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Contributors

Beale, Lionel S. 1828-1906.
Lyle, Herbert Willoughby, 1870-1956
Fadelle, A., active 1890
King's College London

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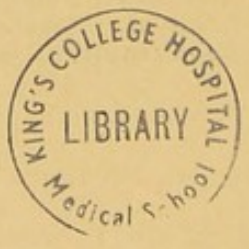

A
Presented by Dr. Willoughby Lyle.

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ON

SLIGHT AILMENTS,

THEIR NATURE

AND

TREATMENT.

INTRODUCTORY.

Each one of us has, no doubt, suffered at times from slight derangements of the health—derangements which are not dependent upon or likely to determine structural change in any tissue or organ in the body, but due rather to temporary disturbance, to an alteration in the functional activity of tissues and organs, which soon may be succeeded by a return to the healthy state. In many instances the derangement depends upon the altered rate at which normal phenomena are performed. Perhaps, in consequence of changes in the blood itself or in the tissues outside the vessels, the blood may flow too slowly or too quickly through the capillaries. These tubes often become unduly distended or relaxed, and disturbed action in the adjacent nerve-fibres is thereby occasioned, pain or discomfort being in consequence experienced.

Among civilised nations a perfectly healthy individual seems to be the exception rather than the rule. I do not remember having seen more than two or three men in the course of my life who had never experienced any form of illness and did not know what it was to feel out of sorts. It is indeed very rarely one meets with anyone who has reached the age of thirty who will not admit that at various times he has suffered from many different, though slight, derangements of health. We are indeed often told by persons, whose prospects of longevity are nevertheless good, that they have scarcely passed a week without the occurrence of a very decided departure from the healthy state. The most healthy among us occasionally feel unwell and are less up to work than is usual. Some complain of feeling fatigued, others tell you they are

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uncomfortable, or complain of being irritable and annoyed at slight troubles which would not ruffle them in the least if they were in ordinary health. How few of those who take a very active part in the work of the world know what it is to enjoy uninterrupted health! Most have to work on in spite of lassitude, or headache, or muscular or nerve pains, or indigestion, or some other discomfort which continually troubles them. How many of us experience a confused feeling, an indisposition to mental exertion, a distinct sense of fatigue after what we cannot but regard as very moderate mental application! Many people take dismal so-called constitutional walks, not because they enjoy the exercise or from necessity, but because they have heard that this sort of penal servitude—walking for walking's sake—is necessary to keep themselves in a condition which some call health. Many a man thus imposes upon himself the regular performance of the most dreary form of task-work, and forces himself to go through his monotonous labours when his inclination would lead him to take rest and probably to go to sleep. In not a few instances the inclination would have the support of the reason.

Some, again, who are considered to be in perfect health scarcely know what it is to sleep soundly and rise refreshed, with spirits buoyant —energetic, with a desire for work. Men and women there are, and in every class of society, poor as well as rich, hardworking as well as idle, who scarcely ever eat without discomfort, and suffer still more if they do not take their usual meal at the accustomed hour. Few, indeed, of those who live in cities pass through life without being troubled with various derangements connected with the action of the stomach and intestinal canal.

You will, of course, desire to know whether all these disturbances are necessary consequences of our civilization—of our somewhat artificial mode of living—or whether by altering our habits we could acquire and maintain a state of perfect health. Unquestionably not a few of us suffer because we are ignorant of the proper way of managing ourselves in order that we may work most advantageously, or because we give way to habits of self-indulgence as regards the quantity and character of our food and drink. Many probably, from inherited weakness of various organs, would suffer more or less under any circumstances, and it is our duty to study the many ordinary slight ailments, in order that we may be able to mitigate the sufferings of our patients, if we cannot make them strong and vigorous. In this direction there is much to be done, and I cannot help thinking that of late years in our zeal for pathological discovery we have devoted less attention to functional disturbance than for the interests of the community might reasonably be looked for from us, and for the interests of true medicine might be expected.

What is the meaning of these slight, but perhaps very frequent, disturbances or derangements of the changes which take place in an organism whose tissues are in a perfectly normal state? When any departure from the healthy state occurs it is obvious that the processes by which the equilibrium of physiological action is preserved are temporarily deranged and out of order. An unusual or exceptional change, —increased or diminished ordinary action, results. In many instances some time must elapse before the exceptional gives place to the ordinary activity, and by slight excess of action in one or other direction the balance is restored.

A little too much food, or food of a bad kind, or badly cooked, or food eaten at the wrong time, or too quickly—a glass of bad wine, bad milk, or bad water, to say nothing of a dry east wind, or a cold damp atmosphere, has occasioned such disturbance in the normal changes in the body, as to cause even the strongest and exceptionally healthy to feel for a time far from well. Every generation has thus suffered, and we have not yet discovered exactly how a healthy person should proceed so as to keep every organ and every tissue in his body in a perfectly healthy state under the necessarily varying conditions to which it is exposed, so that each may continue to act for the longest possible time, and all gradually fail together in old age, until at last action ceases in natural and inevitable death.

As it is our particular work in life to prevent or cure disease and relieve suffering it is undoubtedly our duty to carefully study and investigate, as far as we are able to do so, the nature of such slight aches, pains, discomforts, and derangements as nearly all suffer from. Not a few people magnify their slight ailments, but, on the other hand, some persons are no doubt inclined to under-estimate the importance of, or to ignore altogether, aches, pains, and disturbances, the early recognition of which might be of great advantage, by enabling the doctor to interfere at once, and perhaps prevent serious illness or even save that particular life.

You will certainly be very frequently called upon to prescribe for slight ailments, and you will often be asked how this and that bodily derangement or discomfort may be avoided, upon what it depends, and whether it is not indicative of some change more serious than mere temporary disturbance of ordinary action. You will be expected to fully explain how many a slight ache or pain is caused, and you will often be asked to lay down rules of health, by the practice of which it may be avoided in the future. Very disappointed will the sufferer feel if you make light of his suffering, and dismiss him with the suggestion that, being only functional derangement it is of no consequence. A little study and intelligent observation among sick people will teach you not to be too off-hand in giving advice, and will suffice to

impress upon you the fact that very grave symptoms and the most excruciating pain may result from temporary derangements of no real consequence, and that, on the other hand, the most terrible morbid changes in important organs may exist for years, and run their course without the patient being cognizant of any unusual symptoms, or conscious that anything in his organism had been going wrong.

I propose, then, that the first twelve lectures of my course on the Principles and Practice of Medicine should be devoted to the consideration of the nature and treatment of slight ailments. Could we examine the tissues ever so minutely, it is doubtful whether we should discover the slightest departure from the healthy state. No structural change whatever is induced, and even in cases in which there is decided departure from the normal physiological action, and where considerable pain and distress may be experienced, the accumulation in the blood of some product that should be quickly eliminated, or a slightly altered state of the fluid that transudes through the capillary walls and bathes the tissue elements, is probably all that would be found, and would indeed be quite sufficient to account for the symptoms. In the course of our inquiry questions of the greatest interest will present themselves, and although the present state of our knowledge does not enable us to give a full and satisfactory explanation of all the phenomena, say, of an *Ordinary Cold* or a *Sick Headache*, I feel sure that a more full consideration of the slight disturbances of physiological actions which are continually occurring even in the healthiest among us, will assist us in understanding those more complex changes which occur in actual disease. The plan I propose to adopt will not only enable me to bring under your notice thus early in my course some of the simplest and most common derangements you will be called upon to correct, but I shall be able to direct your attention to practical matters of great importance with regard to the action of remedies and to refer to methods of prescribing and administering many ordinary medicines—matters of greater importance than ever in these days, when so few among you enjoy the advantages formerly gained by apprenticeship, and become expert in the art and mystery of preparing drugs and compounding medicines, and dispensing pills and potions.

I shall make use of very few learned terms, and when obliged to employ hard words shall endeavour to give their derivation and meaning at the present time, for meaning does change. In short I shall try to describe the derangements I have to consider in the simplest manner possible. In case any of you should think I am too outspoken as regards the confessions I shall have to make of ignorance concerning the real nature of some of the simplest and most common of the slight ailments, I would only remark that, as there is so much real knowledge in medicine, and as the labours of our predecessors have established so

many great truths and principles, we may surely freely admit that there are many things which we do not know, without fear of losing the confidence of the intelligent. In my opinion, it is the very worst thing for the interest of true medicine when any of her followers act in such a way as to lead those who are completely ignorant of our work to suppose that we have acquired in some mysterious way knowledge that we cannot communicate to others, or that we have means of investigating disease which cannot be pursued or understood by ordinary mortals. It was true in a way that we used to put drugs of which we knew little into a body of which we knew less, but only in a way, and that a very coarse rough way. What truth there was in the statement in the time of Voltaire has become less and less and no one who knew anything of medicine now would think of quoting such an authority, except for the purpose of laughing at us.

We have no remedies of a secret nature, no occult arts of preparing or combining them so as to increase their virtues. All that we know can be learnt by anyone who chooses to spend the time and take the trouble requisite for mastering the facts of medicine and the branches of science upon which it is based. There is no doubt still manifest a slight tendency here and there to credit some of us with the possession of mysterious power to control disease, but there is no excuse for this. Whenever naturally self-reliant enthusiasts act as if they were really the fortunate and favoured possessors of a power of detecting and controlling morbid processes that was not to be acquired by other men, the advance of medical truth will be retarded. In every age self-confidence and boastful pretension have commanded the faith and devotion of the simple, and with the aid of these the evolution of the extraordinary and marvellous from the ordinary and intelligible is not difficult. I should feel very sorry if in after days I should discover that one of my pupils had strayed from the right path, as some who have studied medicine have somehow been induced to do, and had tried to make people believe he possessed some mysterious power and influence over disease which practitioners generally did not claim.

Of the patients who come under our care, many will be the subjects of but slight ailments, with the general nature of which any experienced practitioner would be well acquainted. But if you go into practice fresh from the wards and the pathological department, and at once undertake the treatment of sick people,—if you pass from the investigation of important structural changes to the practical consideration of functional disturbance, and especially if you look too exclusively from a purely scientific stand-point, you will meet with many things that will puzzle you. The patients you treat will not be satisfied, and you will be disappointed and annoyed, because they are not contented with the advice you give. Perhaps you will feel in consequence out of heart or

thoroughly disgusted with practical professional work. It has been said that the physician should be a consolation to the patient, but many a a physician fresh from the study of severe forms of disease would, I fear, afford poor comfort to a dyspeptic, or to a person suffering, say, from functional nervous disturbance, and would hardly know what to say to a patient in whose body he could discover no actual degeneration or disease of tissues or organs. The patient might describe many unpleasant and even alarming sensations and symptoms, which to him were of course of grave consequence, and all the comfort that he would get from such a medical adviser would be that, as there was no organic disease, he might go away and bear his complaints as best he could. Medical advisers of purely anatomical and pathological habits of mind are certainly apt to disappoint or even offend unscientific patients, and, without deserving it, gain for themselves the unenviable reputation of being thoughtless and unkind, of being regardless of others' suffering, and, if not objectionable, very far from agreeable ministers of relief. People do strongly object to follow the advice of such advisers, however correct it may be ; and perhaps the least unfriendly among the patients of such a doctor would, out of kindness to him and in the most quiet and confidential way, recommend him as soon as possible to change his vocation.

You ought, therefore, to learn how to investigate the nature of slight ailments and how to relieve them, and, if the conditions which give rise to them are beyond our means of control, how to reduce the severity of the patient's sufferings. If the patient's malady is, unfortunately, ever so intractable or incurable, he will be much more grateful to you for your attention, and for doing what you can to relieve him, than he would be if you favoured him with the most learned and elaborate disquisition concerning his case, even if it was accompanied with the demonstration that his illness was profoundly interesting and afforded an exceptionally perfect illustration of very remarkable pathological phenomena. You will generally find that if a man has pain in his stomach, especially if accompanied with excruciating spasm, he will not be satisfied with the assurance that he will be better when the wind is dispersed. However interested we may be in studying the natural history of disease, the patient desires our assistance to disperse wind that torments him, and wants remedies which will relieve his sufferings as soon as possible. I think you will agree in the opinion that such a patient is not more unreasonable than most doctors themselves would be under similar circumstances. If you know your work you can be of use both in getting rid of the flatus and in relieving the pain. If from ignorance of the use of simple remedies you tell the patient that nothing can be done, the chances are that he will go to some intelligent person, professional or non-professional, who may, perhaps, give him a

dose of Bicarbonate of Potash or some Sal Volatile. He is at once relieved, gets well in the course of a few hours, and loudly praises the adviser of the successful treatment. On the other hand, anything but praises in such a case would fall to your share. I fear that the patient would give you a very bad character, and he might possibly speak of you as a most ignorant person and incompetent practitioner. Though, perhaps, not acquainted with the great value of such simple commonplace things as Bicarbonate of Potash and Sal Volatile, and many other simple medicines which are very efficacious in curing various unpleasant aches and pains, you might nevertheless be well informed as regards the management of serious cases, and, in fact, a well-informed and good practitioner. Those of you who are going to take part in country practice ought to be especially careful to try to do all you can to please as well as to help your patients. There may be no other medical adviser within many miles, and it will be unfortunate if any of the people in your neighbourhood should be prejudiced against you. You must, indeed, think over people's individual peculiarities, be ready to pardon their susceptibilities, and try not to offend them. The most painful differences have been occasioned from want of care on this head; and many a coolness between patient and practitioner, which has lasted for years, and has caused much suffering and misery, might have been altogether avoided, if the practitioner had exhibited a little amiability and exercised ordinary caution and self-control early in his acquaintanceship. Not a few differences with patients may sometimes be traced to the practitioner's ignorance of common things he ought to know, or to an attempt upon his part to introduce new customs in dealing with his patients with which they are not familiar. You will find some useful hints to guide you in country practice and much information on conducting different branches of practice in a very useful little book to those about to enter upon the practical duties of professional life, lately written by Dr. Diver. It is entitled "*The Young Doctor's Future; or, What shall be my Practice?*" and is published by Smith, Elder, and Co.

But, further, the study of the slight ailments is of no small importance to medical men, for it is of the greatest consequence that we ourselves should be in good health. Attendants of the sick should themselves be well, and each one of us should recognise the importance of keeping himself in a healthy state, that he may be cheerful and hopeful in the presence of the sick. It never does for the doctor, while listening to the sorrows of his patients, to be continually reminded of his own discomforts, and constantly thinking, if he does not actually say, that he is far worse than his patient, and more worthy of attention, sympathy, and commiseration. The sufferer suffers less if he has healthy, cheerful, hopeful people about him. Dwelling on the fact of pain, and talking

about it, seems to increase it. Many patients suffering from temporary derangements are in a low, despondent state. Such a frame of mind is more commonly due to temporary deranged action of the stomach and liver than to any other circumstance. Though you may be equally or even more dyspeptic and may feel very wretched, you must be careful not to add to the general depression by discoursing about your own ailments. You must encourage and cheer the patient, and speak as hopefully as in sincerity is possible. All this is not very easy to do if we are not well. The doctor who is suffering aches and twinges is to be pitied, for he must not allow himself to complain. He must not make wry faces while he is inquiring into his patient's case. An ailing demonstratively nervous or hypochondriacal doctor will be of little use, will get into discredit with patients, and will be disappointed; and it will probably happen that some, it may be, ill-informed but more worldly-minded medical authority in his neighbourhood will get the patients who ought to be in his more deserving hands. This, may be, not unfrequently the secret of many a failure in practice.

Those of you who, like many excellent men who have preceded you, feel inclined to condemn the delicate attention, the excessive care, the extreme solicitude for minute perturbations of sensation or emotion of the invalid, characteristic of some very popular and very successful doctors, should pause, and try to look a little from the patient's point of view. Even a philosopher who feels ill, though he may be sure that there is not much the matter with him, may nevertheless desire some skilled and experienced medical adviser who will appreciate his aches and pains, who will consider his complaint, and listen patiently to the story of his woes, who will take a cheerful view of his case, and express himself accordingly, instead of suggesting possibilities of pathological degeneration in the gloomiest phraseology. You may be able to relieve many a sufferer by suggesting some very simple remedy. A dose of Bicarbonate of Potash or lime water after meals may be all that is requisite to restore him to health. Little may be needed, but still that little assistance is required.

Do not be too hasty in giving an opinion concerning the import of uncertain and indefinite symptoms. Many of the apparently slight disturbances or ailments may be due to some grave pathological change, which would be entirely passed over by one who had had little experience in medical observation, but would be full of significance to the well-informed practitioner. That very formidable and rapidly fatal disease of the lungs, acute tuberculosis, usually begins as an ordinary catarrhal affection, and for some days the very serious nature of the malady may not be suspected, and unless the practitioner had seen cases of the disease, he might err in taking a hopeful view of the malady till a few days before death actually occurred. Certain forms of blood

poisoning from the introduction of septic poison are associated with such slight general disturbance that for several days the patient seems to be suffering only from a slight febrile attack, the temperature being only a degree above the normal, and the restlessness and excitement being attributed, especially in the case of females, to "nervousness," and perhaps a cause is found in one or two consecutive sleepless nights. In a few days without any great or sudden change occurring, the patient sinks into a state of collapse and dies, the serious nature of the case not having been suspected till shortly before death. On the other hand, we often find that apparently serious illness is really due to temporary and functional derangement only. You should remember that the most perfect machines sometimes go wrong without a flaw being discoverable just before the occurrence, it may be, of a complete break down. No wonder that the tissues and organs and the marvellously minute and delicate structures of a living being may fail in a hundred ways without giving any notice even to their owner. The complex conditions under which living matter lives, and grows, and moves, and dies, may change in one or two seconds without the individual being in the least degree aware of it. The most careful scrutiny and minute examination may fail to demonstrate any fault or flaw. Nay, after the body has ceased to work, after its death, the changes resulting in its destruction may elude the most careful investigation. We know that, for example, Hydrocyanic Acid, by its action on the living matter of the nervous system, will kill a living organism in a few seconds, but as to the exact changes which the acid works in the bioplasm of nerve structures we know nothing. The same is true of many other modes of death. The flaws existing in tissues in disease are not always to be demonstrated, though possibly many at least may be demonstrable, if we only knew exactly how to render them evident and distinct.

ON TACT AND ON GAINING CONFIDENCE.

Practitioners who will not endeavour to help their patients who are suffering from slight ailments had better not attempt to practise medicine at all, because they will almost certainly fail, seeing that a large percentage of our patients, fortunately for themselves, do not suffer from grave pathological changes. Nevertheless they require intelligent medical assistance. There is not one amongst us who gives his attention to those patients only who are suffering from very serious forms of disease. You must therefore understand the nature of slight derangements, and you must know how to relieve them. You must not treat the complaining patient with contempt, and tell him there is nothing of any consequence the matter, and that he may go about his business. If we behave in this manner the public will lose confidence

in us, and great numbers of people will seek and accept advice from mere pretenders, and from wiseacres who profess to discover the most wonderful and exceptional phenomena in very ordinary cases, or who, while thus trying to gain the ear of the patient, make the most of every opportunity of casting a slur on those who have honestly studied and practised their profession. Knowing little or nothing of morbid changes, and of the sciences upon which the investigation and treatment of disease rests, many of these professing healers are, in a way, extremely clever, and not a few have the advantage of a marvellous development of that peculiar mental endowment called "tact"—a most desirable possession for every one who has to treat and take care of sick people, if, in addition, he is honest and good. I would have you take note, however, that this word "tact" has a very comprehensive and elastic meaning, and is in these days equally applied to an honest desire on the part of anyone to avoid wounding the feelings of a sensitive person, or needlessly vexing such an one when it is necessary to communicate unpleasant things, and to the successful exercise of glaring imposture and pitiless humbug. One now and then gets, in a sense, an instructive, though a very painful and profitless lesson, as to the means by which the good opinion of people unlearned in medical and other matters may be gained by a practitioner who is sadly deficient in knowledge and in experience, and who is perfectly conscious of his defects, but knows well how to make up for them. A master of tact, and determined to avail himself of the advantage he thus possesses in the struggle for existence, he convinces, he persuades, and in short flourishes where many a good man would fail, and, perhaps, where many such have already failed. Nevertheless, do not let me lead you to conclude that tact is another name for humbug, any more than that kindness and politeness imply insincerity; but it is only too true that some makers of fortunes have been indebted for their success to cunning, cuteness, and tact, rather than to hard work, goodness, or intellectual power; and he who thinks very highly of tact, and acts upon his opinion, must be very careful lest he slide too far down the incline, which may lead him on from the display of tact to the habitual exercise of humbug, and at last to giving way to utter heartlessness and selfishness of the lowest order.

Unless the highly competent and intelligent practitioner exercise due care as regards what he says and what he leaves unsaid, he may entirely fail to gain the confidence of his patient. Many a good, honest, and intelligent man unconsciously helps to drive the patient into bad hands. Grave pathological changes may be overlooked, and trifling aches and pains magnified by the patient into indications of serious and dangerous disease, if from want of care and attention the practitioner expresses himself in a manner concerning aches and pains, which the patient may

easily exaggerate into a view in accordance with his own dismal conclusions.

But there are persons who would be easily influenced by what the quack says, who would go away from the honest, well-informed medical practitioner, with the idea that he knew nothing whatever about his business, and was quite ignorant of the nature of the changes taking place in the organism, and of the method by which these changes might be modified when they were not properly performed. This is unfortunate, but there is no help for it. Every upright practitioner has been placed in this most unhappy position more than once in his life. Should you find yourselves so situated, the best thing is to say very little, and be as patient as possible, leaving matters to be set right by time. While doing our utmost to preserve and extend the high repute always enjoyed by the medical profession, we must be careful not to play into the hands of pretenders, and this we shall certainly do if we needlessly offend fanciful and crotchety patients, for by thus acting we practically dismiss them to be preyed upon by quacks.

There are few matters of greater interest or consequence to us than the consideration of the manner by which we may succeed in gaining the confidence of our patients, without making promises which cannot be fulfilled, and, indeed, without saying anything of which an upright, intelligent, and high-minded gentleman of kindness and consideration could in the least degree feel ashamed. Some men have the natural gift of inspiring confidence at once, just as others have unfortunately to contend with natural defects resulting in exciting in the minds of others anything but confidence. Still you must bear in mind that he who is to afford real help to people as a medical adviser, must be trusted and believed in by his patients. It is, therefore, our duty to study and train ourselves so that we may inspire confidence in those who place themselves under our care. In this endeavour we are, so to say, often heavily weighted. To gain the esteem, especially of people unlearned in matters medical, it may, indeed, be necessary to promise more in the way of cure than truthfully a man of sound judgment would be able to do. We are often placed at a disadvantage, and a vulgar, ignorant pretender, brimful of assurance and conceit, will sometimes succeed in gaining the confidence even of an intelligent patient, when men of a higher order of mind have hopelessly failed. In not a few instances the patient pays most dearly for the mistake he has made, but it may be long before he finds out that he has made a mistake at all, and still longer before he confesses he has done so when he does find it out. It is the conceit rather than the ignorance of the dupe which renders him an easy victim of the quack.

QUACKERY—CREDULITY—SUSPICION.

To those of us who have passed thirty years or more working and thinking amongst sick people, and studying, with the help of the teaching of our predecessors and the aid of new and accurate scientific instruments, the nature of the actual phenomena occurring in the tissue elements, and in the fluids of the body in departures from the healthy state, it seems as extraordinary as it is disappointing, that men of undoubted intelligence and well acquainted with the ways of the world, should sometimes select for their medical adviser, not so much an ignoramus, as a medical pretender—an impudent fellow, who acts up to the conviction that if he only talks nonsense with sufficient audacity he will prevail, because even among highly educated people, it is very exceptional to meet with one who is sufficiently acquainted with anatomy, physiology, and chemistry to detect the true character of his insolent nonsense. But the complaint is not new. Galen ("Meth. Med.," l. i) tells us that in the time of the Roman Empire that what gave vogue to a physician was not science, but skill in flattery. To him who was the best sycophant, everything became easy. "To him every door was open. In a short time he became rich and powerful." "The asses of Thessalus had parcelled out the art of healing into the most minute subdivisions of practice." In the time of Cicero Rome swarmed with special curers, who rapidly gained a reputation, and made large sums of money. Some, for instance, confined their practice to the treatment of the uvula, or the eyelashes, or certain kinds of cutaneous eruptions. "Some restricted their attention to the treatment of aged men, others to that of the strong and robust. Some would cure only with herbs, others by means of gymnastic exercises." "Some took their title to practice from almost every malady, from each period of life, from every kind of medicament, from each smallest part of the human body." "Not a few professed to be guided in their treatment by the course of the stars, some by the nature of the dreams of the patient himself."

One would have thought that in these days of intelligence and culture people would have preferred as their medical attendant one whose position alone rendered it evident that he could not be a quack or an ignoramus, and that at least they would take the very little trouble required to find among the hundreds of public medical officers, whose work and repute are known, or among the thousands of medical practitioners whose training and character are recognised, an adviser who would not only treat them with judgment and intelligence, but would satisfy them in other ways. But instead of this, how often do we find the recommendation of some old woman who declares she has been cured of the most serious and extraordinary maladies after the most distinguished members of the profession had completely failed, taken and

acted upon without further enquiry. It is quite extraordinary what large practices have been made in a short time by the puffing of influential people, not one of whom has perhaps taken the trouble to ascertain whether the fortunate practitioner so extolled is really deserving or not of the high praise and recommendation he has had the good luck to enjoy. Thus a bone setter, who has never known the anatomy of bones, ligaments, or muscles, is allowed to twist and torture delicate joints without let or hindrance, perhaps after a distinguished surgeon has strongly advised that they should be kept perfectly still for a considerable time.

Sometimes it would appear that a certain extreme confidence of manner approaching vulgarity on the part of the fortunate pretender had been set down as indicating originality of mind, or remarkable genius. On the other hand the art of looking wise and saying nothing seems to be the secret of success in some instances. Not unfrequently fluency in small talk, sometimes a bustling manner indicative of overwhelming business ensures quick success; while, occasionally, peculiarity or perfection of dress appears to have won the respect and confidence of patients, and secured to the elegant doctor a considerable income. You will not, however, feel astonished at all this if you consider how very ignorant of all subjects bearing in any way upon physiology and medicine are the generality even of so-called well-informed people. Not a few among the intellectual classes, the leaders of thought, great classics and mathematicians, lawyers, public speakers and writers, do not take the slightest interest in any department of natural knowledge, and are so incapable of entering into scientific modes of thought and work, that they can be deceived and cheated by the most common-place pretender. The efficacy of the thousandth, or millionth, or decillionth of a grain of charcoal is deemed by them a question open to enquiry and to be determined by experiment, but the utter suppression of experiments upon the lower animals seems to them but reasonable, magnanimous, and right. They do not mind hurting the feelings and saying the most severe things of a fellow creature, but would pass the most stringent laws against pricking the toe of a frog. The ignorance and prejudice fostered by the teaching and advice of persons wholly ignorant of science and by nature strongly opposed to the scientific method as well as to all attempts to enquire into the nature of things, have constituted the chief obstacles to sanitary improvement, and have encouraged the maintenance of conditions adverse to health and favourable to the perpetuation of diseases still annually destroying thousands, but which ought long ago to have become unknown in England.

It is easy for those who make light of the facts of medical and sanitary science, and who profess to believe in the virtue of minute globules, to retort by accusing us of attempting to constitute ourselves into a sort

of trades union, which condemns all who do not fall in with its views. The writers in our public journals, however, ought to be able to see through such false charges and commonplace cries, and expose them. To condemn as a trades union a body of men engaged in the furtherance of the greatest of all blessings, the health of the community, is as unjust as it is, in the case of the medical profession with its thousands working for little or nothing, ridiculous. The profession encourages and rewards individual merit, and allows and sanctions individual success,—permits the freest competition between its members, limits neither the hours of work nor the freedom of thought,—encourages all to aspire to equal, and, if it may be, to excel the greatest of those whose lives and works are recorded in its annals,—endeavours to protect the unlearned and uninstructed from imposition and wrong, and refuses to sanction on the part of its members any secret method of healing, however useful it may be, or the use of any medicine the ingredients, composition, and method of producing which are not published to the world for the advantage of all. There is not the faintest justification for urging a complaint of the kind against the medical profession. Anything like what is called trades unionism amongst us, if possible, is one of the most improbable of improbable eventualities. We only desire that the real knowledge which has been handed down to us, and which is still being added to by the work of thousands of practitioners in all parts of the world, shall not be considered in any way comparable with or related to any so-called medical systems which are based upon the assumption that any effects result from the exhibition of quantities of various medicines supposed to amount to a millionth of a grain or less, or that increased powers are conferred by any methods of division, trituration, agitation or dilution. We maintain that the dicta upon these and other medical matters received as true by a section of the public are opposed to facts of anatomy, physiology and chemistry, to observation and experiment by which, on the other hand, the principles upon which medicine is based, we contend, are continually being tested and verified or modified.

To ascertain whether such a quantity as the decillionth of a grain acts in any way is impossible. Any attempt to do so would be foolish, since no one can be sure that one-decillionth of a grain of anything in the world can be obtained. Such supposed fractional part is beyond the limits of physiological, chemical, or other known method of investigation. It is invisible, intangible, undemonstrable, and as a medicine exists only in imagination, and can be proved by assertion only. In fact it is not possible even to imagine particles of a degree of minuteness considerably less extreme than these. It is useless to attempt to reason on such absurdities. I am ready to admit that there are persons who believe that the decillionth of a grain of opium will

produce an effect upon man's organism, just as there are people who hold that the earth is flat, that living things are machines, that spontaneous generation from the non-living occurs, that vaccination is detrimental, and a number of things which may have been conclusively proved or disproved, as the case may be, or concerning which there can be no evidence one way or the other, or which are altogether beyond the reach of thought. In this country we are proud of what is called liberty of opinion, and we cannot prevent our friends and neighbours from holding and propagating beliefs, views, and doctrines which from the standpoint of fact and reason may be inadmissible.

Many of the questions upon which there is wide difference are really open to discussion, and where there is doubt all ought to keep their minds open to conviction if evidence should be adduced. But many assertions which are commonly and frequently advanced are not reasonable,—not open to discussion. The assertion, for instance, that the decillionth of a grain of opium produces an effect on the human organism is one of these. Many years ago I saw in a hospital in the south of Europe a poor woman who was dying of cholera—was indeed obviously within an hour or two of death. The attending physician examined her and prescribed "Opium." I asked him what quantity of the drug he had ordered the patient to take, and after some calculation, he said, "The decillionth of a grain." Now, I shall no doubt be considered by some who prescribe millionths and decillionths a very narrow minded and prejudiced person, but I decline to discuss with a man, who believes, or professes to believe, either that he had actually given this quantity of opium, or that such an imaginary amount of that drug would, if it could be introduced into the body, produce any effect whatever upon the organism. It is useless to argue about the possible action of these very minute quantities of drugs—even in the case of the most active substances; for the idea of the decillionth of a grain of any thing acting in such a way as to produce any change in the living body is absurd. The assurance that it does act rests on no evidence whatever and is at this time a mere nonsensical assertion. Is there any process known by which a single decillionth of a grain can be obtained, or ten or twenty or a hundred decillionths? Of course there are people who firmly believe in the potency of decillionths—but this is not the question. We have to enquire whether there is any reliable evidence in favour of any action whatever being produced by such quantity, and the answer must be that there is absolutely none. The absurdity of the whole pretension will be rendered evident to most minds by working out a sum in arithmetic:—if a person began to take a decillionth of a grain of opium the moment after birth and continued to take one decillionth each succeeding minute, to what age must he live before he had swallowed one single grain?

It would not be reasonable to expect that the public generally should be sufficiently informed concerning medical and scientific questions to enable them to form a judgment as to the relative merits of different systems of medical treatment, any more than they should be expected to investigate such questions as spiritualism or to determine the nature of, and right method of dealing with, certain forms of contagious disease. All thoughtful and reasonable professional men have, however, strong cause of complaint when they find that persons of intelligence, holding positions of authority—law-makers, ministers, and distinguished political chiefs—so express themselves as to lead people as ignorant or more ignorant than themselves to repose confidence in the adviser who prescribes the millionth of a grain of charcoal or the decillionth of a grain of opium and to declare that he has as good ground for his practice as the one who orders ten or twenty grains of the first or a tenth or more of a grain of the last. It is remarkable how very few persons seem to realise the tremendous difference between such fractional parts as tenths, hundredths, and thousandths,—and millionths, billionths, and decillionths.

HOMŒOPATHIC CONVERSION AND CONVICTION.

I should think that one of the most striking and, I believe, exceptionally rapid cases of homœopathic conversion and conviction on record is that of a great legal authority and profound controversialist and critic, who during the greater part of a long and active life had been very successfully engaged in endeavouring to extract the truth from all sorts of people, frequently under circumstances not very favourable to his aim. Constant familiarity with the ingenious devices adopted by those whose interest it is to conceal, or distort, or misrepresent the truth may possibly have had the effect of fostering a suspicious habit of mind, which after years seems in certain cases to have resulted at the same time in general doubt and mistrust, and a curious infatuation to believe the incredible and love the impossible. Not a few among us doubtless carry trust and confidence in others who assert this or that to almost ridiculous lengths, and at last believe in the virtue of everything which is pressed upon them as an infallible cure, or the beneficial action of which is testified by people who have taken it, and have, or fancy they have, experienced benefit therefrom. Such simple folk in all ages of the world have unknowingly done their best to encourage nonsense and spread sham reputations. But it is passing strange to find the acute lawyer among people as innocent of law as of investigating what purports to be evidence, and incapable of confirming their faith or of increasing their doubt by enquiry and cross-examination, soothing his troubled spirit and assuaging his irritated intellect with simple beliefs in the virtue

of a millionth of a grain of charcoal, and the evolution of new potencies by trituration and division, by dilution and agitation.

But not less wonderful would it be if any such gifted legal mind arrived at the conviction that simple and easily provable medical facts were false, and the prodigious assumptions of some charlatans literally true, or if further, by cross-examination he successfully dissected the many doubts and uncertainties included in scientific truth, and thus having clearly established the uncertainty of some things in medicine, and then triumphantly denounced all medical knowledge as imperfect, defective, pretentious, unsound. But very wonderful convictions are evolved daily and published for the instruction or the warning of the world.

With respect to medical and purely scientific questions, investigation by legal cross-examination often results in confusion and doubt, and the effort to formulate a very definite view of the import of scientific facts may increase the confusion, and result in the spread of error. Lawyers often complain that our medical evidence is vague, uncertain, contradictory, and worthless, and in consequence form or profess to have formed a low estimate of medical and scientific methods. They seem to forget that while we may be endeavouring to get as near to the truth as possible at great cost to ourselves, law involves arriving at a decision at the cost of others, by methods very different in character and promise from those pursued by us.

No doubt there is little or nothing in medicine which from a legal standpoint could be called true. But I fear we should cut a very sorry figure if in the sick-room we resorted to legal processes and attempted to investigate the purport of the facts of a case of illness. Even if the patient were himself a lawyer he would not be soothed by being minutely cross-examined as to the real character of the pain he experienced, or the particular mental twistings in the wrong direction from which he suffered, nor would he like to be very minutely cross-questioned as to the manner in which he had lived for months or years before his seizure. What would be the effect of the doctor examining him as he examines the doctor I will not venture to enquire.

But is it credible that a highly-trained lawyer whose judgment must be good, and who, of course, would be exceptionally quick in discerning goodness and uprightness, intelligence and conscientiousness in his fellow creatures, and who had been in close relationship with some of the best medical and scientific teachers of his time, and who might have had constantly for years under his observation, and studied in all its details medical work as conducted in our best medical schools,—who might have watched for a generation the career of many a man as he passed from school to college, from the state of student to that of teacher, professor, physician or surgeon, should have failed to discover in any of the individuals in question sufficient intelligence,

judgment, honour, or goodness to gain his esteem or inspire him with confidence in their knowledge, intelligence, and integrity? For a mind in such an environment to commit itself to homœopathic dogmas would seem to be scarcely possible. To persuade itself to be satisfied with the evidence adduced by homœopathic advocates is certainly not explicable upon any rational theory that can be proposed. Is it possible that under certain mental conditions some of the arguments in favour of dilutions, triturations, and division into decillionths could temporarily enthral the reasoning powers, or act as an anæsthetic on the legal understanding?

Of late some homœopathic zealots have appealed to chemistry, the microscope, the spectroscope, in the hope of finding facts in some way confirmatory of their extraordinary contention concerning the potency of a millionth, decillionth, &c., of a grain. It has been urged as confirmatory of homœopathic doctrine that since a live bacterium, weighing perhaps less than the millionth of a grain, is capable of exciting fatal morbid changes if introduced into a healthy organism, it is not unreasonable to infer that a like very minute quantity of some potent inanimate drug might be capable of giving rise to very wonderful phenomena. But it is not the one living bacterium that works all the mischief. This minute organism, I daresay weighing less than the millionth of a grain, soon grows, and divides and subdivides until at length millions have resulted, and have by their growth and by the organic substances formed during their growth, effected such changes in the blood, in the interstitial fluid, in the tissues, and in the living matter of all these as to cause very important symptoms, and perhaps even in a short time death; but the homœopathic non-living infinitesimals have no such power of prodigious increase except in the homœopathic imagination.

The question is one of fact and demonstration. In can be proved, and has been proved again and again, that the bacteria really cause the changes which are so important, while it has not been proved, and cannot be proved, that the millionth of a grain of Nux or Kali, of Iron, Lead, Calomel, Chalk, or Carbon, has ever produced, or is capable of producing, any change whatever in any part of man's organism. But anyone can prove easily enough that a distinct effect will result from taking a quarter of a grain of Calomel or Opium. The effect produced, it is true, will not be in all respects exactly the same in every individual, and the degree and rate of the action will vary somewhat even in the same individual at different times, but upon the whole the influence of the drugs will be so similar in case after case, that a general conclusion will be arrived at, and the remedy ordered in appropriate cases almost with the certainty of producing the required effect. Indeed, if the experiment be tried in twenty or thirty or more individuals, the effects will be repeated with general uniformity, and the physician will be able from

his experience to form general conclusions concerning the action of the remedy upon the organism, and the proper doses to be given in different cases. In fact the substances may be given ten or ten thousand times, and the conclusions already arrived at will be confirmed. Generally if the doses be increased, an increased action will result, as any one who chooses to do so may prove in the case of his own organism. On the other hand, if the dose be reduced to the hundredth or thousandth of a grain, no perceptible effect will be produced, and if the experiment be repeated many times in many persons, the conclusion already arrived at will not have to be modified. The very small doses are useless. They produce no definite effect. What then can we expect to prove concerning the action of the thousandth, the hundred thousandth, the millionth of a grain?

Again, from ten to twenty grains of Bicarbonate of Potash or Bicarbonate of Soda will often produce an advantageous effect in cases of flatulence or heartburn, as well as in other forms of functional disturbance of the stomach. If people found that half a grain or the tenth of a grain had an effect, is it likely they would go on taking the larger dose? The thousandth, ten thousandth, or hundred thousandth of a grain would be taken by us all in preference to the larger quantity if we found that it had any effect at all. When an alkali acts by neutralising free acid it need scarcely be said that the amount required is to some extent determined by the amount of free acid present, which varies much in different cases. Now to attempt to neutralise the acid present by giving the one hundred thousandth of a grain would be ridiculous.

I shall of course be assured that the evidence of the action of a millionth of a grain or less of the very same drugs is quite conclusive, although the hundredth or the thousandth of a grain may be impotent, but what is called *evidence* is very different from that adduced in favour of the action of a quarter or half a grain, and is, in fact, no evidence at all. But to prove the point it is not needful that people should try the remedies upon themselves. The drugs in question and many others are being used daily in ordinary doses, and have been used over a period of many years in hundreds of institutions for treating the sick in Europe and in America. By regular attendance for a week or two at any one of these, any person of ordinary intelligence would be convinced that in discovering the nature of disease and in treating it the practitioners were acting upon well-ascertained facts and principles.

Excellence as regards one department of knowledge is often associated with extraordinary ignorance and credulity concerning some others; nay, the same individual sometimes manifests the extreme of scepticism as regards certain things, while in others he is unsurpassed

for his credulity. You will find persons sceptical concerning demonstrable and demonstrated facts, and faithful and believing in respect of fictions of the imagination and dicta of the most nonsensical character. The most profound knowledge of logic, mathematics, law, classics, or metaphysics will not protect a man from imposition and quackery as regards the nature and management of the ailments of his body, and there are not a few persons having great intellectual capacity who have been duped by quacks while they mistrusted the true statements of an honest, straightforward medical practitioner. There is nothing more extraordinary than the trust often reposed in what is false, and the doubt, disbelief, and suspicion exhibited concerning that which is true.

In the matter of medical advice, and not uncommonly in high quarters, humbug sometimes reigns supreme. Character, experience, unremitting work often go for nothing. In England and in America great success is often attained by persons utterly ignorant of their calling. There still lurks belief in mysterious and inexplicable actions as regards medicines and in the wonder-working powers of some who prescribe them. This it is, possibly, which enables the self-asserting vulgar empiric to exert a favourable impression upon some who though really great in some departments, are at best but very ill-informed concerning matters of health and disease. Some even of our very simplest prescriptions get handed about from one to another in consequence of some wonder-working power they are supposed to possess, which would, I fear, vanish in a moment if only they were translated into English. Still we may hope that the time is not far distant when we may order Carbonate of Soda, Hydrochloric Acid, and such-like simple medicines, which often afford great relief, without enveloping them in a cloak of mystery. People would often be much astonished if they knew what cheap and common drugs they sometimes bought at extravagant prices in the form of various highly-puffed patent medicines of secret composition, not a few of similar simple remedies being prescribed by medical practitioners day by day.

It is hardly reasonable to expect that we should be able to persuade people generally, especially those who are very well off, to live in a reasonable manner on simple healthy food. But patients who are completely ignorant of medical knowledge, and who come to us for advice and assistance, go a little too far when they suggest or dictate to us the kind of advice we are to give, the medicines we are to order, and the methods of treatment which we are to adopt. We having been studying over a period of many years the nature and causes of disease, while they are utterly ignorant of its nature, diagnosis, and treatment. And yet this is no imaginary picture; there are people who know nothing of science, and who have never seen anything of sick people, who nevertheless talk as if they were thoroughly experienced in the

science and practice of medicine. Such persons sometimes condemn us because we decline to "consult" with men who practise according to conjectural principles based neither on experiment, observation, or experience. Certain rich, influential, and fashionable persons having patronised and embraced some absurd conceit, profess to be grievously offended with some practitioner, who perhaps has been studying and teaching medicine for half a lifetime, because he declines to adopt measures which it is desired out of mere caprice should be carried out.

It has been my lot to study, on more than one occasion, the well-turned phrases and persuasive sentences by which a popular prescriber of decillionths, brimful of tact, managed to bring conviction to the minds of people of intelligence, and at the same time to impress them with his profound knowledge and intelligence, though all the time he was writing nonsense, and probably knew that he was doing so. But, as is well known, cleverly stated nonsense often hits the mark, and will continue to do so for many a long year. Men, high among the most intelligent and most learned, nay, men who have been looked up to as men of the world, have often been misled in matters medical, and even profound lawyers have failed to distinguish medical nonsense from medical sense, and sham science from real scientific knowledge. Those who are always gauging the value of evidence, and devoting themselves to the extraction of truth, seem to be specially susceptible to medical and scientific imposition. But there is hardly a department of human endeavour in these days in which you will not find audacious pretenders influencing opinion, and gaining for a time notoriety and renown at the hands of their dupes.

WANT OF CONFIDENCE IN MEDICAL PRACTITIONERS.

If we raise our voice ever so gently against nonsense and imposture, some of the writers belonging to the organs of public opinion hold up to reprobation what they denominate the proverbial jealousy, the intolerance, the illiberality, and the narrow-mindedness of the profession. The comments in the supposed interests of the public and the strictures passed upon us are sometimes most comical, but you will now and then find, I fear, that your work is rendered very difficult in consequence. If you attend through a very long and serious illness a patient who, from the badness of the times is perhaps unable to afford you any remuneration for your services, and you hear that as soon as he is able to get about he has placed himself under the care of a distinguished quack, who found it necessary to see him every day, and received a handsome fee each time, you are to consider yourselves fortunate in belonging to a liberal profession, and you are not to feel jealous of the quack who is well paid perhaps for doing nothing, and

possibly for the mistakes he happens to have made. If, after having ridden over hundreds of miles of ground of the roughest country in the roughest weather to attend the sick poor around you, finding not only medicine for all, but food and medical comforts for not a few, you one day discover that the only people within ten miles of you enjoying a moderate income have, out of the purest kindness, invited a celebrated homœopath to visit them, and he, also out of kindness, has seen and prescribed for a number of your patients at half the fee he usually receives, you are to feel thankful that you live in a free country, where opportunity is afforded to all. If, after having served the offices of House Surgeon, House Physician, and many minor appointments in a public Hospital, and qualified for practice with honours, the wealthiest of your neighbours gives it out that you are very kind to the poor, and that the servants are well satisfied with you, while he and the members of his family, when there is anything the matter, send over to —— for a distinguished eclectic doctor of philosophy who graduated abroad, and is supposed to have had great experience, but whose early history and training are involved into obscurity, you are patiently to submit. You may, perhaps, think it hard that unqualified and only partly legally qualified charlatans are not prevented by law from imposing upon innocent people, as is the case in some countries which have not reached the high degree of civilization which we enjoy, but rather you should feel thankful that the Government does not pass laws which would conduce to the further impoverishment and degradation of legally qualified medical men who have to attend the poor in the different districts of the United Kingdom. Many highly influential law-making persons agree with eclectics, animal magnetisers, hydro-, homœo-, and other "paths," in the opinion that it is degrading for a genius, a conjuror, or a certain cure to submit to the ordeal of examinations on elementary anatomy, physiology, and medicine conducted by unpractical theorisers, and presided over by the narrow-minded supporters of "medical trades unions"!

But after all, it must be conceded that the most successful of quacks seldom enjoys more than a short reputation. He has to make hay while the sun shines, for he may soon have to give place to a quack more lucky and more celebrated than himself, and pass into obscurity. On the other hand, although we may receive far less than our due, we belong to a body rightly proud of its history and confident as to its future. Resting on science, medicine must progress as knowledge advances; and as information spreads, respect for real work will increase. The regard for the medical practitioner will be higher in the future than it has been in the past, and by and by the numbers of those who appreciate our work and put trust in us will include as many as the most enthusiastic among us could desire. Nor can we feel surprised that

people who know little or nothing about us or about the subjects we are taught, and the methods of investigation and treatment we pursue, are more or less prejudiced against us and our work. The whole profession is sometimes attacked as if the majority of its members were ignorant, prejudiced, and not worthy of public confidence.

We are, as I have remarked, sometimes placed in a position of great difficulty, and much perplexed as to the course we ought to take. Occasionally regard for the honour of the profession and self-respect would seem to require a course of action which might be opposed to the real interests of the patient and not be in accordance with that consideration and kindness which, under all circumstances, should be extended to the sick and suffering. If, however, we carefully bear in mind the high importance of the credit and honour of all,—if we make people understand that we have no methods to keep secret, no mysteries to protect or preserve—that on the contrary we desire that the knowledge we possess should spread, and that all possible means of relief and all methods of preventing disease should be widely diffused; that we court enquiry into the principles upon which our methods of investigation and treatment are based, and desire that our reasonings thereupon should be examined and criticised, we shall seldom, I think, experience difficulty in deciding how we ought to act in almost any case that may arise. In short, we must do all for the honour of the profession without in any way wounding the feelings or sacrificing the interests of the patient or his friends. In these, and in all other difficulties we encounter, we must think of the maxim *Fac recte nil time.*

It seems desirable that we should enquire into the circumstances which have led many to form, as we think, an incorrect estimate of medical method and work, in the hope that by so doing we may be able to obtain a verdict more in accordance with our deserts, and thus be enabled to increase our usefulness to the public. Prejudice from time to time not only operates against us very seriously, and diminishes our influence, but prevents the introduction of many sanitary and other reforms which would be of great advantage to the community. Indeed it is of the greatest consequence to the public interests that the influence of the medical profession should be greater than it is at this time, and I shall venture to offer a few general observations for your consideration, and urge that whenever an opportunity is presented, we ought to do all in our power to correct erroneous views and to remove the prejudices which exist, and which I fear in some respect are as strong as those that existed years ago. And what is very serious for us is that this ignorance of our methods and even prejudice against doctors exist in high quarters, and too often find expression in the remarks as unreasonable as undeserved by men holding high and responsible public

positions. In many cases I am convinced that observations to our disparagement would never have been uttered, if the speaker had made himself acquainted with the actual facts. There is unfortunately great and widely spread ignorance concerning us and our aims and works, and it is most important that better knowledge should prevail.

It is not easy to give an adequate reason why in these enlightened days there should be strong prejudice in some quarters against scientific workers and many branches of scientific work. Medical methods are by some regarded with doubt and mistrust, and some of our enquiries into the facts of living beings have been so successfully opposed of late years that they have even been stopped by the passing of prohibitory laws, enforcing heavy fines for disobedience. Investigations upon the lower animals are now practically forbidden in England, and those who advocate experiments even upon frogs are denounced as cruel and worthy of severe punishment. And yet with glaring inconsistency the interests of the animal in its tadpole state are still uncared for. Some aspirant to political renown might soon rise to popularity and win power by eloquent appeals to the people in favour of the protection of tadpoles, and then compel the Commons to pass a short tadpole rights protection bill. But all this bitter opposition would never have shown itself if we had had the influence we ought to possess.

For the present we must submit as best we may to the unpleasantness of not being a very popular or a very influential body. We are tolerated and by some considered as a sort of necessary evil, and it is no doubt generally admitted we are sometimes useful in relieving pain and suffering, and occasionally, especially in serious cases, we may even be regarded as a comfort. Politically the profession has no power, and in this respect our interests rank considerably below those of cotton, iron, beer, spirit, and many other industries.

LAW, MEDICINE, AND MEDICAL METHODS.

Both legal and political authorities sometimes express themselves in a manner the reverse of complimentary, and although they must be well aware of the vast work that has been achieved by us for the benefit of the people, we are not treated as we should be if our usefulness had been generally acknowledged.

Of late new legislation has been introduced with reference to the examination and certifying of lunatics, which seems to show how little is thought of our action and judgment, and which is certainly not considerate to the unfortunate patients. The new laws imply a doubt on the part of those who framed them, whether the majority of practitioners ought to be trusted to place under restraint those persons who according to medical judgment, based upon well ascertained facts, are insane. The reasoning

by which the conclusion in favour of the new procedure has been reached seems to be very curious. It looks as if it had been concluded that honest, intelligent, straightforward medical practitioners were largely outnumbered by a class of persons that could not be so characterised, and that therefore it was not necessary for authority to act on the supposition that doctors generally are not to be thoroughly trusted to act rightly towards either sane or insane. A shorter and probably more satisfactory way to have protected the general interests of the sane and insane would have been to have enacted that as practitioners could not be trusted, special persons should henceforth be appointed by law to decide as to sanity and insanity. Further it seems to have been argued that, upon the whole, if the decision was left as heretofore in the hands of the profession, although the risk of dangerous lunatics being free was slight, the risk of sane persons being treated as lunatics was serious. But surely this large question is one in the decision of which the public should have a voice, and it is certainly one the merits of which can be determined by persons of ordinary intelligence and education. I doubt whether it is fair to us that some of the questions should be decided from a legal aspect only. Nor do I think that reasons for completely changing the course of action which has long been adopted are sufficient to convince any unbiassed mind that they ought to be acted upon. The general change in question seems to have been suggested after very limited observation, while its adoption implies the demonstration of very numerous errors of medical judgment. There ought surely to have been overwhelming evidence of its necessity or desirability before a step so very injurious to the reputation of the medical profession was taken. It might have been fairly asked whether upon the whole the public would not have preferred as heretofore to rely upon the judgment and honesty of the medical practitioner than run the very considerable risk of suffering injury or death at the hands of lunatics. Many a lunatic has been sheltered by injudicious friends and has thus escaped being medically examined. Families have been ruined, individuals ill-treated, disfigured, injured, and even killed, by lunatics at large, simply because persons who knew nothing about the disease considered the patient was not bad enough to render it necessary in their opinion to restrict his liberty in any way, and although there had been for some time unmistakable signs of insanity, which would have been at once recognized by any well-informed practitioner, before any danger had been encountered. Such cases it is to be feared will be greatly multiplied as the new plan comes into operation.

It is certain that in the great majority of cases mental disease can be detected and treated, to the great advantage of the patient as well as of the community, but it is not reasonable to expect practitioners will

take the responsibility of advocating that a patient should be confined, if they may be proceeded against by the alleged lunatic, and perhaps mulcted in damages and expenses so heavy as to ruin them, in addition to which there will be the loss of professional reputation necessarily caused from the remarks made with respect to possible motive for the treatment. The detection of early signs of mental disease will, I think, be rendered still more difficult under the new system than it was under the old one.

No doubt the lawyer and the doctor look upon the question of insanity from very different points of view. The last endeavours to prevent the individual from injuring himself or others, while the lawyer is careful to regard every person as sane, innocent, and free until it has been positively proved that he has committed a bad or mad act. In the one case action is intercessory and preventive, in the other detective and punitive. We say "save and prevent the sick and insane person from acting wrongly." The law says "consider him well and sane until he has committed wrong, when he must be judged and acquitted or convicted and punished or pardoned, or prevented from doing more wrong without punishment, as the case may be."

Preventive medicine has of late assumed such immense importance that nothing would convince us that it would be right on our part to allow the health to be deranged or damaged before we interfered; while it does appear that people must be permitted to commit an offence or crime before they can be brought to book by the law, although, at least in many cases, they might be prevented from executing the wrong act, just as by the timely interference of the practitioner a perturbation of some of the functions of the organism might be prevented from passing into disease, and causing serious derangement and damage to important tissues and organs. Thus regarded the spirit of law and medicine appear to conflict. Preventive medicine has been taught and carried into operation in every part of the world for many years to the advantage of all, but preventive law is in its infancy, though many of us feel convinced that as time passes our views regarding criminals will be much changed, and the number claimed for medical treatment will be far greater than those sent for punishment in the jails.

It has been discovered that in medical interference for the purpose of preventing mental disease or relieving it in its early stages there is great danger. The liberty of the subject is threatened and restrained. The law seems to prefer to act on the principle that until the patient has done actual harm to himself or others his liberty should be respected, and he is to be regarded as a sane and free man, and in all respects fully entitled to exercise and enjoy all the rights and liberties of a healthy citizen. In other words the law allows a patient to do and

indeed insists that he shall be permitted to do the very thing we deem it to be of the highest consequence that he should be prevented from doing. We regard him as already out of health, and not responsible for all he may say and do, and we can give full and sufficient reasons for our opinion. But the law seems to feel certain, and insists that there is nothing whatever the matter with him, that the doctors are mistaken and prejudiced or something worse, and that therefore the patient is to be protected by law from medical interference. But from whichever side we look it must surely be admitted that the practical conclusion arrived at and acted upon is very curious, for it seems to involve the proposition that any danger likely to result from lunatics being abroad will be small as compared with the danger to society resulting from the profession having the power to deprive people whom they consider mad of their liberty. And it has, therefore, been decided that though risk of attacks by lunatics may be incurred, it is above all things necessary that means should be taken to prevent the possibility of sane persons being placed in confinement by practitioners who may be stupid, prejudiced, or dishonest. This danger to the sane seems to have been considered so formidable as to render it necessary that a new law should be passed to protect the public. It has been proposed that in future the consent of a magistrate or justice of the peace shall be obtained before a patient can be legally placed under restraint. No notice has been taken of the obvious and very serious objection that the necessary delay may be productive of harm to the patient. But surely this want of confidence in the judgment or integrity, or both, of medical practitioners in general, thus displayed and proclaimed in a public manner, is calculated to diminish the respect entertained for the members of the profession, while the imputation is unjust. The medical authorities have not even been asked to consider whether it would not have been better that members of the profession should have been relieved of all responsibility than their advice required under restrictions so severe and unsatisfactory as regards the relations between doctor and patient.

The courts have their own views as to what constitutes sanity and insanity, and they have the power to carry them into effect. Although they may listen to what we have to say, they often decline to be guided by medical opinion, and regard an unfortunate, imitative, irresponsible creature as a vicious criminal. Why, therefore, should they not act entirely without any reference to us, instead of asking our opinion and then throwing it aside in cases in which we find distinct evidence of defective mental power, due perhaps to imperfect development of an organ? Indeed, many a criminal held responsible in a legal sense is unquestionably irresponsible if the case be considered from the medical side.

Who could have supposed that in England in 1889 it would have been necessary to petition Parliament* not to insist that the sanction of a magistrate shall be required when it is desirable to send a patient at once to an asylum, because if, as suggested, the magistrate or justice "visit the alleged lunatic, summon and examine witnesses, administer oaths, and otherwise enquire concerning him," the early treatment of the patient, so very important, will be hindered or postponed, and perhaps when at last it is commenced, the disease will be more confirmed, and the prospect of improvement will be much reduced. It is well to record the proposal whether it be acted upon or not. It must have emanated from high legal authority, and from its terms some idea of the view entertained concerning the action of the profession in a very difficult and responsible position may be formed.

In the new Lunacy Acts Amendment Bill the magistrate seems to be empowered to sanction or object to the decision arrived at by medical advisers as to sending patients to an asylum. The magistrate or justice of the peace is to visit the alleged lunatic, and may "summon and examine witnesses, administer oaths, and otherwise enquire concerning him," and thus retard, and possibly prevent, what is of the utmost consequence, the early treatment of the case. The patient seems to have the right to be taken before or to be visited by a judge, magistrate, or justice, if he has not been seen by one before being admitted to the asylum. In short, it would appear that the physician may be called upon by the patient to justify the course he has pursued or proposes to pursue with regard to him before a legal authority. The magistrate or justice necessarily becomes the patient's friend to protect him against his enemy the doctor. Is not this legislation in the wrong direction and based upon wrong principles? Why should the legal authorities not undertake the whole responsibility and decide for themselves whether a patient is sane or insane, and if insane, how, when, and where he should be treated? Unless the proposed new system be modified, the physician is not only altogether subordinate to the representative of the law, but he is superfluous, because the question may be decided from the law side, and medical opinion overruled.

But what if the consequence of the reasoning upon which the new system is based become apparent in the increase in the number of lunatic depredations, and the irresponsible but sometimes dangerous acts of persons who have for a long time required care, and whose illness has been increasing until it culminates in some terrible crime: will the legal authority be held responsible for the wrong medical diagnosis and neglect of the proper treatment?

* See "The Humble Petition of the Royal College of Physicians of London," May 25th, 1889.

On the other hand, let us suppose the very worst case that could possibly occur had actually happened,—a sane person being wrongly confined by medical authority. Might not this contingency be easily provided against by a law enacting that everyone placed under restraint should within a defined period of time (twenty-four or forty-eight hours) be visited by two or more skilled officials, who should report upon his case, and order his release if they consider it right so to do? If members of the profession, after a prolonged medical education, are not to be trusted, the best persons to decide upon these sometimes most difficult cases can hardly be magistrates and justices, who may have had no medical training whatever. After passing examinations and receiving certificates that we are qualified to practise, is it right to allow any one to ask our advice, and then contest in a court of law action which was suggested entirely for the patient's benefit?

Why not institute a great Lunacy Department of the State with authority to define the degree of departure from the sane condition which constitutes insanity, and to detect and treat all cases of lunacy, rich and poor, and to provide for the proper care and management of all lunatics and persons of weak intellect?

While there can be no doubt that in fact and spirit the law is just and even kind towards certain classes of offenders, it seems curiously sensitive and suspicious concerning the acts and motives of medical practitioners. Nothing but the strong general suspicion of wrong-doing very widely spread would justify the new proceedings with reference to the treatment of lunacy, and some other proceedings in which medical practitioners are necessarily concerned. It is taking from the profession authority to act which had been conferred at a time when its members were as a body far less well-informed and less responsible than they are at this time. And is it not almost telling the public in so many words that the authority has not been exercised with discretion and care and judgment and disinterestedness, and therefore must be taken away? There is no doubt that in some other respects our methods and acts are not approved by legal authority, but most of us consider that this conclusion is far from being justified by the facts, the real truth being that many of the cases are really medical and not legal at all. There is no better reason for a lawyer deciding as to the nature and treatment of disease of the brain than of heart, lungs, liver, or kidneys. Surely the time has arrived for considering this highly important matter for the purpose of ascertaining whether some change cannot advantageously be made in the relations between law and medicine.

Some will say that we have brought the change upon ourselves by our vague and uncertain statements in the witness-box. Lawyers cannot get us to give yes or no answers to questions impossible to be

answered in this easy way without the sacrifice of fact and truth, and their remarks sometimes often tend to discredit us. But they ought to know, and it is certain that many of them do know, that it is not possible to give positive or negative statements with reference to many medical and scientific questions. The utmost we can attain to in many points is probability, approaching in some cases to something near certainty. But this is not enough for law. Law must have certainty—from witnesses. It is surely the legal method, not ours, which is at fault. Much scientific evidence is of the greatest consequence, although it cannot be put in such a way as to please a court without wide departure from the truth. If then lawyers form a low estimate of us and our work it cannot be helped, and although some members of the legal profession, taking their cue from superior authority, translate the view into their own homely language, by asserting that doctors can be got to swear anything, the imputation, though neither pleasant nor deserved, must be borne until the law relating to scientific witnesses, and the practice of cross-examination to which they are subjected, be changed, as ought in justice to have been done long ago.

Judges have been known to find fault with medical evidence, and indeed scientific evidence generally is not in high favour amongst lawyers. They expect too much from the skilled witness. The legal mind is constantly contemplating clear distinct issues—guilty or not guilty—yes or no—was the act done or not? Did the poison or the wound cause death or did it not? The necessity of decision as regards law one way or the other is paramount; a decision, too, which, as regards the particular case, may be final, and held to be based on principles that are fixed and definite, until it is found by better law to be bad law, and is overruled upon another principle in another court.

All this arbitrariness and this necessity for decision are far removed from the paths of science. The scientific mind scarcely ever attains to absolute certainty, and seldom desires it; dogmatic enunciations are not compatible with the scientific spirit, and final settlement unknown. Probability, the "may be," the "might be," possibility, tendency of thought, are often the nearest approach to the positively certain that science can attain. It is true that the "high degree of probability" does now and then appear to approximate to truth, but as time advances the distance may increase.

Some engaged in science feel that the law is often very hard upon them; they are asked for their opinion, and then to give their reasons, and these reasons are then analysed and dissected by the legal mind, which sometimes attaches its own legal meaning to the words employed, and probably condemns scientific men for daring to ground any conclusions upon the "vague" knowledge they possess, and straightway proceeds to seek out other scientific witnesses whose opinions are adverse to the

first, and whose reasons after analysis and dissection may be found to accord better with legality, or may possibly be found still less satisfactory in a legal sense than those they were expected to replace. Then comes harmonious condemnation of science from all sides. The judge can discover no legal use or truth in the science advanced, and other members of the profession declare roundly they can always get scientific people to swear as strongly for the defendant's cause as the witnesses their friends have put in the box have sworn for the plaintiff's. Sometimes it almost appears as if we were expected to save work for the representatives of the law, or to do their work for them, and so relieve them from some of their responsibility. In condemning us they always admit imperfections in their own methods for deciding upon questions raised, and even appear vexed because a prisoner cannot be proved to be guilty or innocent by the scientific evidence only. But the medical, like other evidence, is sometimes conclusive, sometimes doubtful, sometimes altogether useless. Why not then, in cases in which scientific evidence is of such great importance, refer the question for decision to a court of three or four scientific witnesses upon whom judicial authority had been temporarily conferred, and whose award, as far as the scientific part of the case is concerned, shall be final, or at any rate shall stand until new scientific discoveries have been made? Some scientific evidence, though of the most conclusive character, cannot be made clear to persons who have not been long familiar with the particular branches of scientific enquiry involved, and facts which to us are really quite decisive may appear to one to whom the details are unknown, as of the most shadowy and inconclusive character. I much doubt whether, for instance, a jury of intelligent and well-educated men, but with a general knowledge only of the physics and chemistry taught when they were students, would be satisfied that the evidence that might be brought before them of the presence of a particular metal in the sun was convincing. If they endeavoured to follow the description of the process of examination, but were not acquainted with the principles upon which much of the new work rested, they would probably soon feel confused by the numerous details that were described, and it is doubtful whether they would understand the reasoning on the facts; while, on the other hand, to the trained intellect, acquainted with the facts, the evidence would appear just as conclusive as if a portion of the matter of the sun had been actually obtained and handled, and examined by chemical tests in the laboratory. So is it with regard to many facts of medical technical evidence, which in certain cases have to be brought before the courts. In consequence of our not being able to represent the facts so that the same high degree of importance may be assigned to them as they have assumed in our own mind, we are in disgrace, and an erroneous estimate is formed of the value of our evidence, our

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work, and our methods. In some cases, instead of helping the court, our evidence seems to add to the difficulty of arriving at any decision whatever. It is not surprising that we are not held in high favour in the legal atmosphere, but at the same time it is certain that the profession does not deserve the treatment it has occasionally received at the hands of some politicians and lawyers, and, as a consequence, from the public. Let any one fairly consider what medical knowledge and work have done for the world in recent times, and I am sure he will not form a low estimate of the usefulness of medical work and thought.

Facts patent to all ought long ago to have convinced every intelligent person of the truth and real importance of medical work. Consider, for instance, the steadily falling death-rate, sometimes under fourteen per thousand, notwithstanding the increased density of population, the rapidly improving general health and vigour of a considerable and increasing percentage of the people, the better management and the lower death-rate of young children, the improved laws and continually improving practices relating to the health and management of the sick poor, the inmates of prisons, lunatic asylums, workhouses, hospitals, and other places in which a number of persons are received, the improved dwellings, better clothing, better food and water, and a hundred beneficial changes carried into practice during the last fifty years, mainly in consequence of the repeated advocacy of the profession, and the progressive work, thought, and careful observation of successive generations of medical practitioners. And as advance and improvement go on, it may seem to some of us rather slowly, too slowly, distinct improvement will be discerned if decade be compared with decade. Had we but the influence we deserve to have upon the governing minds of the country, the pace of sanitary and other advance would be greatly accelerated. The more our work is understood the better for us. If only people were better trained in scientific and medical knowledge, so that they might be able to judge for themselves on many of the questions in which we are concerned, our position would be far higher than it is at this time. The very public and, I fear it may be truly said, frequently repeated exposition of want of trust in the profession is calculated to wrong us in many ways. It may have even encouraged proceedings against medical practitioners in cases in which they have unquestionably acted in the best interests of the patient and the public. Though in several such instances the practitioner has been found "not guilty," and has been completely exonerated and dismissed "without a stain upon his character," there are very few who would not consider themselves far better off, and this not merely for financial reasons, if they could have kept clear of law altogether rather than enjoy the proud satisfaction of having the highest character conferred and perfected and sealed by legal authority. You

cannot then be too careful to avoid being needlessly forced or drawn into any position in which it is at all likely you may have to appear and defend your character or acts in courts. The great importance of the matter to all of us is my excuse for having troubled you with these somewhat lengthy remarks.

But, although it may be said the medical does not receive the support from the sister profession which it merits, I think we suffer far more from the system to which lawyers are bound than from any bad or doubtful opinion actually held concerning us by our legal friends. There can indeed be little question that the want of trust in us, as well as the prejudice against the profession, on the part of the public as well as of lawyers, is kept alive and increased by the extraordinary system for taking scientific medical evidence and the plan of cross-examining scientific witnesses prevalent in the courts. As long as certain medical practitioners are summoned to testify in favour of the particular view adopted by one side, and practitioners of equal eminence summoned by the opposite side to controvert the evidence of the plaintiff's medical friends and explain away the facts and arguments that have been advanced by him, so long will there seem to be something worse than uncertainty as regards medical and scientific statements and inferences, and many persons will come to the conclusion that those on both sides of the case are equally unsatisfactory.

Instead of being credited with the desire of giving technical information for the assistance of those who have the great responsibility of arriving at a decision on the merits of a complex and difficult case, practitioners by one side or the other are accused of want of candour, a desire for hair splitting, and entering upon various scientifico-medical refinements calculated to confuse ordinary intelligences, and are sometimes even suspected of hiding or misrepresenting the truth. Again, by the wonderful ingenuity of counsel, any difference of opinion as regards the import and bearing of a fact is sometimes accentuated or grievously exaggerated to our detriment. Occasionally every bit of truth gets squeezed out of scientific evidence by the merciless comments in the course of a long and exhaustive adverse cross-examination, sometimes conducted in a manner apparently designed to throw a witness off his guard, to irritate him in the hope of getting some statement out of him which he would not have made as long as he had command of his temper, but almost always quite unfitted to the requirements of modern knowledge and perhaps as much out of date in the world of to-day as battering-rams and bows and arrows. By the system pursued doubts and difficulties are sometimes created and often increased and made patent in all their irrelevant minutiæ, while the truth is obscured by specialist fog and mist and then distorted or dissolved by rhetorical cloud. At last the case is decided just as the last ray of wisdom is about to dis-

appear, without or in spite of the evidence of the contending experts, who are then shown up to all as a superfluous and perfectly useless encumbrance which has given infinite trouble to the legal and to the ordinary intelligence. And when the enquiry is concluded and the verdict given, the very tangible result of the scientific part of the business will seem to be a considerable, and as it then will appear needless, increase to perhaps already enormous costs on both sides.

PREJUDICE AGAINST SCIENTIFIC INVESTIGATION.

But of all the prejudices against medical methods aroused during recent years the most far reaching is that which essays to put a stop to all scientific enquiry and investigation concerning the nature of physiological and pathological phenomena, and the effects of medical treatment by observation and experiment upon the lower animals. The activity of societies opposed to experiment and investigations for ascertaining new facts not only retards progress in many ways and encourages the feeling already too strong against new work and knowledge, but tends to humiliate scientific workers before the public by classing them amongst people who are vicious as well as ignorant. On every occasion which affords the least excuse for directing public attention to the cruelties supposed to be endured by the lower animals at the hands of their enemies, the most garbled and grossly exaggerated statements have been made about the torture inflicted.

At a meeting held at the Mansion House in support of the Pasteur Institute in June, 1889, the Lord Mayor explained the manner in which a petition against vivisection had been got up and signed. The case is a good illustration of the way in which "evidence" may be obtained to influence those who legislate and the public generally, and how easily and cheaply a very few energetic but prejudiced persons may succeed in making themselves famous and move the opinion of numbers in favour of perfectly needless and very arbitrary legislation opposed to the principles by which legislators in this country have hitherto been guided:—The Lord Mayor, in his opening speech, said:—"that since he had consented to the holding of that meeting in the Egyptian Hall he had been deluged with a very great amount of literature. A large number of the letters he had received were anonymous, and a very large proportion of them scurrilous. When he entered upon the movement he was prepared for a considerable amount of opposition; but he felt that it was one that so affected his fellow-countrymen that he would have been altogether unworthy of his position had he neglected to take it up because of unreasoning opposition to it. A prominent and active part against the movement had been taken by what was called the London Anti-Vivisection Society. From them he had

received a petition, bearing only 2,100 names, although it was 27 yards long, and had evidently been circulated all over England. Those who got it up were evidently well up in the petition dodge, if he might use that phrase, as a few important names had been cut out of their places in the respective districts and had been pasted together on the top. Two-thirds of those who signed the petition were women. He would go further, and say that three-fourths were women and children. In numerous instances the lady of the household after signing her own name had induced her domestic servant to sign it also. In one instance the petition had, he thought, been signed by a number of boys and girls in a mixed school. The writing indicated the greatest possible ignorance; spelling was clearly not a strong point with the signatories, some of whom were too modest to begin their signature with a capital letter. Others had thought well to place on record the prefix of Mr., Mrs., or Miss. Over and over again there was more than one signature in the same handwriting. One gentleman, a crab and lobster seller, who boiled his victims alive, petitioned as an anti-vivisectionist."—"Daily News."

The object of this meeting was simply to help to save life in the case of persons who were likely to suffer from one of the most subtle and terrible diseases known, and to encourage efforts to carry out a method by which the ravages of hydrophobia have been checked and reduced; never was a new process more unfairly criticised or more foolishly opposed, and indeed with an intensity of feeling quite inexplicable, as this discovery by Pasteur of a means of saving the life of the patient although the virulent poison may be already growing and multiplying in his blood and may be about to make itself evident—and within a short time—by disastrous and fatal effects on his fluids and tissues. Deaths among those bitten but protected by Pasteur's treatment, 1·5 per cent., and among those not protected, 15 per cent.

It was clear that whether the evidence advanced was uncertain or conclusive, poor or weak, every reason existed for encouraging instead of opposing further observation and experiment. The question at issue is not political, and therefore ought not to be treated by political process. Petitions to Parliament are not the means to take either to forward or oppose scientific enquiry. It is not right that petitions should be got up to prejudice public opinion against scientific men, and those who advocate them and present them are not doing their best for progress, or for their country. It would be far better for us to forego all advantage of grants and political countenance and support, than to incur the risk of public opposition on political lines. It is indeed hard that non-political scientific thought and work should be exposed to attack for political purposes from a purely political standpoint. Art, literature, and science are far removed from politics, and by common consent ought, like religion, to be thoroughly protected from every kind of political

attack. But unfortunately it happens that from time to time, possibly only to forward the purpose of some political enthusiasts, some defect, abuse, advantage, or call of some kind has to be found, because it is in this way that an opportunity is afforded of adding to their political consequence or gaining importance in an inexpensive and not very risky manner. If they can only get a few friends to sign a petition for or against some act, views, or opinions of members of some profession or calling, and move public attention to the undiscovered rights or the unrighted wrongs, they and their party soon gain attention and notoriety, and if the cards are played with tact, it may be for a short time considerable political power.

By making a fuss and getting a number of signatures to a petition a few irresponsible and possibly not very scrupulous persons, knowing little or nothing of the merits of the view they are advocating or opposing, are permitted or even encouraged to make miserable, coerce, and oppress a number of skilled workers they have never seen and who have never interfered with them in any way. Such workers deserve, if they have not an actual right to, the protection of the State, seeing that their work is for the advancement of knowledge and for the good of all. But in this country the freedom of which we are so proud includes the freedom of the ignorant and prejudiced and opponents of progress by political manœuvres to acquire power to oppress and hamper those engaged in discovering new facts and thus to check the spread of new knowledge. Twenty voters of decided views on anything have only to interview a timid member or would-be member of Parliament and give a hint or two as to the possible importance of a few hundred votes they know of to ensure attention being given to the desires, deserts, or wrongs they come to press or redress. Intense political sympathy and interest are at once aroused in the breast of the polite politician, and his determination is at once taken to redress the wrongs and advocate the cause his interviewers have at heart. He promises that the most energetic measures shall at once be taken to protect the best interests of all the lower animals, down to the very lowest. Nor does it concern him if less fortunate higher animals are attacked, injured, robbed, and murdered in our streets without the indignation of a single society being excited or political persons unduly disturbed. No one thinks of getting up a petition to advocate the protection of the weak and aged human kind against those murderous and cruel vivisections often but too successfully performed by the most dexterous sporting experimentalists of our day, the distinguished roughs.

Sensible persons will feel grateful to the Lord Mayor for putting in their true light the facts of the case. Too frequently have scientific men who cannot defend themselves been unjustly condemned by irresponsible persons, who, no doubt, at least in many cases, quite uninten-

tionally, have been encouraging unfair attacks, and spreading undeserved reports to their detriment and injury. The following extract from a letter of Professor Huxley's to the Lord Mayor, sent on the same occasion, puts the question at issue very plainly, though not quite correctly :—"Opposition to the proposals which your lordship sanctions would be equally inconceivable if it arose out of nothing but the facts of the case thus presented. But the opposition which, as I see from the English papers, is threatened has really for the most part nothing on earth to do either with M. Pasteur's merits or with the efficacy of his method of treating hydrophobia. It proceeds partly from the fanatics of laissez faire, who think it better to rot and die than be kept whole and lively by State interference (!) ; partly from the blind opponents of properly conducted physiological experimentation, who prefer that men should suffer rather than rabbits or dogs, and partly from those who, for other but not less powerful motives, hate everything which contributes to prove the value of strictly scientific methods of inquiry in all those questions which affect the welfare of society. I sincerely trust that the good sense of the meeting over which your lordship will preside will preserve it from being influenced by these unworthy antagonisms ; and that the just and benevolent enterprise you have undertaken may have a happy issue."

OPPOSITION TO THE DETECTION AND CURE OF CERTAIN FORMS OF DISEASE.

In the management of one class of diseases anti-curative legislation has been carried in direct opposition to the very first principles of medicine. It is obvious that the true interests of society render it desirable that all diseases should be sought out, detected, and submitted to treatment as soon as possible. To relieve suffering and to cure disease that is curable are the aim of the medical profession ; but, from the legislation in force, it ought to follow that the evil of a disease spreading far and wide is considerably less than the evil of subjecting it to treatment, and that the objections to discovering cases and curing them are greater than the objection of allowing them to spread far and wide. But it is well known, and there is actual and positive proof, that the class of diseases referred to is one of the most serious and far reaching known. Its prevalence is associated with dreadful misery, shortened life, and incapacity for work, while its baneful properties and the consequences of its ravages may be transmitted to descendants in succeeding generations.

Laws have been framed and passed in spite of the strongest reasons urged against them by professional men who were thoroughly acquainted with the whole subject. I venture to think that the course taken in this and some other instances by legislators in the teeth of the

strongest medical evidence could not possibly have been carried if the profession had had its rightful position. It certainly is most remarkable that in these days a dozen or more people with little or no knowledge of the subject they support or protest against, but eminently skilled in the arts of the advocate, constituting themselves into a society or association or institution or league, should quickly acquire political influence, and by agitation prevail upon Parliament to adopt legislation opposed to the views and knowledge of a profession having no political power, but numbering twenty thousand or more, and many of whose members are well thought of by, and well known to, the legislators.

Even the broad lines upon which the profession has acted in all countries for centuries are assailed and called in question by persons who appear to have considered the question so superficially that they are not aware of the grave objections to their injudicious proposals which as it were lie on the very surface.

But it is not only on account of the paramount importance of political necessity that our practice and principles are set at naught. The very first duty of every one connected with the management of the healthy and sick is to prolong life to the utmost, and this duty is to be carried out in absolute integrity without any qualification under any circumstances. Of course we are to relieve the pain and suffering, but under no circumstances can the principle of prolonging life to the last moment be called in question. Nevertheless, from time to time, cleverly written articles appear, in which it is not obscurely hinted that we are wrong in prolonging life if we prolong suffering and pain and misery. Also it is held by some to be unreasonable as well as cruel to save very weak children. In doing so it is affirmed that we are acting against the highest interests of the community, and are actively contributing to impair the vigour of the race. Nay, some very confident but irrational persons, ill-informed on important facts and shortsighted, suggest that if the weak among us were destroyed at a very early period of life the coming race would be greatly benefited. In the near future we may expect to see inaugurated an association for the relief and release of the suffering and aged, and for the untimely removal of organisms not fitted to survive in the struggle for existence. New lights are emerging from the philosophical fog, who will without unnecessary delay proceed to carry into practice the new ideas, culminating in that greatest of late discoveries "the weakest go to the wall." The modern advocates of this ancient and philosophical reputed certainty and necessity show us how every one who goes to the wall must be weaker than those who do not reach that destination, and further that the proof of being the weakest is the fact of proceeding to the wall. But, alas! every one of these positions is absolute nonsense. In the first

place, as is very well known, very weak children, animals, and plants not only often survive, but become strong and active as growth proceeds. Some live to be old, and some of those who ought clearly to have died in very early youth reach extreme old age. In the case of weakly children, many of the diseases which cause further deterioration may themselves be prevented and average health acquired. On a larger scale, while no doubt the medical, like some other professional bodies, may by their rougher and stronger, and in their own opinion the fitter sort, be driven to the wall for a time, it by no means follows that the result is due to weakness or unfitness, or that, having been driven to the wall by mere brute force, its inherent elasticity will not enable it to rebound and enjoy a happy existence. Temporary oppression and forced obscuration are often followed by freedom and success, and things condemned as utterly unfit, survive and flourish long after the fittest of drivers to the wall have been forgotten. The profession can look back upon centuries of real work and public usefulness, and forwards to boundless and ever increasing utility. All participate in the advantages resulting from its work, although few are aware of the real source of the health and happiness they enjoy. Many a contagious malady fatal to some among the best and wisest of our forefathers is now extinct, and not a few of those which are even now sometimes very fatal will be unknown to our descendants. There can be no doubt that, if scientific men are permitted quietly to pursue their investigations without efforts being constantly made to incense the public against them, many new discoveries will be made which will result in the establishment of means to combat disease, and to prevent the deleterious actions of many of the most potent of contagious poisons. No one ought to side against us, or to sign petitions against suggested scientific enquiry, until he has mastered the precise object and the details, and has convinced himself that the investigation is calculated to result in more harm than good. As regards any particular course of investigation which has been proceeding for years, it is obviously unjustifiable to interfere until it has been or will be clearly shown to be useless and injurious to individuals or to the public. Surely in the particular matter of Pasteur's researches the lives, positions, and characters of the supporters of the investigation ought to be more than sufficient to convince any reasoning being that the enquiries were called for and ought to be continued and encouraged.

Nor is it only that many of the diseases of man have been eradicated, or their dangerous influences mitigated or prevented by scientific investigation and careful study and observation. It seems probable that by timely interference and by immediate judicious expenditure many very serious and fatal diseases from which cattle and many domestic animals suffer may be got rid of, and thus the loss of millions of money

prevented. As regards these and other medical and scientific questions equally important, all that is required to gain further advantages in the future is public trust and confidence in scientific investigation, and the protection of those engaged in the work from being picketed, boycotted, misrepresented, and otherwise ill-used by anti-scientific and anti-progressive opponents, ambitious of notoriety or of political power and distinction, and careless at whose expense their object is gained. But further there is evidence that by preventing the spread of contagious disease in the case of some of the lower animals we are also protecting ourselves from being attacked by many serious conditions—it being probable, indeed in some instances certain, that the same poison acts deleteriously on animals as well as on man, while some of the contagious germs which have such disastrous actions upon man seem to be actually generated in one or more of the lower animals.

PREJUDICE AGAINST MEDICAL METHODS AS ILLUSTRATED BY OPPOSITION TO THE VACCINATION LAWS.

It is wonderful how very slowly the most certain and unassailable medical facts are accepted, appreciated, and practically acted upon in any way approaching the degree of their importance. Some, after having been proved over and over again and in different ways to be based upon true principles, are assailed, condemned, and neglected, year after year, possibly because some of our legislators have been led to consider the choice to be between small pox and revolution. Parents are allowed to disobey the law and risk the lives of their children, or their injury and disfigurement for life, on the absurd plea that they are opposed to vaccination. Thus is preserved and spread among us a loathsome but preventable disease of the most serious character. It is in medical and scientific matters only that people are allowed and encouraged to act against the laws passed for the benefit of all, and to form and act upon their own opinions, not because they have studied the matter, but apparently because they enjoy some political influence, and concurrence in their opposition to vaccination may gain for a certain candidate for Parliament a few votes.

It is scarcely credible that an enlightened community should permit the persistence and spread of a disease so easily preventable as small pox. Only think of the absurdity of having to provide at enormous expense accommodation for thousands of cases of small pox, not one of which need occur; and so year after year people are permitted and even encouraged by some of our legislators to break the law and be fined for the privilege of allowing their children to be in a condition favourable for contracting small pox, rather than permit them to be vaccinated, and thus rendered incapable of taking the disease. Every few years it seems to be necessary to appoint a commission of distin-

guished persons to institute an official enquiry into the efficacy of vaccination, simply because a certain number of well-known people for one reason or another announce that they have made up their minds to oppose this very unobjectionable operation, which ought to be universally performed; notwithstanding that it is practically certain that unvaccinated persons if exposed to the contagion will sooner or later take small pox, while vaccinated persons escape, even if they are constantly surrounded by the poison germs.

Some very odd thinkers attribute our improved condition as regards the prevalence and severity of small pox in recent years not to vaccination but to the improved health of the people. That the population is more healthy and better able to resist the damaging effect of many febrile diseases is certainly true, and the advantage in this respect which we enjoy is unquestionably the result of improved hygiene. But I am not aware of any facts which indicate that the contagion of small pox is more than perhaps a slight degree less virulent or less certain in its effects than it was twenty or fifty or a hundred years ago. Nor do I believe that immunity from the assaults of this disease can be obtained by the most perfect sanitation, by the best food, or by the introduction of any chemically active substance or medicine into the body. Indeed, so far as I am able to judge, no such contention is to be justified in the slightest degree, and for anyone having authority to publicly represent such a view as if it were to be trusted and practically acted upon is really cruel and wrong, because it necessarily leads people to conclude that vaccination is a needless precaution to take, while, in fact, if vaccination were abandoned at this time, we should lose in a few years hundreds and thousands of the population from an easily and certainly preventable disease. The contagium of small pox is one of the most virulent and certain in its action of all contagious poisons, and it is very doubtful whether, even with the greatest care that could possibly be taken, the isolation of those suffering can be carried out so effectually as to certainly prevent the escape of some of the poison particles, and their reception by persons in a state favourable for attack, living in the neighbourhood of the sick.

Small pox and cattle plague are among the most terribly contagious of all contagious diseases, and these contagia are among the most certain to produce their effects. The percentage of unvaccinated persons exposed to small pox who would escape would be exceedingly small. As regards cattle plague, probably not one animal in a thousand would be found to be proof against this most powerful contagious virus. That some individuals among men and animals are more prone to take contagious diseases is certain, just as some are more likely than others to suffer from the febrile state, but resisting power never approaches completeness in the cases of small pox and cattle plague.

It is idle to argue that because some contagious diseases have disappeared, or their intensity reduced, the same is happening or will happen as regards small pox. There is no evidence whatever in favour of such a conclusion. Small pox seems to belong to a category quite distinct from that which would include most of the contagious fevers. Some have died out, some are dying out, but small pox is as certain and almost as virulent as ever. No person properly protected by vaccination takes the disease, but almost every person who has never had it, or has never been vaccinated, suffers if he be well exposed to the influence of the poison. I consider, therefore, the statement that "better hygiene of the person, better ventilation, and more spacious residential quarters" have in any way lessened the liability to take small pox quite unjustifiable, and think that Dr. Creighton ought to withdraw this and many other intimations in the same direction in his article. A medical society, or a small committee of medical men, seems to be the body in which in the first instance minute details connected with the question should have been discussed if it was thought needful to reconsider it at this time. It seems scarcely fair to say anything in a work of general information which may have the effect of making people doubt the advantage of vaccination as long as it remains likely that persons not vaccinated will almost certainly take small pox, and if over middle age will almost certainly die if they are attacked. Within the last few years I have seen some of the very worst cases of small pox that have ever come under my observation. Unvaccinated adults were the victims, and death took place. Indeed it is very rare for a case of small pox in an unvaccinated adult to recover.

Again, some contend, and there is much truth in the contention, that at least in the young at certain times and in certain conditions of health there is an undue susceptibility varying in intensity in different individuals to the influence of different forms of contagion, and that whether a child contracts any particular form depends simply upon the particular disease that may be prevalent at the time. If protected from all disease germs the individual would, of course, retain his good health, but if exposed to the contagium of measles, or whooping cough, or scarlatina, or other contagious fever, such an individual would be attacked, while possibly many exposed to the same poison would escape, and the patient himself at another time would have escaped though fully exposed to the contagium. But the chance of a child escaping any of the above contagious fevers, though surrounded by the poison, is, I conceive, far greater than the chance of his escaping small pox, no matter what might be the state of his general health at the time; or, in other words, the probability of the spread of small pox among unprotected children is enormously greater than that of any other febrile disease.

It is curious how easily some of our greatest law makers and most

knowing politicians, even very old Parliamentary hands, are led to make injudicious if not entirely unjustifiable observations on medical questions. Both Mr. Gladstone and Mr. Bright have shown more political ingenuity than knowledge and candour in dealing with this particular question. Neither has affirmed or denied the efficacy of vaccination, but for some reason both have been most careful to avoid offending the susceptibility of voters having anti-vaccination proclivities. In 1883 Mr. Bright said :—"The facts appear to me to be in favour of vaccination, but that it *often* (!) fails of any good effect, and sometimes causes much evil, and even death (!), is admitted even by its warmest supporters." Mr. Bright thinks that persuasion and example "would have been more effective than compulsion." The penalties and imprisonment of parents "for refusing to subject their children to an operation which is *not unfrequently injurious and sometimes fatal* (!), seems to me a needless and monstrous violation of the freedom of our homes and of the rights of parents." In one part of the speech it is said that vaccination causes even death, in another that it is sometimes fatal, and therefore to fine and imprison parents who object to their children running such a risk becomes a monstrous violation of the freedom of their homes and their rights. Mr. Gladstone, if I remember rightly, some time since suggested to some of the opponents of vaccination that he could conceive circumstances which might render it not undesirable to enquire further concerning the advantage of subjecting all persons under all conditions to the operation of vaccination. But, as I have before remarked, this is one of the many scientific and practical questions the truth concerning which will not be discovered and disclosed by political methods.

We may allow our imagination to wander for a short distance along lines in which certain tendencies have for some time been traceable. In the near future we may expect that representatives will be required by constituencies who will engage to vote for the protection and spread of small pox and other contagious diseases—representatives who will vote for the suppression of scientific investigation and for the encouragement of human suffering—representatives who will engage to encourage the protection of all forms of disease germs and further the preservation of bad health—representatives who will agitate in the interest of typhoid and cholera and other maladies of advantage in reducing our numbers. On occasions such well organised representatives might unite and combine to support resolutions proposed in the interests of class sections, possibly for the general disintegration of empire, for the spread of nihilistic philosophy, for the change of laws, and for a new interpretation of the rights of capital and labour, or for the annihilation of modern civilization.

From time to time some over-zealous members of the profession are anxious that the public should not only know the exact truth as regards

the advantages of vaccination, but should also be well-informed as to any objections real or supposed against the operation. Every particular instance in which, owing to some very exceptional circumstance, the operation was not successful, or which perhaps from some unfortunate and purely accidental circumstance was followed by serious illness, is to be recorded in detail, although such untoward cases are very rarely met with—so rarely that the fact of their occurrence no more justifies the condemnation of vaccination than the very rare fatality caused by an anæsthetic can be held to demand the abandonment of that invaluable means of relief from suffering. The objections to vaccination, having been enormously exaggerated and repeated over and over again by opponents, have acquired a purely artificial and very unjustifiable notoriety. Thus may hundreds or thousands of persons have received a very wrong impression about the efficacy of vaccination and its dangers, and have been led to join the ranks of the opponents before they had informed themselves of the truth and real importance of the objections.

One of the most recent exponents of the supposed facts and arguments against vaccination, and one who I venture to think will not soon have a successor, is Dr. Charles Creighton, the writer of the article "Vaccination" in the new edition of the "Encyclopædia Britannica." In this large work there are very few articles which it can be said have been written in the very critical spirit here apparent, and I cannot but think that if subjects generally had been treated according to Dr. Creighton's method the usefulness of the work as a repository of the real knowledge of our time would not be considerable. Dr. Creighton has remarked that "the profession as a whole has been committed before now to erroneous doctrines and injurious practices, which have been upheld by its solid authority (!) for generations. Le Sage's satire upon bloodletting, in *Gil Blas*, which appeared in 1715 ought of itself to have made that practice ludicrous in the eyes of the world; but bloodletting survived a hundred years after that in all countries." It would be difficult I think to find a more unfair comparison. There is not the faintest analogy between the proofs of the value of bloodletting and the proofs of the value of vaccination. The evidence in favour of the one belongs to a category very different from that in which evidence in favour of the other would be placed. A patient might live or die after bloodletting, and it might be impossible to decide how far the loss of the blood in that particular instance caused or affected the result, and many cases might be very carefully studied one after the other by acute and accurate observers without a definite decision either in favour of or against bloodletting in certain morbid conditions being arrived at. But the evidence in favour of vaccination is conclusive—absolutely conclusive. Let the vaccinated child be exposed to the contagion of small pox

and he will not take the disease, but where is to be found the man who would allow his unvaccinated self or child to be exposed to the same contagion? Dr. Creighton must be well aware that bleeding is still of great use in a few cases, and that were the subject discussed among us many facts and arguments would be adduced in favour of removing blood in certain conditions. There is, then, not the faintest analogy between the "opinion," past or present, as regards the efficacy of bleeding and that of vaccination. And if, as Dr. Creighton seems to think, it must be admitted that bleeding as a form of treatment has been utterly abandoned, what could be more unjustifiable than to insinuate that in the near future vaccination, like bloodletting, will also be abandoned? Dr. Creighton has to prove by experiment either that unvaccinated persons exposed to the contagion of small pox will be in little or no danger of contracting the disease, or that our country is and will be everywhere and at all times so free from the virus of small pox that it is not worth our while to protect ourselves against the possibility of suffering from the consequences of the entrance of the poison in our unprotected bodies.

I am sure that almost every member of the profession and many who are not doctors will cordially agree with Mr. Thomas's observations on the vaccination question ("The National Review" for June, 1889), and it is to be hoped that his criticisms on Dr. Creighton's memoir will be as widely read as the memoir itself. It is painful to think that a practice so certainly advantageous to the community, and which has been tested on the largest scale and in many countries, should be called in question to the certain injury and perhaps death of not a few, and to the danger of all. Of the objections raised to the operation, none are sufficiently cogent to cause any reasonable being to decide against it. As long as there remains the slightest chance of the occurrence of a case of small pox, every infant that is born in this empire ought to be vaccinated, and every child ought to be re-vaccinated before he attains the age of twelve.

Surely a reader of the "Encyclopædia Britannica" has a right to expect in the articles of such a work a fair and accurate account of the views generally entertained at the time; and (in doubtful questions), a summary of the facts and arguments on both sides. But this article "Vaccination" and one or two other articles seem to be written for the purpose of presenting what it is not unfair to call a party academic view, a course surely out of harmony with the general aim and spirit of the work. The admission of an article which is in any degree calculated to make people doubt the need of vaccination, or to prejudice them in the slightest degree against it, is so serious a responsibility that I venture to think some step ought to be taken to show the public that the article in question does not accurately represent the conclusions

arrived at from a careful consideration of facts derived from scientific investigation, or from a course of enquiry or observation extending over a few weeks in any small pox hospital, or the opinions of those who have been long engaged in the management of small pox hospitals and the treatment of the sick; while as regards the practice it is desirable to adopt, in order to protect the rising generation from the chances of suffering from small pox, Dr. Creighton's article, as far as I can understand it, is thoroughly opposed to the views long held and acted upon by the whole profession here and abroad.

The conclusions on this question arrived at in Germany after careful enquiry in 1884, and adopted by the Reichstag, were :—that an attack of small pox conferred immunity against subsequent attacks, that vaccination was similarly protective, but if performed in infancy it must be repeated at puberty; and that since the introduction of vaccination no increase of any particular disease or of the general mortality had occurred which could be regarded as a consequence of vaccination. Mr. Preston Thomas concludes his article from which the above remarks have been taken, with the following valuable summary:—"The Germans now actually enforce *re-vaccination as well as primary vaccination by law*, and it remains to be seen whether by this measure they will not eventually extinguish small pox throughout the Empire. This example, set by one of the wisest nations of the world, is one that England might very well follow. There is no more violation of the sacred rights of man in compelling a parent to secure the revaccination of his child of twelve years than in requiring the vaccination of an infant of three months. Probably, however, another epidemic of small pox will be necessary to secure this extension of the vaccination law. Meantime we have to confront an agitation, much stimulated by Dr. Creighton's article, for the absolute repeal of compulsory vaccination. It is the poor who would be affected by such a change, since *the educated classes are now both vaccinated and re-vaccinated, and would doubtless be so whether compulsion existed or not. To repeal the vaccination Acts would, if the experience of the past is to be trusted, involve the future sacrifice of thousands of lives, and a terrible responsibility attaches to any politician who dares to advocate a step which will have this result.*" The *Italics* in the above extract are mine. ("Vaccination and the 'Encyclopædia Britannica'" by H. Preston Thomas, "National Review" for June, 1889.)

Certainly the experience we have had of the results of legislation as regards vaccination would deter us from advocating that course as a means of expediting and spreading reforms which we know to be for the advantage of all. Legislation if opposed—and some legislation seems to be opposed more for the gratification of the instinct of opposing, than from any objection to the legislation itself—retards instead of

expediting the adoption of wise measures. We are told that there are now some thousands of unvaccinated children in Leicester alone. It is very difficult to believe that the number of parents who have refused to allow their children to be protected against an attack of small pox in the future, perhaps when they may be over forty years of age, in which case the chances of recovery will be very small, have been impelled to take this course after full investigation of the pros and cons. Have they yielded to that irresistible pleasure derived from the contemplation of bravely defending the freedom of the home, and the rights of parents so dear to Englishmen, and acting in opposition to laws which they have been told are unjust? In all legislation affecting ever so indirectly what has been called the liberty of the subject, it is necessary to form a careful estimate of the relative advantage of slowly spreading persuasion, and teaching,—and legislation certain to excite opposition and to arouse the instinct of defiance still strong and apparently very deeply rooted in many of the worthy descendants of the free lances and independent freebooters of earlier if not happier times.

The time may come when vaccination shall be superfluous, but it is not yet; nor can anyone in reason look so far forward into the future as to point to a period when small pox shall for so long a time have been extinct that no longer can any fear be entertained of its recurrence and spread among an unprotected people.

SEMI-CONFIDENCE SHADING INTO DOUBT CONCERNING MEDICAL WORK AND JUDGMENT.

The unreasonable doubt as regards medical and scientific methods is not unfrequently associated with what has been called a general impression that the doubts and difficulties connected with medical investigation are so considerable, while the changes in medical views are unquestionably so frequent, that little reliance is to be placed on the medico-scientific views of the time, however strongly they may be supported by what some consider proof. Nevertheless, it may be said that we are at least as much trusted as any other body of men in these times. Such an admission does not however go very far, seeing that to be of real service to people, to reduce the anxiety suffered by friends in cases of severe illness, and to get patients as quickly as possible restored to health we require the full confidence not only of the patient but of those about him. But such implicit trust must clearly be of slow growth and can only be enjoyed in cases in which doctor and patient and the friends of the patient have been acquainted for years. In many instances it is to be feared the confidence bestowed is not complete and is so easily shaken that often the conversation of a perfect stranger will result in a change of front, and before long, doctrines, principles, and

views, the very opposite of those that only recently prevailed, will engage the attention and be acted upon.

Among the confidential duties which you will be called upon to undertake is the medical examination of candidates for life insurance, and candidates for certain offices and for various posts for the proper discharge of the duties of which good health is necessary. It is of great advantage to know and be known by some of the staff of the office or department in the interests of which you are asked to advise. Unfortunately in this as well as in some other cases a sort of semi-confidence gradually shading into doubt sometimes takes the place of that confidence in our powers of investigation and judgment which we hope to enjoy, and in the absence of which it may be hard to act to the best advantage, but as you advance most will no doubt be implicitly trusted and will soon gain the full confidence of those you have to advise.

General doubt and insufficient confidence in medical judgment are sometimes indicated by the great number and very detailed and searching character of the questions you are requested to answer, as well as by the somewhat abrupt and almost dictatorial style in which some of them are framed. You are not only asked for your opinion but you are in a way cross-questioned and cross-examined as if those who addressed you doubted whether you had the will to afford the information required or the knowledge which would enable you to obtain it, or to form a correct estimate of the bearing and importance of the facts recorded. Sometimes the questions would almost suggest that he who was requested to answer them was just slightly suspected of a desire to keep something back that ought to be told or was likely to slightly misrepresent the truth. It is not very uncommon to be asked by a confiding patient or friend for one's really candid opinion, and to be assured that the answer given shall be kept a profound secret, implying that there are doctors who do not give their candid opinion, who do not say what they know, and are therefore not to be thoroughly trusted.

But a very curious and rather unpleasant example of want of confidence is shown by the questions asked in some of the forms we have to fill up concerning a person's health, powers of work, probable length of life, and many of the questions are put in such a way as to imply doubt as to the degree of confidence to be reposed in the answers. The detailed examination we are expected to make is really quite extraordinary. Sometimes we are asked to describe the condition of the cavities of the body and of the viscera contained in them and their functions—alone a sufficiently comprehensive and extensive demand. But this is only one out of perhaps twenty complex questions, some of which are to the point, while some are almost irrelevant. To adequately reply to many of these questions would take a very long time without in the least degree aiding anyone to arrive at a correct judgment on the particular

case. By some offices the medical examiner, instead of being regarded as a responsible adviser concerning the value of the life he has seen and examined, seems to be looked upon as a sort of half-educated clinical reporter or clerk who cannot be trusted to make the needful examination or to draw conclusions from the facts he has observed. He is therefore expected to give full and complete answers to a great number of questions, perhaps on the mistaken idea that persons who have not seen the life will be able to achieve the extremely difficult task of forming a correct estimate of its probable value.

Some other aspects of this matter appear in the course of a summing up of a case before the Lord Chief Justice, and the observations of his lordship will be read with interest: "Anything more full of pitfalls for the unwary than these two documents he could not imagine. It was perfectly true that the answers were to be made by the assured. It was true also that the terms of the contract were printed, that persons should read them, and that they must be held to the letter of them. But the company was dealing with a class of persons, sensible, perhaps, but uninstructed and unlearned persons who were not accustomed to examining with critical eyes the contents of legal documents; and one could not help seeing that these two documents were full of pitfalls. Now the application form was made a part of the contract, a part of the bargain between the assured and the company. The medical officer was made the agent of the assured, and, by the terms of the contract, if any statement in the certificate of the medical examination was wrong, the policy was forfeited. One of the questions asked was, 'Has the applicant ever had severe headache or any nervous or muscular trouble?' Why, good heavens, was there anybody who in his life had not had some nervous or muscular trouble? In the case of the form before his lordship, the agent had answered 'No' to this question, so that if at the age of fifteen or twenty the assured had overworked himself and become nervous for a few weeks, so that the doctor had advised a holiday, the policy failed. Another question was, 'Has the applicant ever been, or is he now, predisposed to cough, difficulty of breathing, expectoration, or palpitation?' How in the name of sense was a man to know if he was predisposed to cough? There were other questions of a similar character, and yet it was a condition of the policy that if any of the answers to these enquiries were not true, full, and complete, the policy was gone. The medical officer, as his lordship had already said, was made by the terms of the contract the agent of the assured for answering medical questions, and if any statement was wrong the policy was vitiated. They were things for the doctor himself to ascertain. But even if he (the Chief Justice) was wrong about the doctor being the assured's agent for such questions, there was the statement the applicant himself had to make. One of the questions the applicant

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had to answer was, 'Age and cause of death of father's mother and father; age and cause of death of mother's mother and father?' Here also if any mistake was made in the answers given the policy was void. So that if the applicant made a statement which was untrue about the age or cause of death of his mother's father there was an end of the contract. Another question was, 'Do you suffer from, or have you ever had, bronchitis'—which he once heard Lord Campbell describe as a bad cold—'colic'—which they used to call stomach ache—'or any form of trouble referable to the lungs, difficulty in swallowing, or any symptoms indicating disease of the heart or neighbouring vessels, disease of the stomach or bowels, disease of the kidneys, or dyspepsia, excessive or scanty secretion of urine?' The secretion of urine, for instance, must be neither excessive nor scanty, but exactly right, and if the applicant made any mistake as to what was exactly right, the policy was void. Then, again, the applicant was asked, 'Have you ever had any illness, disease, or injury within the last five years?' How was a man to be sure what an insurance company meant by illness or injury? Yet strict accuracy in the replies to all these questions, and many more of a like character, was made a condition of the contract. Some of the questions were no doubt very right and proper, but the enquiries seemed to embrace every kind of slight or temporary trouble that the human frame was subject to; and if there was the least slip in answering the questions, either by the assured person himself, or by the medical man, the policy could be repudiated. It was perfectly true to say that all these questions and conditions were printed, that a bargain was a bargain, and that those who signed the form must be bound by its terms. It was quite true that persons did this with their eyes open, and that no one in his senses would enter into such a contract as that in use by the plaintiffs."—From "The Review," November 6th, 1889.

The questions in some of the official documents can hardly have emanated from a medical mind or be published with medical concurrence. They seem to have been framed rather by those who had more confidence in the numerical than in medical and scientific methods. Some even regard our medical examination superfluous. Nevertheless our statistical friends, for the time, yield to popular prejudice and allow the medical reports still to have some little weight in their decisions. The occasional detection by the physician of facts proving serious disease of heart, lungs, kidneys, liver, or other organ, which could only be discovered by careful medical examination, and may perhaps render the life uninsurable, does not happen in a sufficient number of cases to disturb the calculated results, though careful medical examination in individual cases may be the means of saving heavy losses. On the other hand it may be said, and perhaps with some degree of truth, that the care exercised in the medical selection may easily be carried

too far, and thus lead to the rejection or loading of lives which might have been assured at or near the ordinary premium to yield profit.

It is really doubtful whether there is now the same need for detailed questions as existed formerly. It should be borne in mind that sound medical knowledge is more widely diffused, and the average practitioner far better informed. Not only the medical, but the general, education of the members of the medical profession is far better than it was when many of the forms issued for our guidance were compiled by the offices. The great majority of middle-aged practitioners, even in outlying districts, are now well qualified to examine lives for assurance, and their care and judgment are to be relied upon.

It must not, however, be supposed that objection is made to the plan of printed questions and written replies. Indeed it is quite right to ask us to give any information we may be able to gain even on points which may not be medical, but which, nevertheless, may be of office or actuarial interest and importance. It is, however, obvious that questions may be so needlessly multiplied and so detailed and minute as to absorb the whole attention of the physician: and very considerable time may be required for completing the answers to the series required. In this way there will be risk of the medical mind being diverted from the consideration of broad facts, and important medical enquiries of grave consequence may be omitted. It is even possible that the real object of the medical enquiry may in this manner be almost missed, and the report be of considerably less value than it would have been if the whole time and attention of the examiner had been concentrated upon the purely medical aspect of the case. How far the examiner is expected to exercise his judgment and advise the directors, how far he is expected merely to act as a reporter to furnish facts upon which their judgment is to be based, has not been determined, and perhaps cannot be determined with perfect accuracy, and probably different views are entertained on these matters in different offices. Whether it is to the advantage of the office to place implicit trust in the medical examiner's recommendation, or only to be guided by it in a moderate degree, is a question which will have to be differently answered in different cases; but it is certain that the reporter cannot be too careful in trying to express as clearly as possible the facts he is able to ascertain which in any degree distinguish the life he is examining from an average one of the same age, and particularly as respects the habits of the proposer and their probable effects upon his organism at a later period of his life.

Some of the commands given to us are very curious and almost humiliating in the details and explanations deemed necessary for our guidance. Peremptory directions are given as to the precise way in which we are to put the questions to a proposer. We are enjoined to

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give full and "unambiguous" answers to certain questions, the qualification almost suggesting that ambiguous answers are sometimes given. Then, although we may be asked to form an opinion sometimes, we are not allowed the freedom of expressing it in our own words. Our views are to be stated according to the terms laid down, which may include many things of comparatively little consequence and may compass the omission of matters of importance which would certainly have been represented if we had been allowed to express our view in our own way. Many certificates which we have to give include some things which, from the medical standpoint, will hardly be considered of much use, while certain facts of some consequence, from a medical point of view, may not have a place.

If we consult an authority about a piece of land, or a house, or the points of an animal, we request him to give us his opinion, or ask him to send us a "report," and generally take his advice without anything approaching an enquiry into the several facts upon which his advice is based. We conclude that he has carefully enquired into all the details necessary for arriving at a correct conclusion, and trust to his honour. But, in forming an estimate of a person's health and the probable duration of his life, we are asked for written answers to a number of questions which might be answered by the person himself, by a friend, or by a clerk. So minute are some of the instructions given to us, that we are told to *emphasize* the questions and to *pause* after each answer. The authority framing the questions appears to have been strongly imbued with the idea that unless duly instructed, and warned to be very careful and particular, the practitioner would perhaps scamp the examination, although he had undertaken to conduct it to the best of his power, and has deemed it necessary to tell us that we are to give the applicant plenty of time for considering his answers to our questions, and so forth, as if we were students about to enter on the duties of clinical clerk, and somewhat lazy untrustworthy students too, inclined to shirk work, or to go through the formality without entering into the spirit of the examination. Sometimes we are asked to follow instructions for nothing; in some cases a fee of a guinea is paid; in some half a guinea is proposed. As before remarked, there is nothing unreasonable or objectionable in requesting us to answer questions; indeed, the plan well carried out will save time and trouble, and contribute to the formation of a just conclusion. But to needlessly multiply questions, to request answers to many that could be asked and answered without troubling us at all, and to instruct us where we ought to pause, what we ought to emphasize, is not treating medical practitioners as considerately as they deserve.

According to a less formally but perhaps better arranged scheme, we might be asked simply whether we considered the applicant fit for

assurance or for the post he is trying for as regards health and strength and enduring power, and whether in our opinion it is probable he will live as long as most persons of his age. Should our opinion not be favourable, we should be requested to state the general grounds upon which our adverse conclusion had been based, and whether, if the proposer was considered to be older than his real age by a certain number of years, he might be insured.

But further, not only is our medical examination and opinion sometimes received with reserve approaching to want of confidence, but some of our non-medical friends, with a certainty that is quite astonishing, form a decided opinion, and seem to have a positive conviction that their view is correct in cases in which we feel the greatest difficulty in deciding what is the right course. It is very remarkable that some having no knowledge whatever of anatomy, physiology, pathology, or medicine, as these subjects are known to us, should feel confident that they can form a perfectly accurate estimate of almost any man's health and his prospects of living to be old. Some of these confident judges go so far as to set their opinion against our own, and, laughing at our doubts and cautiously formed view, do not hesitate to declare that many of the imperfections in organs and faults in their action which we detect—many of the diseases we discover in heart, lungs, kidneys, liver, brain, or spinal cord—are little more than the creations of our morbid imaginations, although not one of these same confident authorities as to human life values would think of putting his judgment to the test in the case of an animal to work, or to fat, or to admire, without first consulting with the vet. !

If only educated people generally were but a little better informed concerning our methods of research, our ways of work, as well as the principles upon which modern medical investigation rests, and is being carried further, our work would be greatly assisted, more confidence would be reposed in our judgment, and a higher estimate of medical opinion, especially in its application to the selection of lives for life insurance, would be formed. And medical advice as regards the working powers, and their probable duration in the several candidates for posts in which health, strength, and enduring power require to be considered, would be more often asked and acted upon.

OUT-PATIENTS AND SLIGHT AILMENTS.

Great principles as regards the treatment of disease may, without doubt, be learnt and taught, and the influence of important remedies illustrated in the case of slight ailments as well as in grave disorders. The circumstance that little attention, comparatively speaking, has been paid to this part of medicine, even in the best of modern systematic

works, makes me particularly desirous to bring it under special notice. But among the cases of slight ailments you must always bear in mind that you will occasionally discover some very serious malady, and therefore arrangements made for treating slight troubles must comprehend the detection and proper management of the most serious maladies. No one must practise on the idea that, as slight ailments constitute the great majority of the cases he will see, he need not be qualified to deal with grave cases.

You may learn a good deal about man's slight derangements if you study in the out-patient department of the hospital, or in public dispensaries, and I strongly advise you to take advantage of every opportunity that may offer of seeing practice. Do not be deterred from spending time—much time—in the out-patient department, although in some quarters disparaging observations may be made concerning out-patient medical work both by professional and by non-professional people. Up to this time the out-patient departments of our hospitals have been of the greatest service to the poor, as well as of great advantage to those who are studying medicine. It is there we learn to understand and interpret the curious descriptions given by people in so many different ways concerning the aches and pains they experience. There we learn to recognise the difference between apparent and actual suffering. There we are taught to quickly discern different forms of disease, and to acquire that ready method of investigation which is so valuable in after life.

Although complaints have been made of the rate at which people are gratuitously seen and dismissed, it will be found in fact that the out-patient hospital physician seldom misses an important case of actual disease, while of his real use to the poor there can be no question whatever. Of late years there has been quite a considerable party of charitable people whose chief work has been to bring telling indictments against hospital management. Their fault-finding with our existing system curiously corresponds with an intense desire on their part to establish a different system, which is not like ours, to grow from small beginnings and succeed in due time; but is to destroy that which has worked, and still works well, so that the new plan shall at once burst in full bloom.

In our out-patient departments slight ailments are prescribed for and relieved at once, while serious cases of disease are detected and immediately transferred to the wards for thorough investigation and treatment, without those inquisitorial investigations which form a very important factor in the new model sick-poor relief and centralization and general organization association. It is doubtful if, by any system that can be inaugurated, a poor patient will be more quickly relieved and cared for than by the one which has been gradually built up mainly

by members of our profession, and supported by the friendly help of those who have confidence in us, and are desirous of helping the poor, and is now in useful operation in every part of the empire. To teach providence and thrift to all classes is very laudable, but there is no good reason why this desirable lesson should be taught by effecting the ruin and eviction of the most useful institutions in the world. The whole question of medical charity is very important, and by many very active and energetic people is, I fear, altogether misunderstood. I shall venture to consider how the questions which have been raised by some non-professional people appear when viewed from the medical side.

MEDICAL CHARITY AND ITS ORGANIZATION.

It is now the fashion to condemn the system upon which most of our hospitals have long been successfully conducted. And to those unacquainted with the facts, there is something plausible in the objections raised. It will perhaps be found that the desire on the part of some enthusiasts in charity organization to improve the several departments of hospitals is supplemented by a much stronger desire to encourage a so-called self-supporting system, based on the fanciful hypothesis that working men and others are degraded if they receive relief from their sufferings without payment. The tendency of the thoughts, and the value of the facts and arguments advanced, and the principle of computation adopted, may be judged by the oft-repeated assertion that a fourth of the population of London receives gratuitous medical treatment annually. It is a dictum of certain philanthropists—would that it were the practice as well—that every one ought to pay for medical advice. If the patient cannot pay enough to remunerate the doctor, he is to be made to combine with others placed in a similar position, and so a sort of club, to which a salaried medical officer is appointed, is formed, or funds are to be raised by subscription to be added to the subscribers' payments, just sufficient to provide a small payment for the doctor. This plan, often advantageous, is not in many instances "self-supporting." Anyone who knows much of the working classes knows that the demand for medical help, sick diet, and medical comforts does not always correspond with the time when plenty of wage is being earned. In the universal extension of a partially successful plan thousands of pounds are to be collected for starting "self-supporting" dispensaries, which are "self-supporting" only in name. People are to give in order that certain members of the population may be doctored at half, or a quarter, the usual cost, or something less than that, and doctors are to accept a miserable remuneration, although many prefer to give their services. I have seen a great deal of the poor and of out-patient hospital practice in my time, and, as I have not met with

the recently discovered gigantic evils of the system, I cannot advocate the proposed changes.

With regard to medical charities generally it may be remarked that of late years it has become fashionable to find all sorts of faults with those who are responsible for their administration, and bring against them accusations and charges, most of which are unjustifiable, while not a few are nonsensical. Then there is an anti-charitable relief party amongst us which, like some other revolutionary parties, is destructive rather than constructive. Of the power of this party there is no doubt, for practically it supplies an excellent excuse for not helping charitable medical institutions. If, says the person about to give, there is doubt as regards the advantage of this charity, I had better consider. Consideration soon leads to an instinctive buttoning up of the pocket, and the new views concerning the pauperization of the poor, by helping them when they are ill, take the place of pity for the helpless or nearly helpless sick. But, though the withholding of help is undoubtedly the practical outcome of the opposition to voluntary contributions, the advocates of the new system altogether deny that this is the effect of their ill-judged remonstrance against what they call "indiscriminate" almsgiving. If it is difficult or impossible for an opponent to bring facts against a practice to which he objects, he calls it "indiscriminate," a term, certainly in this case, more correct as applied to the fault-finding than to the thing to which objection is made. What our benevolent opposition desires is "organization." And so confident are the new organizers of their own capacities in this direction that they do not hesitate to intimate that if only the funds belonging to many of the old institutions were but administered by them, instead of by the originators, or by the old or new friends of the charities, both those who give and those who receive would indeed be blest.

It is very remarkable that this strong opposition to giving medical help, medicine, and comforts to the poor during illness should coincide with efforts to give clothes and dinners to the children of the poor. It is certain that if the latter plan is not to be objected to on the ground of its pauperizing tendencies, neither can the former. Organizing philanthropists, claim to have specially trained themselves for expending and managing the funds given and to be given by the philanthropists who have not the good fortune to be gifted with the organizing faculty, and are perfectly confident that all charitable people, institutions, friends, and others anxious to do good to the poor in general, and the sick poor especially, should be committed to them for proper organization. The originators, the present supporters, the working staffs of hospitals, who have done, and are doing, the work, require to be instructed by these specially qualified persons and to be

placed under their immediate superintendence. If the process is objected to, managers, servants, all must be turned adrift, and the institution started afresh on new lines by the self-constituted organizing authority, who will modify, as may be desirable, and remodel the plan of the founders, and carry on the work for the future on the new and improved principles. Our unendowed hospitals seem to be the institutions selected for the immediate application of the new views. Many of them are but poorly supported, and some who help them are, it is feared, persuaded to reduce or withdraw their support in order that the institutions may be organized and administered according to new doctrines. In short, certain persons who know little or nothing of medical work are essaying to completely alter the relations which have for long subsisted between those who supply the funds, those who administer them, and the sick poor. They would regulate the conditions under which we doctors are to be allowed to treat the sick in accordance with their own theories of medical charity and organization. They are thoroughly satisfied that we are deceived and misled, in short, humbugged right and left, and compelled to waste our time as well as spend the money of our friends, in seeing great and wealthy people who, poorly clad for the occasion, wait their turns in the waiting rooms, in order that they may cheat us of our due and use up money given to the poor. Our new organizers pity us, and are fully convinced that if only they were allowed to organize, this evil, as well as many others connected with the present system, would soon disappear. Our confident friends of the new organization never having been imposed upon, and never having failed to detect imposition of every kind, are naturally very desirous to organize anew our hospitals, our patients, and ourselves. To some of us this extreme self-confidence suggests the idea that they may be suffering from a sort of organization mania. Before a poor patient is to be permitted to see the doctor he is ordered, according to the new system, to give a full account of himself, his means, and his family affairs. Account is to be taken of his dress and general appearance, in order that it may be correctly ascertained whether he is really poor and wretched and destitute enough to have given to him a little medical advice and just a dose or two of medicine which possibly may, and at once and completely relieve him, at a cost of perhaps of a fraction of a farthing. All sorts of wild accusations are made as regards the flagrant mismanagement in general hospitals. Then it is said Special Hospitals divert funds from the somewhat better managed General Hospitals, and not a few plausible suggestions are made with the view of inducing those who work in hospitals, and those who subscribe to them, to support the new effort. But it is to be feared that the complaints about bad administration of funds, indiscriminate charity, anxiety to pay the hardly used doctor, and the like, are but means to an end,

and belong to the same category as that to which much political reasoning belongs. The real reason of this extraordinary interference with other people's business is not clearly expressed, but are there not dreams and hopes of a Central Board controlling all the hospitals and appointing all the officers—a perfectly organized universal hospital system, in which the medical officers will be the paid servants of the managers? For years past there has been much fidgety and worse than useless interference with medical work, and it is time the ill-placed activity should cease, or find new spheres better suited for its disturbing, destructive, and worse than useless operations. That we are perfectly able to manage our own affairs is evident enough from the work done and doing all over the world. We have been, and shall always be, obliged to give our services in many cases. With the very best intentions to assist, improve, and correct, organizers will increase our troubles, and in more ways than they can be aware of. That many of us, like members of another profession, have much work and little pay is too true; but most of the proposed new arrangements would have an effect the direct contrary of that desired and intended. The benevolent proposal to establish pay or self-supporting institutions right and left is open to very serious objections, and where one or a few practitioners would be benefited, a number would find themselves worse off than before; for some patients who once paid the doctor will no doubt get their medical help for a little less, while those who have no means at all must still be attended free; for there will be many sufferers whom the practitioner cannot send to the hospital or the workhouse medical officer, because he may be miles away, and, practically, the doctor on the spot will be obliged to do what he can to help them, pay or no pay. To send a working man a long distance who is suffering from some slight ailment, perhaps to be at once relieved by a dose of Sal Volatile or Bicarbonate of Potash, would be as hard as it would be absurd. But unless by the new organizing principles all cases—very slight as well as very severe—are provided for, it will not work as well as the present, if less systematic, very efficient, and very practical arrangement.

To extend any provident system to the unendowed hospitals, and no doubt the effort to do so will be made in some form or other, will be disastrous; for it is obvious that the hospitals will at once lose many of their old friends who liberally support them, while their new friends will no doubt bring them the best organization but little money. They will soon appeal for State help, and the best hospital system in the world, which originated with us, and has been growing for centuries, and has gradually established itself in every part of the country, gaining in usefulness and strength as the nation progressed in wealth, will be destroyed without good reason and against the wish and judgment of those most interested.

Members of the profession, and particularly the working staff, ought to have far more direct influence in the management of medical charitable institutions than has hitherto been generally accorded to them. It must be borne in mind that many of our most useful and most wealthy medical charities would not have existed but for medical men. Not a few were first established and supported by the doctors, who themselves took part in the actual work. None can be carried on without the cordial support of professional men. It is, therefore, clearly right that the wishes and views of those who do the principal part of the work should be considered and acted upon. The staff should always have a voice in the management of the charity, and no radical change ought to be thought of without their concurrence. So far, therefore, from our influence being reduced, in wisdom and justice it should be greatly increased. The adventurers who seem almost to think they have been sent by Heaven for the purpose of manipulating us and our work, who regard us as mere tools to use, or pawns to move about as they think fit, can easily find fields better suited for the exercise of their talent, and in which their labour would be more productive than in attempting the impossible, in organizing the unfortunate, and regulating and drilling the sick and suffering, until they fall into order under their arbitrary hard-and-fast rules and regulations. Illness, disease, suffering can only be regulated within certain moderate limits, and these are best known to those who have been for years working amongst the sick. We doctors take the rough with the smooth. Practically, we all do some work for nothing, and some amongst us are so situated that for the greater amount of work done they get no remuneration whatever—they and their patients nevertheless living and working usefully, and upon the whole well, far away from disturbing organizers and organizations.

THE QUESTION OF GRATUITOUS MEDICAL HELP TO THE POOR.

In discussing the question whether the profession ought or ought not to give gratuitous medical help to the lower classes of labourers and the so-called really poor, it must be borne in mind that what we give has nothing to do with money or property, but must be placed in a category by itself. It is not like giving a dole that might teach a man to whine and grunt, and sue for more. It is very different from giving him free breakfast and dinner, or free education for his children. We do not present him anything he had not before, or add to his worldly goods, or provide him with that which he can sell or hoard, or make profit by. Neither do we aspire to procure for him ease, or, to add to his luxury, reduce the hours of his work, or make it less hard. What we give does not tend to make him idle or more selfish, but rather the contrary. All we aim at, and are able to do, is to put him in the

way of getting back as soon as possible the health and strength he has lost, and with these his power of earning his livelihood; and if he is suffering pain we do our utmost to relieve it. After all, the medical help given only restores him to his natural state, and it really seems to me unreasonable to contend, that by help of the kind we are sometimes able to afford, any recipient by any possibility can be degraded in the very slightest degree. We are often asked to help in a great emergency, and under circumstances and at a time when it is unlikely the question of remuneration would occur to the mind. Sometimes, no doubt, advantage is taken of us, but, in certain cases, are we not bound to help and do all that we can, whether we gain or lose?

The doctor, like every other worker, it is truly said, must live, but, unlike most other workers, he is often called upon to help people in a strait—in an exceptional condition—in a great difficulty, and perhaps from no fault of their own, possibly from sheer accident, or bodily weakness acquired or inherited. If, at the time of trouble, they are without or almost without means, we cannot suggest that they must wait for help until better times, but must do all we can to assist them to get well as quickly as possible. If, in the case of a workman, illness is unfortunately associated with impecuniosity, if, as not uncommonly happens, he has spent all his money, are we to decline to try to relieve him, and to send him, it may be many miles, to hospital, or dispensary, or workhouse, when a little of our time, and perhaps some comparatively inexpensive drug judiciously prescribed, and which we may have ready, will afford almost immediate relief? Or, to take a still worse case, in which a few hours' delay might possibly greatly increase the danger to life, is it not wholly inconsistent with our feelings and principles to discuss about the man's means, and waste time in endeavouring to decide whether he is or is not a proper object for gratuitous medical help? Nay, is not our mind occupied with other matters, and ought we not to permit ourselves to be guided by the strong natural desire to do the best we can without delay? It must also be borne in mind that, although at the time of illness people may not be able to afford to pay anything to the doctor, a time comes later on when they are better off, and are glad to be able to do what is right. In many cases of the kind, the interference of third persons, however highly organized, and however good their intention may be towards us, might completely destroy long-established friendships, and interfere with the relationship between doctor and patient to the injury of both. And is it not passing strange that at the very time there is such an outcry against giving gratuitous medical help and medicine, great efforts are being made to introduce a system for giving food and clothes? Surely the last are more likely to discourage self-help and thrift among the wage-earning classes than our medical advice and physic. At any rate,

it seems certain that if the giving of food and clothes is to be justified, there can be no doubt whatever as to the propriety of giving advice, medicine, and medical comforts in very many cases.

Depend upon it, your own judgment, good feeling, and common sense will enable you to settle these questions as they ought to be settled, and without doubt or difficulty, and far more quickly than the interesting organizers, who are so very anxious to help you to get your due, would be able to effect. If our friends would allow honorarium questions to be settled by ourselves, and would kindly let our real or supposed interests, unorganized as they are, alone, we should be content. They do not perceive that their perfect and much-desired cheap medical institutions for encouraging thrift and all good will soon bring forth cheaper ones, from which still more economical health- and thrift-promoting concerns will in due order be evolved—damaging in many ways to the profession which was to have been assisted, not elevating or advantageous to the poor, not providing them with the good medical attendance desired, not tending in any way to increase the respect of the public for the medical calling.

In any other craft but medicine, such persistent interference would be strongly resented. Suppose an association constituted itself to provide law, or any other form of intellectual labour, at a cheap rate for the benefit of the working classes who were not considered to be able to pay the regular fees, would not the lawyers at least insist that they should be considered, and that the terms and conditions should not be determined by outside interference without proper consultation with themselves? And, as regards medical attendance on the working classes, this outside interference is the less justifiable, because in the past as well as during the present time the practical necessity of giving medical aid in some cases has been and is fully recognized and provided for by the profession in every part of the world. Some of these new associations seem to think that we are to work just in the way and on the terms they dictate. In short, they would deprive us of the right we enjoy with others—of giving our services when, where, and how we may consider right or proper or desirable. On the plea that they have satisfied themselves that they are better organized than we are, and know more about the facts than we do—contentions which to many of us seem curious, as we have been at the work for years while they know very little of the matter from our medical side—they would oust us altogether except as the obedient paid officers bound to execute their orders. It would be far wiser on the part of the public to help us who do the work among the poor, than to establish associations to dictate to us and to select the recipients of our help.

THE PROPOSED ORGANIZATION OF OUT-PATIENTS AND PROVIDENT DISPENSARIES.

A very favourite suggestion of self-constituted organizing philanthropists is that the number of out-patients attending hospitals should be limited. Now it must be borne in mind that a public institution gradually gets very widely known and poor patients come to it for help from very long distances, and it seems scarcely fair to tell a patient that he must come again because he is one over the number admitted for the day, and especially when the real cost of helping him is so very small. Again, among a great number of out-patients will be found some suffering from grave disease. Such by the present system are at once admitted into the wards and properly treated and nursed. To send away such cases, especially if they have come many miles, would be wrong, and it is obvious that the porter is not the proper official to be expected to take the responsibility of distinguishing the fit from the unfit.

Nor is there if the work increases the least difficulty in finding highly-qualified medical practitioners to attend the poor who come in increased numbers to the out-patient departments of hospitals. The staff can always be increased, and the increase is to the public advantage by the larger experience afforded to an increasing number of medical officers and by the prompt action taken in getting poor working people well as quickly as possible. Moreover, in case of the occurrence of any serious epidemic, we have the means and machinery of combating it ready, in thorough working order, available at any moment, and capable of immediate expansion and at excessively small cost to the community. No matter how bad the times might be our present medical charities are fully competent and, with a little temporary additional help, ready organized for almost any amount of work. Several of our hospitals in a week could be arranged to receive twice the ordinary number of patients, and considerable increase of funds would be immediately supplied by the committee and friends of each institution. Instead of this some would set in work the cumbrous and slowly-responding machinery of municipal or imperial taxation, possibly at a time when all classes were overtaxed and an expensive foreign war on our hands. In short, on all grounds it is better to leave these expenses to be provided as heretofore by the highly successful and practically unobjectionable voluntary system. Surely it is better to continue to utilize well-known and long-established institutions, which form centres of medical assistance conveniently placed here and there amongst our increasing millions, than to trust to the chances of establishing new ones equally good, and rearranging all upon new principles of cen-

tralization and organization, however perfect the untried scheme may appear on paper.

The capital asked for and to be expended upon any new movement will merely provide for part of the work which has been and is being performed with the aid of the capital already given by donors to existing hospitals, and employed according to the designs and wishes of the founders handed down and improved as time has passed and gradually perfected by successive committees.

Now is it right that wealthy or powerful and energetic enthusiasts in perfection that might be, having perhaps little practical experience, should interfere and try to stop or change all this tried and steadily flowing current of work and support, proceeding in many cases gently, usefully, and without interruption? Is it right to stop the work of an institution which has been useful in many ways for centuries unless the evidence of bad management, gross extravagance or something worse—impending paralysis—be clear and incontrovertible?

I wonder whether those who want to manufacture wholesale new medical institutions for providing the poor with cheap medical treatment are aware that in some neighbourhoods advice and medicine may be obtained for a fee of 6*d*., that teeth may be extracted for 6*d*., and that fully-qualified medical practitioners are the advisers and operators. Already in some poor neighbourhoods dispensaries have been started as speculative concerns, and it may well be asked—why should not an enterprising company finance new hospitals on a remunerative basis? The staff might be persuaded to pay large sums annually for the privilege of being connected with institutions so important. The scheme might be launched under some such title as the "Universal Diagnosis and Hospital and Dispensary Relief Association."

The last new efforts differ from all others in being backed by capitalists, and instead of being worked by the givers themselves or their representatives, are to be managed by organizers who will have immense power to give or refuse help, and from whose decision there can be no appeal. Refusal at one institution would mean refusal at all, and hard would be the lot of many an unfortunate person suffering from serious illness. But I regard it as certain that, if from any cause our old system of medical help supported by voluntary subscription should be ousted by some new movement, it will soon again revive, and even be more popular and more useful than ever.

Up to this time, the medical management of the sick in our hospitals and public institutions has been committed to officers who hold their posts for years and who gradually become well known. Reputation acquired by years of steady work brings credit to the institution which again helps forward the next generation of practitioners. In the great majority of cases the finances are devoted entirely to the

requirements of the patients. There is no self-supporting question in any form, and it is difficult to see how any really self-supporting system can be established which will work with fairness. Consider the expense of a single case of typhoid. Half or more than half the amount of wages earned by many a workman in a year will be required for proper nursing and day and night attention during the illness, to say nothing of the expense of change of air and suitable diet during convalescence.

In some of the new institutions springing up especially in poor neighbourhoods there is no certainty that the best practitioners will be appointed. In the dispensaries backed by the subscriptions of the wealthy and in the dispensaries started on a commercial basis the officers will probably be young practitioners receiving a fixed salary, the amount of which it is to be feared will be reduced as the number of applicants for the posts increases. These officers will have nothing to do with the general management, and will in fact be the servants of the managers by whom they are appointed.

In many neighbourhoods the dispensary patients would no doubt soon discover that the advice of the practitioners in the neighbourhood was as good as that to be obtained at the dispensary, and the cost little or no more. In this way the new evils may slowly be righted, but the loss to many individuals who have been working hard for many years and whose *clientèle* has been invaded by the new interests laying hands on all the patients they can find, will, it is to be feared, be as serious as it is undeserved. Some of the subscribers to the dispensary would probably have remunerated the doctor to the same and perhaps to a greater extent as private patients, and, from the closer relationship, have highly esteemed him as heretofore. But, according to the new plan, will he not have to attend many of the poorer class for nothing, and practically will he not have to do so, no matter what new rules, regulations, or organizations may be invented? Upon the whole, while the new system is established with the view of helping the doctor and adding to his too small income, like some other panaceas for the cure of existing defects as well as old faults and imperfections, it has had and will continue to have an exactly contrary effect. In exceptional cases in the country and in towns where there are not too many doctors no doubt the Provident Dispensary system has been of service both to patients and practitioners. It has worked well and will no doubt continue to work well, especially if the management remains in judicious hands. But the success of the new effort to extinguish voluntary systems in England, long ago established for helping the poor in sickness, and that have been in active work for years, will be fraught with disastrous results. I think it probable that in the course of time in many places the new plan will be found wanting and will give place to the reintroduction and revival of the sounder and more sensible method.

In conclusion then, I would venture to remark that, like some other modern movements, the Provident Dispensary system, though started in full confidence that it was to be of very great benefit both to the poor and the medical practitioners who attend them, and that it was to effectually overcome all the objections to the present system, will increase some of our present ills and effect the introduction of new ones from which the existing system is free. The fact publicly known that such and such practitioner receives a few pence for his attendance on dispensary patients will not raise him much in the estimation of persons who might be among his private patients, while if he helped some who could not command his services it would redound to his credit, though it would not help him to live.

There is yet another way in which the Provident Dispensary system is likely to damage the profession. Those interested in its success will of course endeavour to get the institution as widely known as possible, and will oftentimes unknowingly persuade patients of neighbouring practitioners to leave them and go to the dispensary or to be attended by the same practitioner through the dispensary. Considering the great number of well educated practitioners in every part of London and other large cities, and the very severe competition that exists already, it seems scarcely kind or wise on the part of persons having command of large means to use their capital in such a way as to lower the very low scale of remuneration which exists at present. But not only must provident dispensaries have this effect, but they will bring about a new and far more disastrous kind of competition, inasmuch as their success is certain to be followed by the establishment of cheaper dispensaries on a similar plan but still more effectually conducing to thrift and self-reliance among the subscribers, and necessarily still further reducing the pay of the unfortunate doctors who do the work of the dispensary, as well as giving more work and less pay to the practitioners near who do not belong to the institution. It is therefore on the highest grounds to be hoped that the rage for the new thrift and provident medical organizations will cease in populous cities where doctors abound. In small towns and villages where there are only a few practitioners, this and some other form of medical attendance clubs, carefully managed and moderate in ambition, will work well and be helpful to the people In such cases the medical dispensary or club can be established by the doctors themselves with the help of friends, or by the would-be patients, without the assistance or interference of any great central organizing power or property. The capital some would expend in establishing new provident dispensaries would be far more usefully employed in helping already existing medical institutions, clubs, hospitals, and other medical charities, than in starting new dispensaries and appointing new staffs pledged to make their work and themselves as popular

as possible irrespective of the ruin that may be wrought as regards other interests.

THE TREATMENT OF SLIGHT AILMENTS CONDUCTED ON THE SAME PRINCIPLES AS THAT OF SERIOUS DISEASES.

There is also this very cogent reason which impels me to direct your attention thus early in my course to the consideration of slight ailments. Many of the principles upon which the treatment of even trivial derangements is conducted obtain in the management of graver maladies, and in not a few instances you will find that attention to the relief of slight ailments will afford you great assistance in determining the proper course to pursue in the treatment of very serious forms of acute disease. For example, I shall be able to show you that the treatment of a grave disorder like acute rheumatism is based upon facts and reasoning which apply equally to slight affections of a rheumatic character. Fevers and inflammations of the very slightest degree afford lessons of the greatest value concerning the management of every disease of this class.

By carefully observing the action of remedies in slight ailments, we may gain valuable knowledge. And especially in the treatment of slight derangements of our own health may we hope to acquire definite information concerning the precise action of some of the most important of the medicines we employ. I am sure that any one who has experienced the change in his sensations which occurs after taking a few doses of ammonia in the course of an ordinary cold, or has noticed the pleasant alteration which takes place during an attack of quinsy as soon as diuretic and sudorific remedies have begun to act, or is practically acquainted with the relief afforded in biliousness, certain forms of indigestion, and sick headache by half or even a quarter of a grain of gray powder or calomel, will not only be convinced of the usefulness of the drugs, but will not altogether despise the views and practice of fifty years ago. Nor will he succumb to the nonsense of giving coloured water to his suffering contemporaries, or suggest that a number of cases of different forms of disease should be left without any medical treatment whatever, in order that what has been naïvely termed the "natural history of disease" may be studied,—the patient, of course, being persuaded not to complicate the interesting inquiry by longing for the relief of his suffering or for convalescence too quick for leisurely observation of the changes in the symptoms.

There are many valuable points connected with prescribing, which are of the utmost consequence, and which are to be learnt from the practitioner who is well acquainted with the management of slight ailments. I have often heard the remark that our predecessors knew

more about the treatment of disease than we of this generation do. There is some truth in this, and I am sure that many old practitioners now living have been very successful in relieving the aches and pains of their patients, perhaps more so than some of the young ones, who possibly may, nevertheless, have a far more intimate knowledge of the diagnosis of obscure forms of disease and of the minute changes which have damaged tissues and organs, but are apt to forget that all unpleasant aches and pains are not due to structural change and serious disorganization. Those of you who have worked under country practitioners enjoy a great advantage in this respect, and will be aware of many things connected with the art of prescribing for symptoms of which even men who have highly distinguished themselves in our medical classes and medical examinations may be in ignorance. Nor do I see how this very desirable practical information can be gained in any other way. I may try to convey to you some of the wrinkles I have learnt long ago from my own masters, but shall only very imperfectly succeed. To offer remarks on the details of treatment when sick people are being treated in the country surgery is very advantageous, but to attempt to give in lectures or at the bedside of serious cases of disease detailed information as to the combination of remedies in pills and mixtures, and a number of things practically of considerable importance, would be tedious, and would take so long a time that one could not expect a class to listen with attention. I shall, therefore, only venture to trouble you now and then with details as regards prescribing, but it will be well for you to take note of particular prescriptions, which I have frequently found of great value in the management of cases of deranged health—a most important class, always requiring our attention.

IMPORTANCE OF KNOWLEDGE DERIVED FROM MICROSCOPICAL INVESTIGATION.

In all healthy changes, in all derangements, in all forms of disease, thousands of minute particles, each of complex arrangement and composition, the action of which *does not depend on their structure*, are implicated. It is by the increased action or want of action on the part of multitudes of these that the broad phenomena evident to us as disturbed actions, and derangements and morbid changes, are occasioned. Do not, therefore, cast a slur on the consideration of minute details; do not neglect the facts arrived at by microscopical investigation. Rather, on the other hand, try to acquire the power of seeing in imagination the very particles which are involved, and of contemplating the phenomena proceeding in connection with them. Bear in mind too that around and in the interstices between the molecules of matter composing each

elementary part of a living organism changes are constantly taking place. Remember that of the matter of the elementary part it is the bioplasm only that *lives* and is the seat of the *vital action*. The formed material which results from the death of particles of the bioplasm is the seat of physical and chemical changes only.

These elementary parts or cells are so small that more than a thousand thousand of them might not occupy more than a cubic inch. Each during life is the seat of incessant change. Towards the bioplasm of each elementary part streams of fluid, holding various substances in solution, continually tend, and, having reached it, part with certain constituents, which are taken up by the living matter, and while in its substance converted into living matter having the same properties and powers as the already existing bioplasm. The fluid, deprived of some constituents and having received products of *débris*, again traverses the formed material, and is taken up by the blood or is otherwise disposed of. Thus the formed material or tissue of every organ of the body is the seat of the passage to and fro of streams of fluid, and each part is being continually bathed by fresh portions of fluid, bringing and taking away dissolved in it things required for use or things which must be got rid of. This continual movement of fluid characterizes everything living that exists or ever has existed from the lowest to the highest. In every form of plant and animal it is present and is essential. When the flow is impeded derangement results and degeneration and decay may commence; when it stops death takes place, and the portion of tissue thus losing the preservative influence exerted by the never-ceasing currents of fresh portions of fluid through its most minute interstices undergoes chemical decomposition, just as a portion of tissue taken from a dead animal would do if kept artificially at a temperature of 100°. If the change stops in a single elementary part or in a few elementary parts, the products resulting must be gradually removed, or adjacent elementary parts will die and more poisonous products result. The deleterious gases and other poisonous substances formed, if there is no vent by which they can escape altogether, may pass into the blood and contaminate or actually poison every drop of the nutrient fluid, or may, by transudation into adjacent tissue, destroy considerable portions of it by causing the death of its living matter. In this way a large portion of tissue may soon be involved and the death of the individual must shortly follow.

There is, in fact, a constant circulation—a constant interchange of gases and certain solid matters dissolved in fluid, some of which are appropriated as nutrient material, while others are removed as products of decay. This never-ceasing circulation goes on around and amongst the smallest particles of all tissues and organs. Slow-moving tiny streamlets bathe the very molecules of the cells or elementary parts, and

thus minister not only to the growth and increase of the bioplasm, but by aid of these currents alone can the formed material of the different tissues be preserved in a healthy and active state. What may be correctly termed an *active inter-molecular circulation* is one essential condition of a healthy state of tissues, and it will be well for us to occupy a few minutes' time in its consideration.

This interstitial circulation taking place in every part of all organs and tissues is absolutely necessary for their free action and for the preservation of their structure. Its complete or partial cessation is very soon followed by actual degeneration or by the deposition of substances calculated to produce a deleterious action. The interstitial inter-molecular circulation requires in most persons, and in all those who live too well or even moderately well, a little assistance from time to time. Especially is this necessary in the case of those who consume much nutrient material in proportion to the muscular and nerve work they discharge. Free action of skin, kidneys, and bowels is the principal means by which the activity of the interstitial flow may be increased. Hydropathic and bathing systems generally are beneficial, and those who suffer ought to carry out the same general plan less continuously and energetically perhaps, but from time to time, on their return home, and in this way complete the gradual cure and prevent further tendency to adverse changes. If the removal of matter from the blood is properly effected, the interstitial flow in the tissues and to and from all the capillary vessels will be promoted.

In plants the inter-molecular circulation is equally essential, and the constant removal of fluid consequent upon evaporation from the surface of the leaves and flowers is one of the most important of the operations concerned in establishing and maintaining a very free circulation of fluid around and in and out of every living cell of the plant. Even in the lowest, simplest, and most minute of living forms inter-molecular circulation begins with existence and never ceases until death takes place. It is one of the phenomena constant in and characteristic of every form of life, but it is peculiar to living things. There is nothing like it in any non-living matter.

The importance of the continual flow of fresh portions of fluid through all the formed material or tissue of every part of the organism cannot be exaggerated. The rate of flow changes from time to time, and though it may sometimes take place very slowly, the movement never stops as long as life lasts. You must try to picture to yourselves these never-ceasing movements of fluids simultaneously proceeding in every elementary part of every tissue of the organism, though it may be considerably less than the one-thousandth of an inch in diameter. It is obvious that the activity of these movements will in some measure depend upon the quantity of fluid taken up by the blood. If the

nutrient fluid is habitually deficient in water, more especially if it be surcharged with only slightly soluble materials, there will be slow molecular circulation and a tendency to the deposition of some of these slightly soluble matters in tissues where the circulation is slowest. It is in this way that urates are deposited in fibrous tissues where ordinarily the circulation is slow, in cases of gout. When we treat the condition we cause the introduction of substances from time to time into the blood which have the property of exerting a solvent action on these slightly soluble compounds. In this way their deposition may be prevented, or, if deposited, their resolution and reintroduction into the blood, and at last their excretion from the body, may be effected. The knowledge of the phenomena proceeding in the interstices of tissues enables us to understand precisely how many of our remedies act. The careful consideration of such minute changes may enable us to suggest methods of treatment in various cases of great importance and value, and the frequent contemplation of the phenomena may and probably will result in the suggestion of new and better remedial measures.

We may act upon the formed material itself, rendering it more soft or more firm, help or interfere with the deposition of insoluble matters in its substance, influence the growth of bioplasm, assist the removal of products of its death, and bring about many changes of the greatest consequence in treatment. Many of the diseases we have to diagnose and treat are due to a disturbed state of this inter-molecular circulation, and not a few of the most serious morbid changes result from diminished activity of the flow. Thus many matters which ought to be washed away accumulate in the interstices of the tissues and impede their action.

When we can restore this molecular circulation to its normal state derangements of various kinds are at once relieved. In treating many forms of established disease our principal object is to increase the activity of the inter-molecular currents in the interstices of the tissues involved. This object may be fulfilled in several ways. In many cases free perspiration and indraughts of water will effect it; sometimes the administration of frequently repeated doses of alkali promotes increased activity of the inter-molecular circulation, and assists the solution of imperfectly soluble matters which have been deposited or are in course of deposition.

Looking from the point of view I have indicated, it will be well to consider, for example, what is the precise action of quinine when it cures in a few hours certain forms of obstinate lumbar pain, what happens when local thickening of the subcutaneous areolar tissue and inflammation of the sebaceous glands, that may have lasted for months, subside in a fortnight or less under the influence of biniodide or other preparation of mercury.

In cases in which too much nutrient material has been day by day introduced into the blood for considerable periods of time, slow circulation or stagnation of some of the molecular currents in various tissues and organs of the body will occur. Diminishing to some extent the quantity of blood in the body, as may be effected by partial starvation, or rather by a moderate diet for several weeks, will again promote the flow. Free perspiration will have the same effect. The imbibition daily of several tumblers of water will, by favouring the free action of the kidneys and transudation of fluid from the blood, also benefit the patient. Water containing alkalies or salts of vegetable acids, particularly the citrates and tartrates, will, by exciting cutaneous and renal action help to re-establish currents in the several tissues and organs in which the molecular circulation has become unduly slow or may even have ceased for a time. By promoting purgation and sweating and the free action of the kidneys we favour the circulation of interstitial fluid in all the tissues and organs of the body. It is in this way that any imperfectly soluble substances deposited are dissolved and removed in solution. By exciting these processes from time to time, the deposition of any insoluble matters in the case of persons predisposed is prevented. And the greater the excess of nutrient matter over the exact amount required, the more important is it to encourage these processes of elimination. In other words, he who lives well requires free action of the skin, kidneys, and bowels far more than does the person who lives abstemiously.

Further, when we consider the close proximity to the very thin walls of these tubes of the nerve-fibres distributed to the capillaries, we shall not feel surprised that nerve changes are among the prominent and constant phenomena of disturbed molecular circulation. Any change occurring in the composition of the blood, which results in a diminished tendency on the part of the fluid constituents to permeate the vascular walls, will give rise to disturbance of the nerve-fibres just outside the capillary vessels. If the capillary vessels are over-distended or insufficiently filled with blood, these nerve-fibres will also be disturbed and will transmit impressions to the nerve-centre, which will react upon the efferent nerves leaving the centre and at length distributed to the muscular fibres of the small arteries. This change results in dilatation or contraction, as the case may be, and may perhaps lead to a more serious and more widely distributed nervous disturbance. But this part of a very complex question will be more conveniently discussed when we have to consider the vascular phenomena of Inflammation and Fever.

DISEASE GERMS.

From vague ideas about subtle poisons and imponderable or scarcely ponderable entities we have gradually passed to actual fact-knowledge We have been slowly learning more and more during the last twenty or thirty years, and the researches of Pasteur have taught how in certain cases we might see and study, isolate, and grow, and experiment with the actual material that established the destructive morbid changes which may take place in the organism of the sufferer. During recent years numbers of highly skilled observers have been conducting the most elaborate researches with such success in every direction that multitudes of new facts of the highest importance have been discovered, and every few months some important demonstration is added to the volume of knowledge. To give a correct idea of what is now known and the precise bearing of many of the established facts in a few pages is not possible, and many observers are unable to accept as general propositions many of the broad conclusions which have been embraced by not a few of those who are rightly regarded as very high authorities. Not only so, but, I fear, I must confess to entertaining doubts which must needs prejudice many against views I have ventured to put forward. Although in the abstract, scientific investigation is of all things free from the influence of authority, it unfortunately happens that as regards conclusions, and the acting upon conclusions, authority plays a very strong but unfortunately not always wise or reasonable part. I shall, however, venture to discuss the matter under consideration as it seems to shape itself in my own mind, and bear as best I may the punishment authority may pronounce.

Before concentrating our attention on the question of the nature of the material which is concerned in the propagation and spread of communicable diseases, I shall offer a few remarks concerning the action on the system of one or two of the many classes of poisons which may be introduced into the blood. It is remarkable that our knowledge of the actual changes which occur in cases of quick death from poisons is still very imperfect. Even in the case of a potent agent like hydrocyanic acid, the broad effects of which are so very obvious, sudden, certain, and constant, we are still unable to give an account of the actual phenomena so quickly following one another, and involving disastrous and irreparable damage to the delicate and ever active elements of the nervous system, and which so soon result in the cessation of all living action. The action of poisonous matters which immediately stop or seriously disturb the respiratory process, or which paralyse the heart, is more obvious, at any rate up to a certain point of the destructive change; but of the exact nature of the phenomena which occur in the

working elements of the organs, we are still ignorant. Then there is that wonderful class of death-producing substances to which the poison of the rattlesnake and of other venomous snakes belongs, and which may be dried, or boiled, or frozen, or acted upon by strong alcohols, and kept for any length of time in a dry state without loss of potency. This remarkable substance, according to the researches of Weir Mitchell and Reichert, seems to be allied to peptones which result from peptic or tryptic digestion. The action of certain matters in a state of putrefaction may belong to the same category, but, at least, many of these have been proved to be due to, or are complicated by, the action of the living bacteria they contain. Allied to putrefactive substances are some of those remarkable chemical compounds formed during the life of certain bacteria and fungi, or immediately resulting from their death. Nay there are substances which appear to be formed under certain circumstances by these organisms, and which ensure their own death, and then cause that of the textures among which they have grown and multiplied.

As we are unable to adequately explain how such poisonous substances as opium or hydrocyanic acid bring about the changes in living matter which result in its death, we shall not feel surprised that the exact action of living particles so minute as the particles of various kinds of contagium has yet to be ascertained. In the action of such substances as the poison of venomous snakes, putrid substances, hydrocyanic acid, strychnine, certain forms of pus, and certain bacilli, we have examples of so many essentially different destructive agents, all capable of causing death. But each acts in a different way, though all may kill the living matter, if not directly, by bringing about a state or condition which quickly has this effect. We are not able to give a rational account of the actual changes effected by any one of them from the time of its entrance into the body to the time when the death of the living matter upon which its influence is brought to bear is occasioned. Nor are we at present able to say what is the nature of the alteration which first occurs when the living matter enters upon that series of changes which soon ends in its death.

Although broad well-marked phenomena characterize the action of many of these poisonous substances, and the effects of their action are so well marked and distinctive that from the broad symptoms alone we can sometimes point to the particular poison at work, the actual disturbances taking place in the ultimate particles of nerves, or nerve-cells, or in the constituent molecules of the living matter of the anatomical elements, have so far eluded our grasp. We cannot even conjecture how any one of these poisonous substances produces the disturbance, or stops the vital processes in the living bioplasm. The instant the poisonous matter comes into contact with the moving,

growing, and living matter what striking changes must occur! Is the portion acted upon actually destroyed and cast away from the rest? Is the series of normal chemical changes that was proceeding interfered with? Are the molecules merely disturbed in their relations to one another; the living matter jarred or shaken, so that the changes that were steadily proceeding are for a time brought to a stand still, or is the relation between the elements to one another in the living particle disturbed and entirely altered?

It is certain that the changes occurring in the living matter of the organism are not the same in every kind of death; and decompositions, which in some cases seem to begin before death has actually occurred, in other instances are postponed till long after death has taken place. It may be fairly asked whether the sudden death of multitudes of masses of living matter as contradistinguished from the death of one after the other, particle by particle, will account for the difference. In the case of bites from some venomous serpents decomposition is said to begin in the neighbourhood of the bite within a few minutes of the introduction of the poison, which looks as if all the living matter in the immediate neighbourhood of the affected tissues died instantly, and the circulation of the interstitial fluid suddenly stopped, so that putrefactive decomposition must take place and spread very rapidly. The venom of poisonous snakes upon being directly mixed with the blood prevents coagulation, but decomposition soon follows; while hydrocyanic acid produces what we call a sedative action on the nervous system, paralysing action, and stopping the vital movements of the bioplasm, but it seems to arrest fermentation and putrefaction.

When certain quickly acting poisonous materials are introduced into the blood, the bioplasm not only of the blood itself, but of the capillaries and of the nerve-fibres lying close to their walls, is very soon killed. The considerable amount of products of rapid decomposition from a considerable area being thus quickly introduced into the blood would soon cause the death of any bioplasm that might have escaped the action of the poison in the first instance, and being quickly diffused through the tissues in the neighbourhood, the death of further particles of bioplasm must soon follow.

Now, with reference to the material concerned in the spread of communicable diseases, our knowledge up to this time has rendered it certain that, at least in a great number of cases, the communicable matter is in a living state, that is, capable of growing and multiplying under certain favourable conditions, and perhaps of lying dormant, but still retaining its vitality under circumstances not so favourable. If it dies its potency ceases, and can never be regained. At the same time it is conceivable that there may be disease carrying particles passing from the infected to the uninfected, which, although not in a living

state, may nevertheless cause the production in the body of the sick person of substances which by coming into immediate relation with the blood and fluids in a certain condition may start chemical and other changes similar to those in the course of which the original particles were formed.

While it is true that the communicated material is in a great number of instances composed of matter in a living state, the nature of the living matter is very different, absolutely different in certain different forms of disease. The conclusion which by some is believed to be established, that contagia generally consist of one class of substance only is, I think, untenable at this time. The contagia of small pox and of the vaccine disease belong to a category distinct from that in which those of anthrax, septicæmia, or relapsing fever would be included. These differ in their nature, the mode of their action, and in their origin. Cancer, and leprosy, and tubercle are not contagious in the same sense that scarlatina, measles, and typhus are contagious, though the contagious material of all is no doubt in a living state.

The contagia which are the active agents in transmitting disease all consist of matter in a state of division so minute that the active particles will pass readily through the walls of capillary vessels without the occurrence of any rupture or opening, and may then travel for a considerable distance, suspended in fluid, in the interstices between epithelial cells, and even through the substance of the cells themselves. We know indeed that particles many times greater will traverse considerable distances, and will pass through most of the tissues of the body, and ultimately reach an organ, at a considerable distance from the point of the entrance, and where they grow and develop very rapidly.

That the minute particles of contagium, many of which are less than the 1–100,000th of an inch in diameter, consist of living matter is conclusively proved by the fact of their wonderful increase and multiplication in the body, and in suitable media in the laboratory. Every one entering the body is soon represented perhaps by a million or more, which leave it after the attack is over, and which may thus spread the disease far and wide in all directions.

Many disease-producing living particles retain their vitality for a considerable time after they have left the seat of their production, and some under very adverse circumstances. Certain forms may remain in a dormant but nevertheless living state for a very considerable length of time, in some cases perhaps to be measured by centuries. A single minute living particle gaining access to or being carried into a position in which the surroundings are favourable, and the proper pabulum abundant, will soon grow. And it multiplies exceedingly, for each of the thousands of resulting particles undergoes the same process till count-

less millions, each one having the same properties or powers possessed by the parent particle, result.

The demonstration of minute organisms, bacteria, bacilli, micrococci, and the like in all the tissues and fluids in many contagious diseases of man and animals from the highest to the lowest, and in plants from the most complex to the very simplest kinds, and the discovery of numerous well-characterized species of these with most marked individual specific characters, necessarily led many to accept the conclusion that the causation of all contagious diseases had been successfully elucidated, and that the true cause of every form of every communicable disease was the bacterium, and that every form of contagium was a species of bacterium. But, alas! many who have been following with the greatest interest and care the truly wonderful discoveries in this practically new department of knowledge of the last ten years have felt quite convinced that the inference that all the contagious poisons were of the same nature was a mistake, and that to attribute all communicable diseases to bacteria and allied organisms was not at any time to be justified by any facts and observations recorded. Now it would seem that we are again approaching the road by which we may eventually reach the conclusion much nearer to the truth that contagious poisons are not all of the same nature. That some are bacteria is certain, but some, as I have said, are undoubtedly derived from the living matter of the body itself. Under this last head we must admit the possibility of the origin from time to time of some new disease producing germ. Again, it is possible that some contagia may partake of the nature of peptones, which without being living set up chemical changes, which, having once commenced, spread from particle to particle, by virtue of some contact action, the exact nature of which has still to be ascertained. While it seems possible that certain complex chemical organic substances, which, though incapable of multiplication, may nevertheless initiate changes in an unaffected organism and establish phenomena like those which occurred in that in which these chemically active substances were formed.

But if all contagia agree in being composed of living matter, they do not all belong to the same class or category. Some are themselves organisms that live like parasites in other beings, some possibly changing their characters at different periods of developmental progress towards a form of life very different in character from them. Some contagious disease-producing particles consist of a form of living matter very nearly related to, and indeed emanating from, that of the organism and result, in fact, from abnormal growth and multiplication of certain forms of living matter of the tissues or fluids of the body. In this process of descent from the bioplasm of a high to that of a low degraded form, the living particles lose some of the most striking of

their original powers and acquire new ones, different from any possessed by the higher bioplasm from which they came.

The most important of the living disease germs which are instrumental in spreading contagious diseases, and which alone I shall consider in this place, are the following:—1. Bacteria, micrococci, and the still more minute germs of these and allied organisms. 2. The germs of microscopic and perhaps other fungi of various kinds. 3. Minute particles of living matter originating in the living matter of the organism itself.

OF BACTERIA, BACILLI, MICROBES, MICROCOCCI, AND ALLIED LIVING ORGANISMS.

Although there is much yet to be learned before we shall be able to give a full and accurate account of the exact way in which these, perhaps the lowest of the low forms of life in the world, are connected with disease and death in man, and in all animals and plants, so much has been demonstrated of late years towards proving that, at least, in some if not many instances, there is a true causal connection, that it is necessary that our attention should be directed to the consideration of a question of such great interest and consequence.

While actual proof that the bacteria really cause the disease is in many cases wanting, the evidence in some seems to be so strong that it is not easy to avoid the conclusion that the connection is direct and intimate. On the one hand, I shall have to draw attention to the fact that many, perhaps hundreds of species of bacteria are as harmless as their presence is universal, and, on the other, that the entrance of some into the organism is so soon followed by characteristic symptoms exactly repeated in case after case, that we cannot doubt for a moment that the minute living particle by its growth and multiplication in the blood and fluids of the organism, and by the changes it causes during its growth, gives rise to disease and death. Of examples of harmless bacteria you may find millions in and amongst the epithelial particles of the mouth and tongue of every one. Of the death-causing bacterium I cannot give you a better instance than that of anthrax. So certain is its influence that if but a single living particle less than the one hundred thousandth of an inch in diameter be introduced into the blood of certain animals they will almost certainly have the characteristic symptoms in a short time, and will almost as certainly die.

Wherever organic matter is undergoing change and disintegration in an organism, or outside it, at the temperature of man's body, or some degrees lower or higher than this, and in some cases at a much lower temperature, such organisms exist in countless multitudes, and grow and multiply at the expense of the disintegrating organic matter. At this

time of the year (October) there is not a leaf in which you will not find millions of low vegetable organisms in various stages of development and growth. As the organic matter of the dying leaf or plant undergoes change, and the decomposition of its more unstable compounds commences, the circumstances specially favourable for the growth and multiplication of many of the microscopic fungi are established. Fungus germs exist in the air at every part of the earth's surface at all times. Though by no means constantly present in precisely the same amount, some are always to be detected in appreciable numbers, if the air is properly examined. Many, coming into contact with the moist surface of the leaf about to decay, find there a surface favourable for their development. The spores germinate, and from the surface of the tissues of the plant the growth easily makes its way into the substance.

But are we to believe, on the one hand, that the decay of the leaves is due to the fungi, or, on the other, that this decay is the cause of the development, growth, and multiplication of the minute organisms? All that can be proved by facts and observation is that as the leaf grows old substances are formed which are easily appropriated by the fungi. The germs of fungi are present and are ready to develop just at the time when the appropriate pabulum is formed. The fungus does not spring from the leaf, neither is the leaf caused to grow old by the fungus, and its deterioration begins before the growth of the fungus commences. The fungus is in no sense either the cause or the consequence of the decay. And in the case of the higher animals and man, at least in many instances in which low organisms are associated with morbid processes, these last are neither the cause of disease nor are they produced by it. Fungus germs and micrococci of various kinds, being present, will grow and multiply whenever the surrounding conditions may be favourable for the multiplication of each particular kind. If the conditions remain for a considerable time unfavourable, the germs if present remain quiescent, and may at last die, though probably many such germs retain their vitality in a quiescent state for many years, and some perhaps for centuries.

Nor are bacteria and micrococci found only at this period of the year (autumn) in connection with dead and decaying vegetable tissue. At all times millions are discovered in every particle of earth near the surface, and upon all bodies near it, in it, and upon it, in the bark and among the tissues of every tree and plant. In the vegetables and fruit we eat are countless multitudes of living growing organisms. Look, for instance, at the cells of a piece of lettuce or of the leaf of the watercress, nay, even those in the leaf and stem of the young and rapidly growing mustard and cress. There you will find, if you examine thin sections or the separated cells under a magnifying power of three

hundred diameters or more, millions of little bodies, each of which is capable of giving rise to countless multitudes in a very short time. If you carefully study the revolving living matter of the cell of the leaf of the Vallisneria, you will have no difficulty in discerning some of these low organisms in close proximity to the living moving matter of the plant itself. So very close, indeed, is the lowest living particle to the highest during its life, that no wonder the material of the latter falls a prey to it at last. The instant the higher living matter ceases to live it is invaded and appropriated by the ever-growing bacterium—the most constant, the most unchanging and universal of all kinds of living things, and, if I mistake not, of all the survivor; but whether it be of all things the most fit to survive you may decide.

As with regard to deteriorating vegetable tissue, so it is with decaying animal tissue. Whether the body be in a state of health or disease, wherever tissue or any form of organic matter is about to undergo disintegrating chemical change, wherever decomposition is taking place, or is approaching, the conditions will be favourable for the growth and multiplication of certain low organisms, the germs of which are present. But long before any changes akin to deterioration and decay are ordinarily supposed to commence, even from the very earliest period of construction and growth, bacterial germs are ever present, ready to grow and multiply should the death and disintegration of a living particle occur, or even if the interstitial circulation of fluid should cease from any cause. No wonder, then, that we find so many low organisms growing in connection with the old decaying epithelium of the mouth and of the tongue, of the œsophagus, stomach, intestines, and other parts. Under certain circumstances, the fungi grow and multiply to a vast extent in the lower part of the alimentary canal, as I shall presently explain. We cannot suppose that such organisms do harm; for patients suffering from maladies in which the alimentary canal seems to be almost filled with bacterial growth recover, and without damage to any textures having been occasioned.

I have not studied the epithelium from the mouth of a savage who has never been in contact with civilised man, but, without having actually looked, I think I may feel pretty confident that similar low vegetable organisms, and of the same species, would be found growing in the cells just as they grow in those of our own mucous membrane.

In the lower animals, organisms of the same general character abound. If you examine the tongue of the dog or of the cat, of the sheep or of the ox, you will find that the same sort of changes are constantly going on. Everywhere the old epithelial cells are being invaded by low organisms, which grow and multiply as they do in the epithelial cells of man himself. Multitudes, of course, pass down into the stomach, and, under ordinary circumstances, many are probably de-

stroyed during digestion by the action of the gastric juice and bile, and other fluids, which are poured into the alimentary canal. Those that are not destroyed certainly do no harm. In the healthy state they either do not grow and multiply at all during digestion and assimilation, or only to a very slight extent.

In the case of animals the introduction into the stomach of fungi of very many species and other low organisms in countless numbers constantly proceeds upon an enormous scale. Every mouthful of water consumed by sheep, oxen, and other animals constantly teems with myriads of low vegetable and animal organisms in various stages of development; and in the food taken bacteria and many species of fungi in various stages of development are present, as well as the sporules of many different species. But although millions of living fungi are always entering the alimentary canal of man and animals without doing harm, and probably without growing and multiplying there to any great extent, there are circumstances under which a different state of things is met with. If the stomach is out of order, if the bile and other secretions are deranged, or if from some temporary or permanent impediment to their passage they are not poured into the alimentary canal in proper quantity, phenomena totally unlike those characteristic of the healthy state are induced.

Many an infant has suffered from the extraordinary development of bacteria in its alimentary canal, and some children die from the state of things thereby induced. But the bacteria cannot correctly be regarded as the cause of the departure from the normal state. That is to be sought in the secretions and in the action of the glands prior to the multiplication of the organisms. I have seen every part of the cavity of the stomach, and of the small and large intestines of an infant filled with curdled milk which had not undergone the slightest digestion, and every particle of which, when under the microscope, almost seemed to be composed of bacteria, so abundant were these bodies. Sometimes, however, bacteria grow and multiply in the milk of the mother before it has escaped from the breast, and the changes effected in the milk by the growth and multiplication of these organisms, it need scarcely be said, render it quite unfit for the sustenance of the infant; and such milk, were it taken, would, except perhaps in the very strongest children, give rise to serious derangement of the digestive organs. In such a case the maternal secretion must have been out of order at the time of its production, or the bacteria would not have grown and multiplied in it. It is certain that in such secretions and in the glands that produce them ordinary bacteria-germs are invariably present, but they do not generally increase and multiply until long after the secretion has been discharged from the gland.

Erroneous notions have been spread far and wide by sensational

phrases like "Dust and Disease." The dust which causes disease is of a most exceptional kind. It has been said that the air of the Swiss mountains is devoid of bacteria. But is the health and vigour of the inhabitants of the Alps to be compared with that of the workers on the Paddington Dust Heaps?

There is, probably, not a part of the body of any one of us of a quarter of an inch in diameter where bacteria germs are not present. Certainly every time we eat, myriads are carried into our alimentary canals; and every time we breathe, except in the very purest atmosphere, multitudes pass into the air-passages. So small are these bacterial germs, that they would pass without the slightest difficulty through thin membrane and through the interstices of any of the tissues of the organism in all directions; and yet the public is taught that there is some intimate connection between bacteria and dust, and morbid phenomena.

Ordinary bacteria are indeed harmless enough; they exist in us without disturbing us in any way, but they only grow and multiply in great numbers when circumstances become favourable. I can give you positive proof that bacteria germs exist not only upon the surface of the skin and mucous membranes, but in the internal organs, in the interstices of healthy tissues, and in the blood itself. The view, therefore, that when these organisms are found in the tissues and internal parts they have entered from without shortly before their presence was detected, is incorrect. Some years ago I examined the layers of a fibrinous clot which had been slowly formed from the blood in the interior of a large aneurismal sac of the aorta of a man who died of the disease. The body was examined six or eight hours after death. The aneurism had existed for many years; and probably some of the layers of fibrin which had been deposited were almost as old as the aneurism itself. Now I found that in all parts of the firm, laminated, leather-like material, which served to greatly increase the thickness of the wall of the aneurismal sac, there were indications of disintegrating changes having taken place. Upon carefully examining minute pieces of the fibrin under high powers, multitudes of bacteria and their germs were discovered without difficulty. But the older layers in the outer part were here and there softened, and portions of the fibrinous matter seemed eroded, many small masses of soft and broken-down material being present. All these teemed with bacteria, moving, growing, and multiplying.

Now these bacteria, like the fibrin in which they were growing and multiplying, were within the vascular system and very close to the blood, internal to the several tissues constituting the wall of the vessel, which was dilated to form the aneurismal sac. From their immense number and from the eroded state of the layers of fibrin, the

bacteria must have been growing and multiplying in the lifetime of the patient, and for many months before death. They could not have got into the position in which they were discovered from the outside, for it is hardly conceivable that a bacterium could find out, while yet outside the body, that within the vascular system of a particular individual there was material very suitable for its growth and multiplication. Neither in this case was it possible that the bacteria could have made their way from without to the situation in which they were found, nor could they have effected in the course of a few hours the extensive erosions and softening of the fibrin observed. Hypotheses such as these could not be suggested with any show of reason. The only conclusion, therefore, in accordance with the facts of the case and with common sense, is that which I have adverted to :—viz., that bacteria germs exist at all times in all parts of the body, even in the blood itself during the healthy state. As long as the normal state of things exists, the ordinary living bacteria germs in all parts of the organism do not grow and multiply, but when any change occurs of such a character as may result in chemical decomposition, the germs multiply. The multiplication proceeds in decaying tissue elements although we are alive, just as it takes place in dead animal and vegetable matter out of the body. Under certain circumstances bacteria grow and multiply in the capillaries of a tissue or organ, causing local obstruction or stoppage of the circulation. And the process will occur in every part of every one of us a very few hours after death has taken place.

In face of such facts, it is not reasonable to accept the doctrine that bacteria, fungi, and such like organisms are invariably morbific, or disease-producing, or are of themselves, at least under ordinary circumstances, productive of harm to the organism into which they pass. The theory that such organisms, or closely allied organisms, or their pathologically modified descendants, constitute the actual poison of most of the contagious diseases from which we suffer has been taught and accepted far and wide, and is now by many regarded as a true general principle. There are, however, many contagious diseases which are not due to bacteria, and it has been shown that many bacteria do not cause any disease at all. If then bacteria germs constitute the actual, material, living particles by which specific contagious disease is propagated, they must be special or peculiar bacteria, totally different from the ordinary bacteria germs which exist, and have existed everywhere. The ordinary bacteria may certainly grow and multiply enormously on the mucous membranes of the body, in follicles of the mucous surfaces and in viscera—intestinal canal, bladder, and passages therefrom—nay, even amongst the elements of healthy growing tissues, without causing any disease whatever. Bacteria germs, low fungi, and perhaps some low algæ may exist in the tissues and fluids of the human organism. As you

may convince yourselves at any time, millions of such living bodies are unquestionably present during every moment of existence in health on the surface of the dorsum of the tongue. Multitudes, as I have said, pass down the alimentary canal every time we swallow food or fluid. But putrid fluids loaded with bacteria are not innocuous. Organic matter in a state of putrefactive decomposition when introduced into the alimentary canal may give rise to pathological phenomena irrespective of the bacteria it may contain, and from the bacteria present bacterial growth may spread to the destruction of tissues and most important organs, and the poisoning of the whole organism may be brought about in a very short time.

MODE OF ACCESS OF DISEASE GERMS.

Contagia gain access to the organism in different ways; some suspended in the air we breathe, as those concerned in the production of Influenza, Whooping Cough, Measles, and other diseases, if, indeed, these affections are bacterial in their nature; some floating in the water and liquids we drink, some mixed with our food. For the passage of some into the blood an open wound is necessary, Vaccinia (?), Rabies, Syphilis, Glanders (?), Erysipelas, Pyæmia; though whether these conditions are actually due to bacteria is still an open question. For others, long exposure to the frequent or constant presence of the minute living organism seems to be an essential condition. In this last case it may be that the organism, retained possibly for a long time as in a fold of skin, at last begins to grow; and diverticula from it, or possibly spores considerably smaller than itself gradually gain entrance into the body, make their way to favourable situations, and grow. Or possibly, in the case of persons not influenced by the wide-spread belief in the great importance of cleanliness, these organisms or their germs may long retain their vitality in the mixture of secretion from within and dirt from without which collects in folds of skin and even on parts of the surface not exposed to friction. Only by very slow degrees do the living germs at last gain an entrance and establish themselves in the tissues, but when this happens, changes characteristic and terrible soon result.

For the successful and rapid growth and multiplication of most of the bacteria, outside as well as within the organism, rest seems a favourable, if not an essential, circumstance. A calm state of the air, more especially if associated with a considerable degree of moisture, still water, or other fluid, the surface of decomposing organic matters unruffled by air currents or internal movements, slow circulation or actual stagnation of the fluids within the body, are the conditions most favourable to the rapid growth and multiplication of the organisms.

On the other hand, the opposite state of things is inimical. It is therefore that which we endeavour to establish in order to prevent bacterial growth and accomplish the destruction of bacteria. Frequent cleaning of rooms, moving things in all the corners, brushing, sweeping, scrubbing, airing every part of rooms and passages, warming air, opening windows and doors so as to create air currents—causing water to flow freely and frequently through all pipes and water courses—interfere with the multiplication of bacteria. Whether by these or any other means the destruction of all or nearly all the organisms present is achieved is, indeed, doubtful, but that their numbers are greatly reduced, and many caused to pass into a dormant, inactive state, in which though they live they cease to multiply, is pretty certain. Many contagia enter the body suspended in the air or supported on dust particles floating therein; not a few are directly introduced with water and different kinds of food. Some require to remain in contact with a certain part of the surface for a considerable time before they can gain an entrance, and some can only get in through a wound or abrasion, but can of course be introduced by direct intentional inoculation with the aid of a sharp instrument penetrating through the cuticle.

That many disease-causing bacteria germs are air-borne, there can be little doubt. The poison of mumps, of whooping cough, and many more gain access to the organism by being carried into the lungs, possibly injuring the delicate nerve fibres lying just outside the capillary vessels and exciting reflex nerve actions in their course through the delicate membrane into the blood. Some think that the tubercle bacillus gains access to the walls of the pulmonary air cells by being carried in this direct manner in the air during inspiration. Adhering to the wall of the air cell it would grow and multiply and gradually give rise to inflammation, leading to other changes, which result in the formation of what we know as a tubercle. Whether we should regard tubercular disease as due alone to the presence, growth, multiplication, and effects of the tubercle bacillus is, however, questionable. Of its constant presence there can be no question, but whether it be causal, concomitant, or sequential has to be determined. What, however, is not at all doubtful, is that at least many persons may be freely exposed, and for years, to the influence of the organism without contracting the disease. It is true that some authorities teach that tubercular disease is contagious, but I cannot help feeling astonished, considering the evidence adduced so far, that this view should have been accepted. To me it seems very inconclusive, and I should not hesitate to disregard it in practice. From what I have been able to learn, there is no reason for a person in ordinary health to fear this contagium, if the individual exposed be in good health and be not of a pronounced tubercular tendency. Nor, in the existing state of our knowledge, should I consider it my duty, for

example, except under special circumstances, to advise a wife not to nurse a husband who was dying of tubercular disease.

SPECIFICITY.

Of the existence of specific and peculiar properties and powers in bacterial organisms, so marked and so constant as to entitle different kinds to be regarded as distinct species, no doubt can be entertained. The evidential differences are almost as marked as those which distinguish a penicillium from a sugar fungus, or a mushroom from a puff ball. Moreover, the more carefully the several kinds of bacteria are studied, the more marked and more numerous are the differential characteristics discovered. The very numerous bacteroid bodies which infest different plants and different kinds of organic matter in a state of decay are probably distinct from one another, but whether they should be regarded as species I am not competent to decide. In some instances the specific differences are indeed remarkable. The bacillus of anthrax, for instance, differs from every other known bacillus in many well-marked characteristics.

But while we note specific differences, it must be allowed that by growing and multiplying under conditions differing in certain respects from those present in the natural state, their characters become modified, as was shown by Pasteur, or entirely new properties may be acquired. And to such a degree is this difference sometimes carried that, as in the modified anthrax bacillus, for instance, if the modified organism be introduced, the animal, instead of being destroyed by anthrax, will live, and such changes will be effected in its fluids that for the future the creature will resist the destructive action of the normal anthrax bacillus. In other words, the animal is afterwards protected from anthrax, though not in the same way as the human organism is protected from small pox, by the growth and multiplication of the living particles of the vaccine lymph inoculated in the operation of vaccination. But because by growth and multiplication under artificial conditions, which are not supposable in nature, new properties are somehow acquired by some organisms, it must not be assumed that it is in some such way all species result. The argument from artificial to natural selection seems almost as unjustifiable as the argument from non-living to living. There is what I would term a natural inherent specificity and there is an acquired artificial specificity. In the first case reversion is slow, if not exceptional. In the last reversion to the original form probably results, unless the early death of the organism takes place. In not a few cases the new specificity is associated with a tendency to weakness and exhaustion and early death.

Some have attempted to surmount the difficulty of accounting for the

origin of such a multitude of bacterial species or varieties, each having the power or property of causing a definite disease, by the conjecture that ordinary bacteria, like higher organisms, are themselves the subjects of pathological evolutional changes. It is surmised that an ordinary bacterium living under particular but at present unknown conditions, might give origin to pathological bacteria of the vilest nature, and these might further change, and give rise to absolutely new disease-producing organisms. In this way, conjecture is added to conjecture, and the evolution of one hypothesis prepares for the evolution of many more. New forms of being are assumed, and pathological prodigies are added to the already multitudinous new creations of the evolutional imagination. As a fact, we find that the pathological phenomena occurring in man and the higher animals become less specific as we descend in the scale of created beings, and it is doubtful whether in the lower simpler forms of life any phenomena occur to which the term pathological or morbid is strictly applicable. That an Actinia or a Hydra may suffer from pathological change, is certain, but that organisms so very much lower in the scale and simpler in organization than the above should be capable of undergoing change which could be properly regarded as morbid or pathological, is extremely doubtful and very improbable.

The suggestion of bacteria naturally taking upon themselves a sort of pathological transformation, and developing by degradational evolution a bacterium of vileness and virulence potent to produce, it may be, new and fatal forms of disease, is a wonderful conjecture. The broad facts of nature are entirely opposed to it, though, as above remarked, by growth and multiplication under certain artificial conditions, new and often extraordinary properties may undoubtedly be acquired; but for how many generations can they be retained?

Conditions varying within the limits of nature which in high and complex organisms would result in pathological phenomena, in these low forms determine an alteration in the rate of growth and multiplication. The change in such an organism as the yeast plant, which seems to correspond to the process of formation of pus in man and the higher animals, is more rapid multiplication by the division and subdivision of the living matter (bioplasm). The bacterium would appear to be much lower and simpler as regards the varied conditions under which it will live and grow than the yeast plant. Indeed, under ordinary natural conditions the bacterium seems to be one of the most constant and unchangeable of all forms of life, and if by artificial methods adopted by us artificial forms are caused to spring from it, these if left alone would die or revert to the primitive constant form.

Still, it might be urged that it is possible that great change in surrounding conditions might cause the development of bacteria with new disease-causing powers, from pre-existing harmless varieties or species.

The ordinary bacterium growing and multiplying under natural conditions is among the least varying of all living forms. The organism that grew and multiplied in dead bodies at the time of the Pharaohs is probably identical with that which is associated with the decomposition of the organic matter of the human body in our own time, and possibly germs may have lain dormant in the mummy for ten centuries and produce descendants now. Nor is there any reason to suppose that, should the world last as long, any alteration will take place in the characters, mode of growth, and disintegrating activity of the bacterium some thousands of years hence.

Looking broadly then, one most striking fact in connection with bacteria is that countless millions of similar forms in endless repetition have been produced without change in power through past ages, and will be produced through the ages yet to come. We must, therefore, be very careful as regards the acceptance of so-called evidence of change in property and power of organisms of this low class so long as they are freely left to grow and multiply in their natural way. In conclusion then, I would sum up thus :—In spite of the facts which incline one to doubt whether the views here criticised can be accepted, it must be admitted that some low organisms by being placed under altered conditions do in multiplying acquire new properties, or at least properties far removed from those which the bacteria from which they have been derived possessed. And wonderful to relate, the living organisms, though differing but very slightly from the original and as far as we know constant forms, if introduced into the body will not destroy life, but will grow and multiply and establish changes which, though harm less, protect the host from the dire consequences of invasion by the original form. Such results established by Pasteur lead us to hope that further research will show us how by the attenuation of the virus of many contagious diseases and protective inoculation our successors may effectually escape maladies which are fatal to not a few of this generation. The apparently new forms constituting the attenuated virus are perhaps but temporary modifications, the descendants of which would soon resume the old type. Divergence and reversion in a limited and very moderate degree, and in forms of life much higher than the bacterium, occur, and may be frequently repeated, without ever leading to or resulting in any lasting change of type.

Cases in which the specificity of a contagium is very strongly marked exhibit such great variation as to the intensity of the symptoms produced that it has been said the type of the particular disease varies from time to time. And what is still more remarkable, what appears at the outset to be a slight epidemic may become a very severe one, or *vice versâ*. In some cases the contagium continues to gain in virulence during a certain period, and then the intensity of action of the

poison seems to be gradually reduced until the epidemic completely ceases.

One of the most remarkable facts discovered in connection with bacilli is that certain virulent organisms are destroyed by certain other forms. Even the anthrax bacillus, one of the most inveterate, is destroyed by the pyocyanic bacillus ("Chassin La Maladie Pyocyanique," Paris, 1889). In this way the living virus of one contagious disease may be destroyed by the introduction of another.

Most bacilli lose their power of growth and multiplication after remaining for a time in a dead body buried in earth. The period varies much, some bacilli dying or more probably becoming dormant in a few days after death, while some retain their activity for several weeks. The spores in many cases resist the influence of adverse conditions for a much longer period than the bacilli themselves. The spores often survive under conditions which are fatal to the bacilli. According to E. Von Esmarch, pathogenic microbes disappear quickly after death ("Zeitschrift für Hygiene," Bd. VII, Seite 1, 1889; "British Medical Journal," December 28th, 1889, p. 1465).

Vignal has shown that the nature of the food has an influence upon the quantity and quality of the ferment formed by the common micro-organism (Bacillus Mesentericus Vulgatus, the Kartoffel Bacillus of Koch, "British Medical Journal," December 28th, 1889, p. 1465).

There is no doubt that in wards in which numbers of patients have been received and treated over considerable periods of time, infective germs increase in virulence as well as in number. The fact is proved by the frequency with which wounds become septic. The intensity of the disease, as well as the certainty of infection, increases according to the reduction of ventilation and room space and the increased number of sick. Is this an example of the formation of a pathological infective bacterium from a common, universally distributed harmless one? On the other hand, by thoroughly cleansing the walls, floor, and ceiling of a thoroughly infected apartment, and leaving all the windows open for a considerable time, the infective tendency will disappear, at any rate for a time, and recent wounds will be observed to heal satisfactorily.

IMMEDIATE CONSEQUENCE OF THE GROWTH AND MULTIPLICATION OF BACTERIA IN THE ORGANISM.

One or a few living particles soon after gaining access to the blood or lymph or interstitial fluids begins to grow and multiply. The multiplication may proceed until the number formed exceeds perhaps by many million-fold the actual number originally introduced. While this is going on there may be no observable disturbance of tissues, organs, or functions. The period during which multiplication proceeds is different

in the case of different specific disease-producing particles, and may be a few hours only or it may extend to many days. This quiescent time is called the period of incubation.

Some of the contagia increase and multiply out of the body as well as within it, and may thus increase as the condition caused by their presence spreads. Some, perhaps, pass part of their existence outside and attain another phase of development in the fluids in the interior of the body. The complete life-history of many species of bacteria has yet to be discovered, and it will probably be found that not a few exhibit very different characters in different stages of their development, and possibly one organism in different phases has been mistaken for several distinct specific forms. Some bacteria live and grow for a time in the ground or in water, reaching another stage and becoming free in the air, and perhaps at last attain their latest and fully-developed form in our bodies, should we be so unfortunate as to be doomed to act the part of host and provide for them the necessary conditions required for their free multiplication and still wider distribution.

One of the most typical effects of the multiplication of bacteria within the circulating system is seen in weak frogs towards the end of winter. The course of some of the capillary vessels may even be as easily seen in the microscope as if they had been injected, in consequence of being completely choked with collections of bacteria. Whether such collections are to be found in all frogs towards the end of the hybernating period I cannot say, but I have found them in several. If not very numerous the collections might break up, and after being propelled for a time with the blood, many of the organisms probably die and the products resulting from their death are soon eliminated. Of the younger and more vigorous organisms some perhaps are retained in the splenic vessels and in other parts of the vascular system where the circulation is slow, to increase and multiply again whenever the surrounding conditions become favourable.

There cannot be any doubt that local congestions or stagnations of blood in the capillaries of certain tissues of man and the higher animals are due in the same manner to the presence, growth, and multiplication of bacteria. It is also almost certain that the fibrin around them and the substances resulting during their growth and multiplication, being gradually disintegrated, pass little by little into the blood current. They then get gradually oxidised and are thus slowly removed from the system. But some of the living germs still remain in the vascular system, not a few being embedded in the matter of the colourless blood corpuscles, while probably some continue to freely circulate in the blood current. Under certain alterations in the composition of the circulating fluid these would rapidly increase and soon lead to that condition being established which is known as septicæmia, a form of blood poisoning,

which may soon end fatally or occasion serious illness of many weeks' duration, terminating at last in recovery.

The conclusion, then, is now pretty widely accepted that the contagious matter, the contagium instrumental in the production of communicable diseases, is a bacterium of some kind or other, a living organism of very simple form, occupying a very low position in the scale of life and far removed from the organism in which it produces dire results. But as bacteria germs are always present in a quiet or dormant state in the tissues and fluids of the higher animals, a great change must ensue before they can grow and multiply. For instance, from some disturbance in the capillary circulation a portion of tissue may be destroyed, and pass into a state of putrefaction. The blood itself is poisoned, and this preliminary change seems to be necessary to the growth of the bacteria. An exceptional state of things, widely differing from the normal condition, is, in fact, in the first instance necessary. The phenomena, which in man and the higher organisms ordinarily interfere with the growth and multiplication of the ever-present bacteria, give place to something very exceptional, and the cause of this, not the bacteria, seems to be the real cause of the morbid condition which may result in death.

The bacterium seems to be, as regards the higher organisms, an unalloyed evil, and, as far as we can learn, the annihilation of this and kindred organisms would be of great advantage to man and the higher animals. Had the world never been invaded by such bodies, the higher forms of life would have profited. Though its presence and the mode of its evil working are known, the reason of its being, its origin, and ultimate destination are not known.

PRODUCTION OF POISONOUS ALKALOIDS, PTOMAINES AND LEUCOMAINES, BY BACTERIA.

Ptomaïnes.—In the putrefactive decomposition of albuminous matters which ordinarily begins soon after death, and in which bacteria probably play a very important part, certain alkaloids are formed. The bodies in question are known as Ptomaïnes, and some are highly poisonous. Several have been isolated and their properties investigated. The substances in question have recently been investigated by Gautier and have been divided into two classes. I, those which contain no oxygen :—Parvoline, Hydro-collidine, Collidine, Neuridine, Cadaverine, Putrescine, Mydaleine ; and II, those which contain oxygen :—Neurine, Choline, Muscarine, Gadinine. Some are highly poisonous, and some inert. The so-called "Fever of fatigue" is thought to depend upon the accumulation of certain ptomaïnes in the blood. The composition of several has been accurately determined by different distinguished

chemists, and the result of their researches will be found in Dr. Brown's work on Ptomaïnes and Leucomaïnes.

Leucomaïnes.—During the disintegration of some of the albuminous matters in the physiological changes in the living organism, several substances allied to organic alkaloids are being constantly formed. The chemical composition of some of these has been determined and their poisonous action proved. In health they are removed, but if from any circumstance they accumulate in the blood deleterious action is produced. The bodies in question have been called Leucomaïnes. Among them the following are enumerated by Pouchet and Gautier and thus arranged by Dr. Brown in his work :—Group I. The Betaïnes, or Uric leucomaïne group; Betaïne, Karnine, Adenine, Guanine, Sarkine or Hypoxanthine, Xanthine, Pseudoxanthine; Group II. Kreatinine, Xanthrokreatinine, Crusokreatinine, Amphikreatinine, Pseudoxanthine. Group III not yet well defined, found in urine, in blood, intestines, saliva.

Leucomaïnes in the healthy state are continually being produced during physiological changes, and are no doubt removed with a number of excrementitious matters as fast as they are formed. Probably many slight and temporary departures from the normal state of health are due to the accumulation in the blood of these substances, or to the temporary derangement of the organs whose duty it is to eliminate them ("Animal alkaloids; cadaveric and vital; or the Ptomaïnes and Leucomaïnes chemically, physiologically, and pathologically considered in relation to scientific medicine, with an introduction by Prof. Armand Gautier." By Dr. A. M. Brown. Hirshfeld Brothers, Bream's Buildings, Fetter Lane, London, E.C.).

Many general disturbances which have never been adequately accounted for may result in an indirect manner through the action of these substances. First, there may be an accumulation of excrementitious and toxic substances in the blood; and, secondly, in consequence of the action of these upon branches of afferent nerves distributed to the capillaries of different parts, would be caused,—thirdly, disturbance in nerve centres immediately followed by changes in parts supplied by efferent nerves starting from the nerve centres thus influenced.

In the production of some of these animal alkaloids, bacterial organisms are no doubt concerned. The bacteria may live their life and die without any harm resulting to the organism, but after their death the soluble toxic alkaloids which result may soon occasion serious changes by poisoning the living matter of important tissues and organs, and indeed cause rapid death. Or, during their life bacterial organisms may give rise to ferments which cause chemical changes in the course of which animal alkaloids among other products will be formed. The activity of these ferments in some cases does not appear to commence

until the microbes themselves are dead. The toxic effects of the alkaloids and other poisonous substances is no doubt dependent upon the state of the processes connected with elimination. If the substances in question be very quickly excreted no harm will result, but if the excreting organs act imperfectly an accumulation in the blood will take place, and in certain cases to an extent sufficient to cause death.

It is possible that beneficial effects may result from the production of these ferments, or from the chemical compounds resulting from the action in consequence of the establishment of a state of the fluids unfavourable to the support of bacteria. In this way a protective influence from future attack may be brought about. "Attenuated virus" may be capable of effecting the necessary changes required for the production of the compounds which exert a protective influence without giving rise to a quantity sufficient to damage tissues and organs or to endanger the life of the organism.

Although we have long been aware of the serious consequences which result from the accumulation and retention of excrementitious matters in the blood, and the class of substances known as extractive matters, recent researches have shown the existence of a number of chemical compounds quite new, many of which are crystalline and of well-defined characters. This is an extremely interesting section of the very large subject of Bacteria and their effects upon the higher organisms, but it cannot be further considered here. The reader is referred to Dr. Brown's work, of which a second edition has been recently published and in which full references will be found to the memoirs of some of the most recent distinguished investigators, also to Lauder Brunton's researches, "Gulstonian Lectures," 1889; and to a small work just published: "On the animal Alkaloids, the Ptomaïnes, Leucomaïnes, and extractives in their pathological relations," by Sir William Aitken, Knt., M.D., LL.D., F.R.S. Second edition. H. K. Lewis, Gower Street.

OF CONTAGIOUS LIVING MATTER ORIGINATING IN BIOPLASM OF THE VERTEBRATE ORGANISM.

While the contagium of some diseases undoubtedly consists of bacterial or allied organisms, it has not been proved that all or nearly all are of this nature. The evidence that some contagia are produced in the organism they damage or destroy seems to me conclusive. Such contagia consist of living particles derived by direct descent from the living matter of the tissues and fluids of the body, which living matter being supplied with an increased amount of nutrient material grows and multiplies very rapidly, and soon gives rise to multitudes of particles of

living matter, having new powers and capable of living and multiplying under new conditions.

It has been objected that the *materies morbi* of contagious diseases cannot consist of the modified living matter of the body itself, because the healthy living matter rapidly undergoes change when removed from the seat of its growth, and very soon dies. But he who accepts this apparent objection ignores most important facts, and seems to forget that, for example, among many other bioplasts healthy ciliated cells retain their vitality for many days after the death of the body; the bioplasm at the base of the hair, and that in the deep layers of the cuticle, also resists for a considerable time the destructive influences which quickly destroy the living matter of many of the higher tissues of the healthy body. Then from how many of the tissues may small portions be taken and transferred to another organism in which they will live and grow, perhaps long after the organism from which they were taken has ceased to exist?

Many "disease germs" which invade man and animals are, in my opinion, composed of living matter formed in and belonging to the organism, and are not in any way related to bacterial bodies. The virus of small-pox and that of vaccine lymph are of this nature. The micrococci which have been seen in vaccine lymph and figured are not, I believe, the particles which possess the potency. In lymph, in chyle, in blood, and probably in most of the interstitial fluids, very minute particles of bioplasm, much less than the 1-100,000th of an inch in diameter, exist in countless numbers. Particles of morbid bioplasm introduced into the fluid would mix with these, and could not be identified or distinguished. But although like them in appearance, the vital changes of the living particles in question are different, and it is probable that after growing and multiplying for a time many of the morbid particles resulting from the multiplication of those introduced may escape from the body, while those left in the tissues and suspended in the fluids die, and the products resulting from their death may render the fluids incapable of supporting any new particles of the same kind that may be introduced and thus "protect" the organism. In this way may be established that wonderful state known as protective influence, such as is brought about with respect to small-pox virus by the influence of that of vaccinia, and which may last for years, though its influence is of limited duration. It is the knowledge of this fact which has led to second vaccination being enjoined. Some of the above and many more cogent and striking facts are feebly adduced or wholly ignored by some of the bacterial school. General views have been founded on highly partial considerations, and the judgment of some seems to have been warped from the first by the confident assertions and extraordinary delineations of speculative authorities like Hallier. In spite of all that

has been urged in favour of a general bacterium hypothesis, it must at this time be admitted that in every case the specific bacterium of particular diseases has not been identified.

So far I feel unable to accept the idea that bacteria are instrumental in the production of pus corpuscles. That bacteria and pus corpuscles are often associated is perfectly true, but I cannot admit that it has been proved or even rendered in slight degree probable that the bacteria have had anything to do with the production of the pus corpuscles. This at least is the conclusion forced upon the mind by microscopical investigation. In some of the drawings in which the bacteria and pus corpuscles are shown certain pus corpuscles are seen here and there with no bacteria near them.

When ordinary pus corpuscles are rapidly growing and multiplying very few bacteria or none are to be found, while when the pus corpuscles have ceased to move and are dead, and after death while they are undergoing disintegration and decomposition, multitudes of bacteria are invariably present. And these increase in numbers as the process of disintegration goes on, until the pus corpuscles are wholly disintegrated.

Just as many of the lower forms of life by growing and multiplying under certain altered conditions lose some of their old properties and acquire new ones, or their old properties undergo such modification that they produce effects totally different from any of their predecessors, so the bioplasm of the tissues and blood of man and animals acquires in process of multiplication under altered conditions new properties and characteristics. While the bacteria germs may in further growth revert to their former type, the morbid bioplasm never produces descendants having formative power. As the bioplasm of man's body acquires increased power of growth, it also acquires increased power of resisting the destructive influence of external conditions. The movements of the morbid bioplasm of the pus corpuscle, showing that it is alive, will continue long after those of the healthy bioplasm of the tissues and the white blood corpuscles have ceased, and it is certain, that other forms of morbid bioplasm originating in man's body exhibit far greater resisting power than that manifested by pus.

In my work on "Disease Germs," p. 256, I endeavoured to show how a highly virulent contagious germ might result from the gradually increasing rapid growth of normal living matter. The evidence adduced and which was afforded by careful microscopical examination was strongly in favour of the conclusion that the virulent germ was derived by direct descent from normal bioplasm, and that it was not in any way related to bacteria or to any particles derived from without. And as regards this particular contagious matter it has to be observed that when it is most virulent very few or no bacteroid bodies are to be

found, while as the latter increase in number the degree of virulence is reduced and at length departs. The virulent contagious bioplasm just referred to is closely related to pus, and it is well known that certain forms of pus possess the most active septic properties which I think are inherent in the particles themselves and are not to be attributed to the fluid in which they grow or to the bacteria which may be present in large or small numbers about them and in their substance.

The process of pus formation may be studied from very different points of view. Suppuration may be considered as it occurs in a large abscess or in pustule containing a small quantity of pus, or the changes occurring in an individual elementary part in which pus formation is proceeding may be carefully studied by microscopical investigation.

The genesis of pus-like particles of bioplasm may be investigated in epithelial cells, and particularly in those of the vagina and in some of the forms of bladder and urethral epithelium, as well as in the bioplasm of the lacunæ of bone, in that of muscle, nerve, and other tissues. Pus formation may be also followed in some cuticular epithelial cells which have been exposed to the action of a blister.

It is well known that healthy cuticular cells will live and grow if removed with certain precautions and grafted on a surface of the body of another person properly prepared for their reception. But the pus-like particles of bioplasm resulting from the rapid growth of that of normal epithelial cells, have during their formation gained such powers of rapid growth and of growing under altered conditions, that if a few be transferred to the moist conjunctiva of the eye, they will take up nutrient matter, grow, and multiply at such a rate as to seriously damage if not completely destroy the surface of that delicate mucous membrane.

The evidence so far advanced in favour of the view that the formation of pus is due to bacteria seems to me altogether inconclusive, while it is evident that those who support the bacterial hypothesis of pus production are not familiar with the changes which occur in the bioplasm of many elementary parts in the early stages of inflammation. Under some circumstances, bioplasm originating in that belonging to normal tissues attains such a rate of growth and acquires such power of living and growing under altered conditions and on different surfaces or in different tissues and fluids, and even in other species of organisms, as to seriously derange the most important physiological actions in the body and to act as a highly virulent contagious poison which may, and in a very short time, destroy life.

The intensity of the virulence really seems to increase with the increased rate of the production of the bioplasm, as if free access of nutrient material to normal living matter and its appropriation resulting

in exaggerated growth, caused the development of a morbid bioplasm of the most destructive character.

The growth and multiplication of pus bioplasm may be studied under the microscope. Movements of the matter of the bioplasm very like those of leucocytes may be watched. Diverticula of the perfectly clear structureless living matter forming the basis of the living corpuscle are seen to make their appearance and project and move away from the surface of the mass. These are from time to time detached. Each little particle soon grows, and in this way rapid multiplication takes place.

One is thus able to give a reasonable explanation of the origin of living pus corpuscles in the living bioplasm of a tissue without the aid of bacteria, and it seems probable that those organisms follow instead of precede the early pathological changes. But admitting for the moment that bacteria are the true cause of suppuration, what are the stages which may be noticed from the first introduction of the bacteria, onwards to the development of the fully-formed pus corpuscle, and how are the organisms supposed to act? What in fact is the pus corpuscle from a bacteriological point of view? In the same way we may fairly ask how the bacillus of tubercle acts towards the bioplasm of the pulmonary tissues, and what is its relation to the so-called tubercle corpuscles and the other anatomical elements with which it is associated and which seem to perform a far more active part in the disintegration of the lung tissue and in the destruction of the patient's health and life than the minute and slow-growing bacillus.

But pus formation can hardly be considered apart from inflammation —a vexed subject upon which very diverse doctrines are taught, and which cannot be further discussed here. The views above advanced are based upon observation of inflamed tissues of different kinds and at different periods of the process. I am sorry to say that in some very recent memoirs on the subject I find a number of words and phrases introduced the meaning of which is most obscure. Those who call to their aid processes or conditions under such terms as "damage," "suspended vitality," "lowered vitality," "weakened vitality," and speak of "weak tissue," "irritation" and the like, should at least define what they mean by them. Such phrases ought to have been buried long ago, but they are still employed as if everyone could define them and understood what was meant by the authors who used them. This revival of what I cannot but regard as mediæval pathology and of antiquated methods of explanation seems to me most unfortunate. Until it gives place to views more reasonable and more in accordance with what can be observed it is almost impossible, if not perfectly useless, to discuss the nature of the actual changes occurring.

PRECAUTIONS TO BE TAKEN AGAINST THE SPREAD OF DISEASE GERMS.

Unquestionably the liability to take contagious diseases varies considerably in different individuals exposed to the same influences and in the same individual at different times. While children are as a general rule much more susceptible than adults, we do not know precisely upon what the difference depends, but we should perhaps look for some variation in composition of the interstitial fluid of the tissues or of the blood itself to explain the facts. Stagnation and slow movement of the fluids—slow and moderate interchange of nutrient materials—the slow and incomplete removal of excrementitious matters in all parts of the organism, must be regarded at least as circumstances favourable to the entrance, growth, and multiplication of the living contagium. So too in the case of allied low organisms which pass their existence out of our bodies, are stillness, and very slight disturbance of humid air or still water favourable to their growth and multiplication.

As so far it has proved impossible to utterly destroy many forms of contagium, our efforts have for long been directed to the discovery of means by which we may protect ourselves and others from invasion, and prevent the growth and multiplication of the germs which may have gained admittance to our fluids and tissues.

The researches of Lister have clearly proved that the disastrous changes liable to occur in wounds may be prevented by dressing them in such a way that the access of living germs from without would be prevented. There are many ways of obtaining this desirable result, but in all that can be relied upon it would appear that bacteria are destroyed or conditions are established which have been experimentally proved to be hostile to their activity as well as to their growth and multiplication.

But in spite of scientific and practical evidence accepted, confirmed, and acted upon by hundreds of hospital surgeons in all parts of the world, in favour of the use of antiseptics for the purpose of destroying and preventing the growth and multiplication of bacteria, it is positively affirmed by some surgeons that many if not all the precautions taken to prevent the access of germs to wounds are superfluous and useless. Nothing can exceed the confidence and decision with which views opposed to those recently adopted have been announced and acted upon. Not only are no antiseptics employed, but their use is condemned. In operations for ovariotomy Dr. Bantock employs no antiseptic whatever. In the fourth hundred of the cases performed by him with the use of plain water, the mortality was only four. Following the practice of Mr. Lawson Tait, Dr. Bantock washes out the peritoneal cavity with warm water, using a pint or a quart jug, a

clean Higginson's syringe or Mr. Lawson Tait's apparatus. He says: "I have never known any evil result follow its use, but I have several times regretted that I did not resort to it. Nor am I at all particular in getting all the water away." . . . "I have washed out the peritoneum in more than one-half of the last hundred cases in the table." Again, "Once more let me say that for my hands, instruments, and sponges I use plain water; that I take no precautions to sterilize it, as it is called, by boiling; that I regard water that is fit for drinking and household purposes generally as suitable for the purpose of any operation; that while the water is heated—but not necessarily boiled—I have no hesitation in cooling it down, if too hot for my hands, with cold water drawn fresh from the tap, as for instance, when washing out the peritoneum, and that I pay the greatest attention to cleanliness and see that all utensils are as clean as water can make them. I wash my hands very carefully before commencing an operation, making them as clean as soap and water and a nail-brush can make them, and I frequently cleanse them during the operation. As a covering to the wound I employ simple absorbent gauze, perfectly innocent of any germicide or foreign substance. And such is my belief in the hurtfulness of 'germs,' that, were it not for other considerations, I would leave all my wounds exposed to the air—as for example, I have sometimes done in amputation of the breast, and always do in the operation for restoring a ruptured perineum." Appendix to a paper on "Hyperpyrexia after Listerian Ovariotomy," Royal Medical and Chirurgical Society, December, 1880. *See* "Provincial Medical Journal," December 2, 1889, p. 721.

But to assertions that operation cases do perfectly well without any antiseptic treatment whatever it may be replied that at least in contaminated wards or rooms the antiseptic treatment will save many cases that would otherwise very soon become septic—that even under still more favourable circumstances wounds heal more slowly and less equably than where antiseptics have been used in every case. Eye operations seem to be a delicate test of septic poisons. Can such be performed in ordinary wards in which no antiseptic precautions have been taken? Has the knee-joint been opened with success without antiseptic precautions? Dr. Bantock says he would do so without hesitation, for he can see no difference between the synovial membrane and the peritoneum. This, however, is not proof that it may be done. If operations can be successfully conducted in air contaminated with septic germs which would infallibly produce a deleterious influence if no such steps were taken, an unanswerable case is made in favour of antiseptics from the practical side. This, as far as I am able to learn, is undoubtedly the fact. In other words, operations may now be performed in general wards with safety which could not have been undertaken

years ago without the most serious risk to life, while by the antiseptic system results as satisfactory may be obtained in densely populated places as can be looked for in the purest country air.

It is incumbent upon those who maintain that the favourable results attributed to antiseptics are really due to cleanliness and water only, to show what the cleanliness really does, and exactly what is the nature of the deleterious matters that are removed by the frequent hand-washings and extreme care in thoroughly cleaning everything that is to come into contact with the wound. Is the substance in their opinion of a chemical nature, or is it a lifeless ferment or a living germ? If the last the advantageous influence of antiseptics has been conclusively proved experimentally. If the former, it is for the opponents of antiseptics to show how these act so favourably as they do in general wards in which, before their use, many operation cases went wrong. But if the opponents of antiseptics are constrained by the facts to admit their utility only in the very slightest degree, the case for their general employment is established.

In spite of all the care that we have taken to restrict, as far as possible, contagious fever and other germs to the space and things immediately around the individual patient suffering from their presence, as well as to prevent their being carried about through the carelessness of attendants, complaints of the most serious kind have been made by persons who know little about us and our methods, but who appear to find consolation in the condemnation and mistrust of medical knowledge and action. We are accused of being the culpable germ-carriers from the sick to the healthy, and the distributors of contagious diseases to the people. Never was a charge more gratuitously made, or more groundless. Surely it is well known to the public that we, and our predecessors, have always done our utmost everywhere to destroy disease germs and to prevent their spread. The observations of the Registrar General conclusively prove that our efforts have been attended with success. But it is curious to note that as soon as any ingenious person reports the discovery made in the recesses of his own imagination of something connected with medical matters, that is not as perfect as it should be, the cause is at once taken up by the newspapers, and medical wrongs and evils out of number are discovered, reported far and wide, and commented upon for the public benefit. Parties are formed, strong letters written, addresses delivered, deputations appointed; the peccant germs are to be brought before Parliament, and all members of the profession to be subjected to new laws, in order that all the supposed wrongs may be righted. The artificial excitement after having been kept at a white heat for a week or two, gradually gives place to some other and equally artificial and uncalled-for suggestion. In this way people are needlessly alarmed about the propagation and spread of vile

contagious germs, and sick people made to fear that the doctor treating them for one malady is perhaps bringing to them the germs of another, and is the bearer of more contagion than consolation.

From time to time public-spirited, irresponsible amateurs, with little medical knowledge, write startling letters to the journals to expose glaring medical wrongs connected with the arrangements and internal management of our public hospitals, usually selecting the very poorest for their conscientious condemnation. One of the last terrible disclosures published far and wide was that cases of contagious disease were sometimes treated in the general wards. We are, therefore, to be ordered to at once send every suspected case of contagious disease to the Fever Hospital or to an Asylum Board Hospital, perhaps four or five miles away. If such advice were generally acted upon, it would sometimes happen that patients suspected to be suffering from contagious disease, but really free from any form, would be put into an infected place, and there infected, and have to pass through a serious disease which but for fussy officiousness they would have altogether escaped. If only the public were well informed upon these matters they would thoroughly trust us and protect us from the continual interference of restless people who, under the guise of philanthropic effort, are damaging the reputation of useful institutions, and assisting to destroy public confidence in hospitals and hospital officers, without the smallest justification or excuse. Ill-considered interference in our arrangements do harm, not good. Instead of helping us to do all we can for the helpless sick poor, the real effect of injudicious fault finding and spreading terror of contagion is to render it more difficult for us to act for the best, and to obtain the necessary means to provide for the sick who are suffering from serious disease.

It is very curious how many amateur half-medical people, with extraordinary self-confidence, seem to consider themselves specially licensed to attack the profession of medicine. There is no other calling so constantly and so cruelly assailed. Now and then it is true we are patronised a bit in a half-apologetic manner, and it is reluctantly admitted, that under certain circumstances, we may be of some little temporary use. Every opportunity of fault finding with unendowed hospitals, deserving very different treatment, seems to be taken—institutions which have been admirably officered by generation after generation of physicians and surgeons, and warmly supported by the generosity of friends, and the self-imposed labours cheerfully performed by enthusiastic committees. When one considers the real work done, and the men who have done it, it does seem preposterous that the public should allow hospitals to be attacked without reason, interfered with, and most unfairly condemned. The public should protect us from the continual carping of people who desire to get power over institutions

and funds not belonging to them. Hardly a session passes without Parliament being moved to institute enquiries into some hospital question, magnified by fervid imaginations into an abuse, in order that the fault finders may have the chance of convincing the world how much better the work would be done and the money spent if they were requested to take the place of the committees and the doctors, and administer the affairs of all the institutions, according to the principles they had been good enough to lay down.

But if practitioners really were the carriers of contagion, would not the fact have been long ago proved by the circumstance of their own families being the first to suffer? The gloomy forebodings of bacteriological pessimists are surely but the offspring of their own morbid imaginations. How many of us have attended general hospitals for years, as well as cases of contagious disease in the homes of the poor, and have escaped? Now and then it is true a disease is contracted in the course of our work, but with the precautions taken such an event is rare indeed. I have been in hospital wards, and formerly for hours at a time, and many times in the week during the last forty-five years. I have lived in the hospital for months in succession, in years gone by, not only without having contracted contagion but without having been laid up for a week during a period of more than fifty years. Nor have I reason to accuse myself of having acted as a carrier of germs more than once, and this was most doubtful. On two occasions I have been day and night, for two or three weeks at a time, among cholera patients. Undoubtedly I have always exercised reasonable prudence as to diet, and have taken hygienic precautions, particularly as regards getting plenty of fresh air in all weathers, clothing warmly, and making up as soon as possible for reduced sleeping time. I have no reason to think that my fortunate experience is very exceptional, and believe there are hundreds of practitioners, and probably thousands of nurses, who have not taken or carried contagious diseases, and have retained good health during a long working life.

In short there is no justification for the outburst of bacteriological fright or for the proposed institution of bacteria-proof dresses. The public may depend upon the profession for taking all necessary precautions, but neither doctors nor nurses are inclined to make themselves ridiculous as regards germ protection, or offensive to their patients, as unquestionably some of the proposed vestments would make them. Decades have passed since the surgeons of hospitals deemed it necessary to wear a peculiar dress while at work, and may it indeed be long before there is a return to a custom so offensive and so needless. At the same time, there is no doubt that if new means of protection are discovered, the members of the profession will at once carry into practice every available process which bids fair to reduce the chance of spreading contagi-

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ous disease. But the suggestions alluded to are of doubtful advantage. In addition to the employment of germicidal solutions diffused through the air mixed with water—spread over wounds and around the patient—some of the most enthusiastic of the fair instructors of medical practitioners want to force us into germ-proof garments, which are to be washed and rubbed down after each visit to the germ-ridden patient. Our skin and hair are to be properly disinfected with carbolic spray or vapours of potency, so that any germ about us may be paralysed or destroyed. These directions will soon be followed by new and more stringent rules for our guidance and instructions that *must* be obeyed. The time during which we are to be in quarantine, and for compulsory abstinence from visiting patients who are not suffering from contagious disease, will have to be fixed by new laws. Every germ without us, near us, within us, will submit. But after enduring the suggested disfigurement and discomfort, what would be gained? We should not spread contagion. We do not spread contagion now.

By having the clothes saturated with carbolic acid or camphor, or other highly odoriferous germicide, particularly now that cases of contagious disease are to be notified, we might excite a panic in a populous healthy neighbourhood, for we should thus, by odours and vestments, proclaim that we were attending cases of contagious disease, and were perhaps carrying and diffusing poison germs which had resisted our efforts to destroy or paralyse them. We ourselves should of course be aware that we knew that alarm was baseless, because, besides the presence of the germ, a certain condition of the body of the recipient is required for germination, and that whilst absolute certainty of prevention is not to be obtained, the fear alluded to is almost groundless, and communication of disease by carrying from the sick room one of the rarest events, comparable with events of the most exceptional kind.

Not a few of the new suggestions for destroying the bacteria, and for preventing their being carried from the sick to the healthy, appear to be founded upon purely theoretical considerations, and are not in the least degree justified by facts. The contention in letters published in the "Times" was supported by a strong article, leading the public to think that we doctors are so often the agents of carrying infectious disease, that special precautions of a very stringent character ought to be enforced. But the public, having practical evidence of the care taken by us, and as well as of our thorough candour in pointing out danger as soon as discovered, and of the efforts made, and generally with success, to prevent all risk was satisfied. The evidence afforded by the gradual decrease of the already low death rate (from over 21 per 1000 to under 18 per 1000 in '88, the lowest recorded) rendered it unnecessary to write letters in defence, notwithstanding the vigour of the attack, the

undeserved accusations, and the very candid exposure of our alleged shortcomings.

The public no doubt sees clearly enough that, if we did convey infection, we ourselves and those who belong to us would be the first to suffer, and is confident that any such error, if it existed, would be at once corrected, without returning to the antiquated pest-house accommodation or reverting to pest-house doctoring and other systems and principles of a mediæval character. We think we deserve, and feel pretty confident that ere long we shall receive, the support of the public in these matters. The writers in the greatest of great journals are now and then liable to fits of nervous excitement, and apt to be a little emotionally indignant about nothing, and big gooseberries, frog and toad storms, the blue-bottle with millions of many species of life-destroying contagious germs, carried long distances on his toes, and other terrifying "facts," are now and then apt to receive more serious consideration than they really deserve. Now and then nothing very stirring will happen. What is to be done? The columns must be written. Why not offer suggestions concerning nets and traps and other means of catching the germ-laden blue-bottle, and propose different methods of destroying him when caught? The debate may be followed by a serious discussion on the thickness of coffins, the advantage of very rapid disintegration of our remains, and the quickest way of converting the products into food for vegetables, to be in turn converted into nourishment for the rising generation, which will thus be saved from destruction by the inhalation of the emanations from its dead progenitors. The demand for far-fetched sensations and forcible descriptions of grimy horrors seems to recur periodically, and should be provided for without the necessity of encouraging the new order of philanthropists to attack the profession and invent imaginary wrongs, in order that the fancied perpetrators may be punished for their fancied crimes by being incarcerated in white mackintoshes and suffocated by cottonwool respirators.

The isolation of the sick, and the means of preventing the spread of contagious disease, and all other sanitary arrangements necessary in the case of those suffering from contagious disease, are so fully considered in works on sanitary science that I shall not enter into the matter here. The reader will find much information on this part of the subject, brought up to the present time, in the lucid and well arranged treatise on "Hygiene and Public Health," by Dr. Louis C. Parkes, published by H. K. Lewis, Gower Street, 1889.

OF THE TONGUE IN HEALTH AND IN SLIGHT AILMENTS.

In the first place, let me speak of the characters of the tongue. Few things it used to be supposed were of greater consequence than the recognition of the varied character which the dorsal surface of the tongue assumes in various cases of actual disease, and of slight derangements of health. That the importance of the changes of the surface of the tongue as an indication of internal disease has been exaggerated by some physicians is undoubtedly true, but that it is altogether useless as an indication is certainly incorrect. Anyone who is at the pains to notice the alterations in his own tongue under varying conditions of health will convince himself that something is to be gained by noting the changes of the tongue in disease. To form a correct estimate of the value of the changes, you must be well acquainted with the appearance of the surface of the healthy organ and with the nature of the structures which exist upon its dorsal surface.

I dare say that many who tell each patient to put out his tongue sometimes do it as a matter of routine. I have known a rather absent doctor tell the patient to put out his tongue more than once in the course of a few minutes' conversation. Patients are sometimes a little prosy, and if there is not much the matter with them, you may not attend to their story as diligently as you ought to do. You lose the thread of the discourse, and while your wits are wandering you may cry out quite unconsciously, almost as if your request was the result of some reflex and habitual action, "Put out your tongue," the organ having been already more than once displayed for your examination.

If a small piece of the soft matter from the surface of the dorsum of the tongue be scraped off and placed on a glass slide, and a drop of water be added, and covered with a piece of thin glass—if this be examined under a quarter of an inch object-glass, you will find, though the tongue be in a perfectly healthy state, a great many objects of interest, of which I shall have to speak presently.

General Characters of the Surface.—The character of the tongue undoubtedly is influenced by the state of the stomach. The mucous membrane which lines every part of the alimentary canal is, as you know, continuous with that which lines the mouth and covers the tongue. Whenever there is a little gastric disturbance the tongue may participate in the change. The relation between the two phenomena is, however, a complex one, and not very easily explained. Of the fact, in very many cases, there is no doubt, as we may easily prove by observations upon ourselves.

The appearance of the tongue, as I shall explain more in detail further on, is also in some measure affected by the state of the circula-

tion, by the character of the blood itself, as well as by the rate at which the epithelium (ἐπί, upon, and τίθημι, to place) on its surface grows, arrives at maturity, and decays and falls off. Sometimes the superficial epithelial cells remain intimately adherent to the tissue beneath, upon which they are placed, and from which they seem to grow. On the other hand, a layer of the epithelium is frequently very easily detached. The removal of a certain amount of the superficial layer of epithelium with millions of bacteria and fungi, which grow and multiply in and amongst it, invariably occurs during eating and drinking. When, therefore, little food or only liquid food is taken for a time, the epithelium adheres in thick layers to the surface, and makes the tongue look white.

In health the general colour of the dorsal surface inclines to pale red, but in certain forms of disease it becomes of a bright colour, almost like raw beef, and it is in consequence sometimes spoken of as "beefy." This seemingly raw condition depends partly upon the desquamation and falling off of a good deal of epithelium, so that the layer covering the subjacent structures is much reduced in thickness, and partly upon the capillaries being unduly distended with blood. You can see the deep red colour of the blood through the epithelial layer. The vessels of the mucous membrane of the stomach and of other parts of the intestinal canal may participate in this change. As regards the general appearance of the tongue then, it may be remarked that if the epithelial layer on the organ is thin, the tongue will be red; if very thick, it will be white; if rather dry, of a dull brown or dark brown colour; and if there is an abundant accumulation of soft and moist epithelium upon its surface, of a very opaque dirty white.

If you look at the under surface and sides of the tongue in a looking-glass, you will observe that these parts have a deep red appearance. The epithelium upon the sides, and the deep aspect of the tongue, consist of a layer so thin that the colour of the blood is seen through the epithelial tissue. The degree of redness varies according to the quantity of blood in the vessels, and changes in the colour are due to varying degrees of vascular distension, as in the case of redness and pallor of the skin. In blushing the small vessels of the skin of the cheeks are suddenly distended in consequence of an inrush of blood, permitted by the sudden yielding and dilatation of the little arteries in continuity with them, and the same phenomenon under certain circumstances occurs in the vessels of the lips and tongue.

On the Fungiform and Filiform Papillæ, and of their Epithelial Covering.—In health there are to be seen here and there over the dorsal surface little spots, which are of a bright red colour. Upon more careful examination, it will be found that the red spots are really small papillæ with a constricted neck, in shape resembling that of a mushroom, and known as the *Fungiform* (fungus, mushroom-shaped)

Papillæ. The epithelial investment of the fungiform papillæ is extremely thin, and the blood-vessels and terminal nerve networks lie just beneath. The papillæ in question are, therefore, always red, and can easily be detected here and there amongst the filiform or conical papillæ which are pretty uniformly spread over the dorsal surface of the tongue.

The epithelium covering the surface of the filiform papillæ is so thick that we cannot suppose sapid substances would quickly pass through it, or between the edges of the overlapping cells, and then come in contact with the nerves beneath. These filiform (*filum*, a thread, and *forma*, likeness) papillæ have probably nothing to do with the sense of taste, but are important organs of touch, much concerned, it may be, in the process of feeling the food so that the proper muscular movements may be made in order to place it in the right position for mastication and deglutition. It is the fungiform papillæ and the soft red mucous membrane at the sides and back of the tongue, as well as that of the palate and fauces, which are mainly concerned in taste.

Epithelial Hair-like Processes of the Filiform Papillæ.—In the central part of the dorsum of the tongue the epithelial sheaths of the filiform papillæ are very long, and indeed form elongated thread-like filaments, closely resembling hairs in structure. You may snip off a few of these hair-like bodies from your own tongue, or scrape portions of them from the central part of the back of the surface with a knife. The specimen may then be placed in a watch-glass in a little weak glycerine. After the processes have soaked for a time they may be removed to a glass slide, covered in the usual way with thin glass, and examined under the microscope, first under an inch power, and then under a quarter of an inch object-glass. You will find these long hair-like processes are composed of layers of scaly epithelium imbricated and superimposed one upon the other. The longest of the epithelial filaments project from the surface of the tongue, perhaps, for more than the twentieth part of an inch. In *furred* tongue these sheaths of the papillæ grow considerably in length and in some cases make up the greater part of the white fur. Small particles of food often become entangled amongst these ragged epithelial extensions of the filiform papillæ. If you scrape the central part of the back of the tongue a short time after you have taken a meal, and examine the matter in the way described, you will almost invariably find a number of oil globules, and very frequently starch globules, portions of muscular fibres, and other things, according to the nature of the last food taken, as well as an infinite number of low vegetable organisms.

Of the Epithelial Cells.—The epithelial layer on all the papillæ of the tongue varies in thickness from time to time. The several epithelial cells composing the layer necessarily differ in age. The oldest

of these cells are those which are outermost, and situated at the greatest distance from the surface on which they grow, and the youngest are those which are nearest the vessels. Passing outwards we meet with cells gradually advancing in age. The oldest are constantly decaying and falling off. These mix with the food, and, no doubt, during every meal we swallow them in thousands. But the old epithelial cells upon the tongue and mucous membrane of the mouth undergo other changes, with the general nature of which it is important that you should be acquainted. The changes in and about the epithelium should therefore be carefully studied as opportunities of making the examination occur.

Of Fungi and Low Organisms in and amongst the Epithelium of the Tongue and Mouth.—If you carefully examine under high magnifying powers (from three to twelve hundred diameters) the old epithelial cells detached from the mucous membrane of the mouth, from the inside of the cheek or the tongue, you will find that the cells contain a number of very minute spherical or oval particles, and multitudes of very delicate filaments are often seen amongst them. ("Microscope in Medicine," pl. XXXVIII, fig. 1, p. 272.) Now these minute spherical and oval particles, situated in the formed material of the cell, and most numerous at its outer, that is, in its oldest part, are very low and simple organisms in an early phase of development. They have been called *micrococci* (μικρός, little, and κόκκος, a grain), and have received other names. In this state they have not reached their full development. They are of many species, and some are probably the living germs of organisms which exhibit different characters in their fully developed state. Each is capable of producing millions of descendants, under favourable conditions, in a few hours. Some of them, probably under certain circumstances, become elongated, and thus bacteria of various forms are evolved; others may form the long threads which used to be called *Leptothrix buccalis*. ("Microscope in Medicine," pl. LXXXI, p. 492.) Some, perhaps, may be the germs of *Oïdium albicans*, which under certain altered conditions grows and forms its mycelium, which spreads and grows amongst the moist epithelial cells, and other fungi. It is probable, indeed, that many different species of fungi are represented by the spherical or oval germ-particles, existing in connection with the older epithelial cells on the surface of the mucous membrane of the mouth, and the germ-particles themselves, although they closely resemble one another in appearance, may have been derived from different species of organisms. The various species of germs grow and multiply under different circumstances. The growth and multiplication of these minute organisms have much to do with the appearance which the tongue presents in the same person at different times, as well as its character in different forms of derangement and disease.

In 1879 Mr. Butlin expressed the opinion that the fur of the tongue consisted principally of vegetable organisms, but in all the specimens I have examined, I should have said that the major part was composed of epithelium and epithelial *débris*, with particles of food and oil globules.

It has been stated by more than one observer that *Sarcina ventriculi* is often present in the fur of the tongue, but I have never found it in this situation, though I have examined the fur in very many cases during the past forty years. In cases in which sarcinæ were found in the stomach, I did not find them on the tongue or in other situations. I am afraid that many mistakes have been made with regard to the identification of *Sarcina ventriculi*.

Old epithelial cells, like other old and formed tissues or other dead organic animal or vegetable matter, are very soon invaded by the germs of low vegetable organisms, always very numerous in their vicinity, which grow at their expense, and live upon their substance. Not only on the surface of the cells, but in their substance, the fungus germs are found, and frequently project from them, forming little collections, which may be detached from time to time. Amongst the hair-like epithelial processes projecting from the free extremities of the filiform papillæ, are often found masses which have a granular appearance under low magnifying powers. When examined under objectives magnifying more than three hundred diameters, these masses will be found to consist of millions of spherical and oval fungi or micrococci, grouped together, each little mass of bioplasm being surrounded by, and separated from, its neighbours by clear structureless material, which probably has been formed by it.

Amongst the epithelial cells in every part of the mouth you will often find some very long, extremely delicate filaments, which, if examined under high powers, will be found to exhibit a number of transverse markings. Some of these exhibit slow undulating movements. These grow and freely multiply in the fluids of the mouth at the usual temperature of that cavity. Many are found between the teeth. In the tartar you will meet with numbers of vegetable organisms. Indeed, it is probable that the deposition of the tartar is intimately connected with changes occasioned by the living organisms in question. Many of the filaments, long and short, exhibit peculiar movements, some vibrating to and fro, others taking a spiral course. In many cases you will find whole forests of vegetable organisms consisting of many different species, and of the same species at different periods of growth, upon the dorsal surface of the tongue.

The growth and multiplication of these low organisms at the very entrance of our bodies, and so placed that they must pass in immense numbers into the stomach whenever we swallow anything, is a fact of

great significance in connection with certain conclusions respecting the action of these low organisms upon the solids and fluids of man's body. The first question you will ask will probably be this:—Do these micrococci, bacteria, and allied organisms perform any distinct office or function in connection with the solution of food or digestion, effecting changes directly or producing ferments which induce changes, or do they merely live and grow upon the old epithelial cells and the *débris* of the food which must needs undergo change in such a situation, and at the temperature of the inside of the mouth? We find such bodies in animals as well as man, and though they are found in greatest number in certain derangements, multitudes are constantly present in the most healthy individuals. They have no doubt grown and multiplied under similar conditions and without varying in character for thousands of years.

CHANGES IN THE MUCOUS MEMBRANE OF THE MOUTH AND TONGUE: AND OF THE SALIVA.

It has been already suggested that changes in the mouth and tongue are frequently associated with somewhat similar changes occurring in other parts of the very extensive system of mucous membrane concerned in the preparation, digestion, and absorption of food. One part of the mucous tract may participate in phenomena occurring, it may be, at a considerable distance. This participation is doubtless due to the circumstance that the nerve-centres presiding over the several actions occurring in different parts of the mucous membrane of the alimentary canal are connected together by commissural fibres. In certain forms of disease a local affection of limited extent may provoke an altered and pathological action of many feet of intestine, and may affect the character of the secretions from gastric and intestinal glands, though situated at a great distance from the seat of actual lesion. Very slight changes as regards diet will lead to reduction of the secreting action of the stomach glands. The mucous membrane often becomes less moist than it should be, and the secretion from every part is reduced, though it would be incorrect to say that the membrane became dry. The mucous membrane of the mouth and the glands connected therewith may participate in any altered action going on in the stomach. In practice we invariably find that in fevers, and indeed in any slight attack of feverishness, when the temperature of the body has risen only two or three degrees, in short in the common pathological change which everybody has experienced when he has taken cold, there is imperfect action and deranged secretion in the stomach. The saliva has much to do with the maintenance of a moist healthy state of the tongue and mucous membrane of the mouth, and even in very slight derangements

dryness of tongue may be due to these circumstances. In febrile conditions the tongue often becomes much furred, a change arising partly from the mere accumulation of epithelium and *débris*, owing to the surface not being cleansed by the passage of food and liquid over it, partly to changes in the circulation in the capillary vessels and in the composition of the blood, consequent upon the febrile condition.

For several hours, it may be for two or three days, there is in most cases defective formation of the substances which form the all-essential constituents of saliva, the gastric juice, and other secretions poured into the intestinal canal. One consequence is that the ordinary desire for eating is not present, and if the person eat well in spite of his disinclination to do so, further derangement, perhaps severe pain and indigestion, may add to his troubles if he has not the good fortune to escape by free vomiting or by the occurrence of diarrhœa, or both. Under such circumstances it is, therefore, the best plan to starve or, if the person is weak and feeble, he might take milk, beef tea, or strong soup in very small quantities, at short intervals of time (an hour or two hours) until healthy action returns.

It is probable that under the circumstances I am considering, the various materials out of which the viscid material known as *Mucus* is formed, which is secreted on the surface of the mucous membranes and by the glands connected with it, are not separated from the blood, or are present in an altered state. In fevers, and even in slightly feverish conditions, I believe that those complex compounds from which the cells of the salivary glands form saliva, and those out of which the gland cells of other parts of the alimentary canal develop the marvellous and peculiar substances which play so important a part in digestion and ultimately in nutrition, are not drawn from the blood through the walls of the vessels. This deranged action of an extensive system of glandular apparatus necessarily affects the composition of the blood (which also suffers in other ways), and thus the action of every tissue and organ in the body may for a time become more or less deranged.

When we come to consider the nature of the changes occurring in feverishness, we shall see that in all fevers, and in every febrile condition, digestion and the action of the alimentary canal are invariably disturbed, and often to an alarming extent. Every intelligent mother knows that in infants and in young children the febrile state often commences with derangement of the stomach, and may be occasioned by improper food, as, for example, hard unripe apples. In this way important alterations in the blood and general derangement of the system may result from pathological actions which start from localised disturbance.

In such cases it is very important that the organ or portion of

mucous membrane, the action of which is disturbed, should be permitted to rest for awhile, for you will find that after a rest for a time there will be good evidence of returning action, possibly of undue action. But if a greater amount of action than occurs in health should be noticed, the change will soon be followed by reduced activity, and at length by the normal degree of action. By degrees the state of health will be re-established without any permanent lesion or structural change of any kind having been induced. In such derangements, if by any means we can promote the return of secreting action—if we can get the various glands to act freely, the abnormal condition will be relieved, and the normal or healthy state restored, sooner than if matters are left to right themselves. In this way the patient would gain an important advantage. I think I shall be able to convince you that in many cases we can be of use not only by effecting the expulsion of the irritating matters from the stomach or bowels, but also by diminishing the febrile condition set up; and in some cases in which the febrile development is more obscure and difficult to trace. It will be well for me, however, before further discussing this part of the matter, to draw your attention to one or two points of general interest in connection with the febrile state.

In an ordinary cold the mouth is often more or less uncomfortable or clammy. The throat, as you know, feels dry and rough, and the appetite becomes impaired. Little saliva and little gastric juice are formed under these circumstances, and probably the quantity of intestinal fluid that ought to be secreted is much less than usual, and you will also notice, if you pay careful attention to the matter, that the kidneys do not secrete in the normal degree, while the bowels are often constipated. You will find, when you are suffering in this manner, that if you take a warm bath or a hot-air or vapour bath, by which the free action of the skin will be excited, the unpleasant sensations will cease, and at least for a time you will feel very much better. You may even experience complete relief. If you take a few doses of *Nitrate of Potash*, or *Bicarbonate of Potash*, or *Citrate of Potash*, or *Liquor Ammoniæ Acetatis*, or *Liquor Ammoniæ Citratis*, or some other saline which acts on the skin and kidneys, you will be greatly relieved.

This relief is, I think, consequent upon the removal of certain substances from the blood which had been accumulating in that fluid to its detriment, and which as they circulated caused derangement of action in many tissues and organs of the body. I shall have frequently to direct your attention to the general and often widespread changes which result from deranged actions confined to very limited areas of tissue or organ, and shall show that at least, in a number of cases, this may be explained by the alterations induced, directly or indirectly, in the cha-

racter and composition of the blood. Hardly any of the ordinary physiological changes of the body can be deranged without some alteration taking place in the composition of the blood. The action of the digestive organs will be disturbed at once, and of this we shall soon have indications in the loss of appetite and various unpleasant sensations in the stomach, as well as by the altered state of the tongue.

Of Dry and Moist States of the Tongue.—One of the commonest changes observed in the tongue is undue dryness—a condition which may depend upon a variety of circumstances. The moisture of the parts within the mouth varies greatly, and even, in most persons, the mouth is not equally moist at all periods of the day and night. The activity of the process of secretion varies much at different times; the quantity of fluid in the interstices of a thick tissue like the skin or the dorsal surface of the tongue is by no means always the same, and varies with every change in the tension of the walls of the capillaries, the pressure of the circulation, the activity of the lymphatics, and a number of other circumstances. Lastly, it is obvious that the varying rate of evaporation from the mouth and nasal passages will alone cause alterations in the tongue as regards its moisture. The tongue is often dry in cases of Diabetes mellitus, though moist in the so-called Diabetes insipidus.

The dryness of the dorsal surface of the tongue, a change which is not uncommon in many forms of disease, cannot be attributed to changes taking place upon the surface of the mucous membrane only, for the secretion of fluid by the glands beneath might entirely compensate, or more than compensate, for the loss of fluid by evaporation. In many cases the dryness seems to be due to alterations which occur beneath the mucous membrane, affecting the nutrition of the deep cells of the cuticular coverings of the papillæ, and in part to the change in the composition of the blood itself and an altered state of the blood distribution, as determined by dilatation of the little arteries, consequent upon relaxation of the circular muscular fibres occasioned by change in some part, peripheral or central, of the nerve apparatus which governs their calibre. In ordinary health the moist condition of the tongue is due partly to the transudation of fluid through the walls of the vessels towards the epithelial and other tissues, and partly to the presence of fluids secreted in varying quantities and poured into the cavity of the mouth, particularly the saliva. The surface of the tongue and inside of the mouth are thus kept moist. The moisture of the tongue and interior of the mouth will, however, be very much favoured if the air we breathe is moist, while in the opposite state of things the tongue will become more or less dry from evaporation, and obviously a greater amount of fluid will be required to maintain the mouth in a moist state in dry than in damp weather. The quantity of vapour communicated

to the expired air which traverses the cavity of the mouth is liable to variations according to changes which occur in the lungs and air passages. The blood, as it traverses the capillaries of the lungs at different times, contains very different quantities of fluid, and therefore during some periods much more vapour will be given off from the blood to the air about to be expired than at other periods. Not only so, but the rate of exhalation of watery vapour from the blood is influenced by a number of complex conditions which are continually undergoing change, but which I must not attempt to consider here. Every time we expire through the open mouth, the air laden with moisture is driven over the mucous membrane of the mouth and tongue. However dry the *inspired* air may be, it becomes, if the individual is in good health, nearly saturated with moisture as it leaves the air-cells of the lungs. This damp air playing over the surfaces it traverses assists in keeping them moist.

The mouth and tongue, however, may readily become dry, and a very unpleasant state of things will be experienced. Those who have acquired the bad habit of sleeping with the mouth wide open frequently suffer from the derangement in question. We should close the mouth before falling asleep, and during sleep we should breathe freely through the nose. In cold weather it is important that the cold air which is inhaled should pass over the surface of the mucous membrane of the nasal passages in order that it may be warmed before it reaches the wind-pipe and lungs. There is good reason to think that many attacks of bronchitis, pneumonia, and congestion of the lungs have been occasioned by breathing through the mouth instead of the nose in very cold weather. The air which receives a supply of moisture is better adapted for the further complex chemical changes effected by respiration, which changes, as many of you are no doubt aware, are most actively carried on during the period of sleep. Always advise your patients to get into the habit of keeping the mouth closed and breathing through the nose, not only during sleep, but generally; for, especially in cold weather, it is important upon many grounds that the inflowing air should take this circuitous route rather than the more direct one by the mouth.

As soon as the mucous membrane of the mouth or adjacent passages gets dry, a desire for fluid will be experienced. The person longs for a little water, and when he gets it he moves it about in all parts of the mouth, so as to thoroughly moisten the mucous membrane; but this operation requires to be very frequently repeated, as the surface when moistened with water gets dry much sooner than when bathed with the natural fluids of the mouth. In many cases you will find glycerine and water, in the proportion of one part to five or six, more effective than pure water. A little lemon-juice may be added to make

the mixture more palatable, and sometimes you will find that linseed tea with glycerine will be better than water. If the mouth becomes very dry, articulation will be difficult or impossible. No one can speak properly if his mouth and tongue lose their ordinary moist condition, and you may have noticed that many orators who are accustomed to address audiences for a considerable period of time are obliged to sip water every now and then. But a man in good health ought to be able to talk for two hours without taking a drop of liquid. In perfect health the quantity of saliva that flows into the mouth varies remarkably at different times, and the proportion is diminished in any little derangement of the system. The free flow of saliva has much to do with the moist healthy state of the tongue. Some speakers are seen to take a few sips of fluid every four or five minutes, but this ought not to be required, and I much fear that in some of these cases the dry state of the mucous membrane has resulted from the habit over a long period of time of taking into the system too much alcohol or too much solid food and too little water, a practice which soon causes most important changes in the blood, and eventually may lead to impaired action of some of the secreting glands.

Of Exciting the Flow of Saliva.—In many cases in which the secretion of saliva is deficient, the increased action of the salivary glands may be excited in a very simple manner. Anything which promotes the flow of saliva and induces the glands of the mouth to secrete more freely will, to some extent, relieve a dry state of the mouth and tongue. Commonly, the mere irritation, stimulation, or excitation of the sensitive nerve-fibres spread out beneath the epithelium of the mucous membrane of the mouth, brought about by the contact of some pungent or acid material, is sufficient to cause a very free salivary secretion. A small piece of lemon just placed in the mouth will often give rise to a very free flow of saliva; and there are various pungent materials which are introduced into the mouth for the very purpose. The mere moving about in the mouth of some solid body such as a smooth pebble will, through reflex action, promote the secretion of the saliva. The pebble acts upon the afferent nerves, and an increased flow of saliva follows. This is owing not only to the expulsion of the secretion already formed, but to increased secretion of salivary fluid by the gland-cells.

Sialagogues.—We have many remedies which belong to the class of Sialagogues (σίαλον, saliva, and ἄ-γω, I expel), *Horse-radish*,—*Mezereum*,—*Ginger*,—*Pyrethrum*, the root of *Anacyclus Pyrethrum*, the old *Pellitory of Spain*, are examples of well-known sialagogues. But there is one better known to most of you, though its use as a sialagogue is in these days almost limited to some of the nautical people—I mean *tobacco*, which if used at all should be smoked, not chewed, and

smoked only in moderation, and in the open air. Certain salts also excite the secretion of the salivary glands. *Chlorate of Potash* (*Dose*, twenty grains in water) and *Nitrate of Potash* (*Dose*, five to twenty grains dissolved in a wineglassful of water) are among the best. Sucking *fused nitre* (nitre balls) is an old and very favourite treatment for many slight ailments.

You may now get *Nitrate of Potash*, generally known as *Nitre*, *Chlorate of Potash*, *Bicarbonate of Potash and Soda*, and a number of other useful saline remedies, compressed into small lozenges or tablets containing five grains each. One or two may be allowed to slowly dissolve in the mouth three or four times a-day, half an hour or more after a meal, and you will find they will cause a very free flow of saliva. When the mouth becomes very dry at night it is a good plan for the sufferer to sip now and then a little cold *Barley water* or *Linseed tea* (one tablespoonful of *Linseed* infused with a pint of boiling water; when cold, the seeds may be strained off and a little sugar added). Or the viscid fluid may be flavoured with lemon juice, and sweetened with glycerine in cases in which it is not desirable to give sugar. Or, a mixture of one of glycerine to five or six of water may be used.

But the most important and most potent of all our medicines used for increasing the action of the salivary and most if not all other glands in the body, is Mercury. You will find when you have to prescribe for a dry uncomfortable state of the mouth, that if you give only half a grain of calomel, or even considerably less than this, within five or six hours a free secretion of the saliva into the mouth will occur, and the mucous membrane of the mouth, fauces, and neighbouring parts will become moist and more comfortable. All the little labial and buccal glands will secrete more freely. Instead of *Calomel*, you may give a grain or less of *blue pill* or *gray powder*. The last (*Hydrargyrum cum Cretâ*) is the mildest and perhaps the best of all the mercurial preparations we use. In children's ailments it is one of the most efficient remedies handed down to us. In the days of my apprenticeship, we used to keep equal parts of powdered *Rhubarb* and *Hydrargyrum cum Cretâ* already mixed, and we ordered from one to six grains of the mixed powder to children according to age. I continue to use this most useful prescription. The only objection is its nastiness, even in jam; but for older children and adults the powder may be made into pills with a little *Extract of Henbane*.

VARIOUS STATES OF THE TONGUE.

I will now proceed to consider a little more in detail the peculiar characters assumed by the tongue in different states of health. The

subject has received great attention from the very earliest ages, and not only from medical practitioners. It is in all respects worthy of your most attentive consideration. To many persons the state of the tongue is a matter of grave anxiety through life, and men have been known to use the looking-glass every day for half a century or more for the purpose of observing the daily changes which occur. Especially does the tongue excite the greatest attention and interest among the members of that large section of civilised man, which knows not what it is to feel perfectly well—to be free from discomfort of every kind, and not to ail anything.

The latest memoir on the tongue is the excellent work of Dr. Dickinson, of St. George's Hospital—"The Tongue as an indication of Disease." The Lumleian lectures, delivered at the Royal College of Physicians in 1888.

White Moist Furred Tongue.—In some conditions the tongue presents a very peculiar appearance, being very white in consequence of the accumulation of a quantity of soft moist epithelium on its surface, with mucus and secretions from some small glands, with multitudes of bacteria, fungi, and the *débris* of food. This state of tongue is seen in its most remarkable degree of manifestation in acute rheumatism. You may indeed often be led to suspect that a patient is suffering from acute rheumatism from the character of the tongue only. Unfortunately we have many opportunities of studying the tongue in this serious malady in the wards of our hospitals, which often contain several well-marked cases of the disease. The tongue in cholera is moist during the stage of collapse, dry in that of secondary fever.

I do not know anything you can do in the hospital tolerably early in your student days, that will be of more real use to you in practice, than making observations upon the characters of the tongue in different forms of disease. I strongly advise you, with the permission of the house physician, to go into the wards when he makes his visits, and institute a careful examination of the tongue in several well-marked cases. Describe what you see, and repeat the observations on each case every day or every other day. It is better not to undertake more than two or three cases at one time. Make microscopic examinations of the fur every now and then, and keep careful records and drawings of the results. From time to time you will notice how frequently improvement in the state of the patient coincides with, or is just preceded by, satisfactory changes in the state of the tongue. Of course you will meet with exceptions, and you will easily find cases which might be adduced in favour of the opinion that the appearances of the tongue are so variable and so uncertain that nothing of importance clinically is to be gained by taking note of the state of the organ. To rely exclusively on changes in the tongue would undoubtedly be unwise and misleading,

but I think not more so than it would be to observe exclusively other individual signs and symptoms of disease. We do gain important information from the tongue, and I strongly advise you to study the changes which occur in its appearance. But, as regards diagnosis and treatment, never forget that we rely not on one or two facts, but we learn all we can and well think over all points before we decide.

Pale Tongue, Anæmia (ἀ, priv., αἷμα, blood, literally bloodlessness). In anæmia the blood is poor and defective in red blood corpuscles. In *anæmic* persons, and in those suffering from various forms of disturbed digestion, the tongue is flabby, the vessels being imperfectly filled with blood and the blood itself poor in red corpuscles. The dorsum of the tongue appears flabby, and a quantity of moist epithelium adheres to its surface. The tongue itself is sometimes visibly larger, swollen or sodden, œdematous (οἴδημα, from οἰδέω, to swell), as well as soft and flabby. The edges are much indented and marked with impressions of the teeth. This state of tongue improves under the influence of quinine and other tonics, and other remedies which improve the digestive power of the stomach and the tone of the body. In some cases the capillaries and veins of the tongue are much dilated and distended with dark blood. The dorsal surface becomes blue or cyanosed, as is also the skin in the same condition, the pulmonary circulation in such cases is defective, and the right side of the heart weak and much dilated.

In Slight Chronic Rheumatism (Rheuma, ῥέω, to flow) the tongue is frequently white, covered with what we call a blankety fur. The white furred tongue is more moist than is the organ in the normal healthy state; its epithelium is abundant and sodden, and everywhere invaded by fungi. Numerous low organisms are actually growing and multiplying very rapidly in the moist, soft, imperfectly-formed epithelium which continues to be developed and to accumulate while the rheumatic state lasts. If there should be a rise in temperature an increase in the thickness of the fur will often be observed. Various organic matters also collect, and decomposition may take place in the whitish spongy layer which is formed in such abundance. The different fluids of the mouth and mucus and epithelium also contribute to increase the thickness of the white fur so characteristic of the condition. In many temporary derangements of the stomach and bowels we also find this moist furred condition of the tongue, and it may last for a few days at a time. The tongue of inveterate smokers is generally white and dirty. Some persons constantly have a foul tongue, although they are nevertheless in good health. A constantly dirty tongue, like some other departures from the normal state, is not incompatible with considerable vigour, good working power, and longevity. A moist tongue may change its characters during a malady and become dry. In a case of

Diabetes insipidus, in which the patient passed a pint of urine per hour, Dr. Dickinson observed that the tongue was very moist, but after a time the case passed into Diabetes mellitus, when the tongue became dry. "The Tongue as an Indication in Disease," p. 97.

Bright Red Tongue.—In striking contrast with the white furred or "blankety" tongue is the red tongue, which is met with in certain forms of fever, the surface being smooth, of a bright red colour, sometimes appearing raw, and not unfrequently being dry and glazed. The red tongue is often seen in scarlet fever. In the early stage of the disease the tongue is often furred, and the red fungiform papillæ are seen to project through the adherent epithelium, and appear as bright red spots. The fungiform papillæ are swollen and the vessels much distended, the surface more or less uneven, and we have the appearance somewhat resembling that of a strawberry—hence, *the strawberry tongue.* But in a few days the superficial layers of epithelium of the tongue and of the lining membrane of the mouth and fauces are detached, desquamate (*de*, from, *squama*, a scale), and then the whole surface of the tongue is red.

The smoothness and redness of the tongue last for some time, for the old cells of epithelium having been completely detached, some time must elapse before the new cells have sufficiently accumulated to prevent the red colour of the blood being so distinctly seen in the vessels beneath. The raw beefy character of the tongue is also observed towards the close of many exhausting diseases, as phthisis (*φθίνω*, to corrupt), and some forms of pyæmia. Aphthous sores also form sometimes in conjunction with this state of the tongue, and must be treated as described in page 126.

The Dry Brown Tongue.—Strictly speaking, the dry brown tongue is hardly ever seen in slight ailments, and I shall only say a few words about it here. This state of tongue is often preceded by a moist white furred condition. Do not forget that a state of tongue somewhat resembling the dry brown tongue may result from sucking liquorice, black currants, or black cherries; and other dark fruits may produce temporary staining of the tongue. But such give to the tongue a very peculiar appearance which you ought to be able to recognize at once. It is well also to bear in mind that the juices of some fruits, and other fluids having the property of staining the tongue or skin, are sometimes used by patients for the purpose of puzzling us.

The dry brown or black tongue was common in many diseases of old time, and was well known to Hippocrates. In typhus and typhoid fever, and many other low conditions, the tongue may become brown or more or less black, owing in part to changes occurring in the epithelium, which, with mucus and secretions from various glands, has accumulated upon its surface and has got dry. If the feverish condition reaches

any considerable degree of intensity, as I have already told you, the moist surfaces about the mouth soon become dry and the little glands of the mucous membrane cease to secrete. The secretion of the salivary and other glands is diminished to such an extent as to render the process of deglutition (the swallowing of the food) extremely difficult. This is one of the reasons why we give to patients suffering from fever milk and beef-tea, and order nutrient matter dissolved in fluid. Indeed everything required should be introduced in actual solution, or in a very moist state, as in the form of pap. Or finely divided solid matter may be suspended in beef tea, soup, or milk, and thus nourishment in a state easily absorbed may be given in cases in which it is absolutely required to support life.

In many cases great relief will be afforded if the nurse will occasionally paint, as it were, the dry mucous membrane of the tongue and mouth with a little weak *glycerine and water* (one part to nine or ten of water) with a camel-hair brush. This is very necessary in some severe forms of fever in which the tongue and mouth become very dry and painful. After the tongue has been dry for several days, it is not unusual for deep fissures to form upon its surface, and these fissures sometimes extend quite through the mucous membrane, and even reach the vessels and nerve-fibres in its substance. Escape of blood (hæmorrhage) frequently occurs, and the blood accumulates and helps to form the dry brown matter which adheres to the tongue. Sometimes much of the hæmoglobin of the blood is disintegrated while the blood circulates, and may make its way through the capillaries without rupture; but more generally blood itself escapes from the capillaries in the usual manner, in consequence of their over distension and the formation of longitudinal rents or fissures in their walls. Unless sensation is previously numbed by the presence of morbid substances in the blood, the occurrence of the fissures is associated with much pain, discomfort, and distress.

The blood from the vessels and the viscid mucus which collects upon the tongue and lips together form dark brown or black flaky masses (*sordes*, from the Latin, *sordes*, dirt, filth), which accumulate about the mouth and often firmly adhere to the surface of the teeth. Sordes may sometimes be pulled off, but generally leave a raw and sore surface beneath.

The dry brown tongue passes by gradations into the black tongue, characteristic of some of the very worst forms of fevers which occurred in former days, and which are even now occasionally met with in the East. As the severity of the feverish state passes off, the tongue begins to clean, usually first at the edges. This "cleaning" results from the growth of new epithelium on the deep surface, and the detachment of the old cells with mucus, fungous growths, particles of food, and probably

a little blood—which have been accumulating and have adhered to the surface during the illness. As convalescence approaches all this is cast off. To prevent this altered and partly decomposed organic matter, *débris*, &c., being swallowed, the mouth should be frequently rinsed out with *Condy's fluid* and water (one teaspoonful to a tumbler of water), or a very weak *Solution of Sulphurous acid* (one part of the *Sulphurous acid*, *Acidum Sulphurosum* of the Pharmacopœia, to five or six parts of water) or of *Hyposulphite of Soda* (five grains to an ounce of water).

Hæmorrhage.—Just now I used the word hæmorrhage, and as this was, I think, the first time I have had to employ the term, it is desirable that I should explain its meaning and tell you exactly what happens when *hæmorrhage* takes place. The word is derived from two Greek words, αἷμα, blood, and ῥήγνυμι, to break forth. Hæmorrhage means, therefore, a breaking forth of blood. In former days we used to be told that there was such a thing as the passage of blood corpuscles through closed membrane, through the walls of vessels, in some mysterious manner without any rupture or solution of continuity. This was called *hæmorrhage by exhalation*, and in my student days the opinion was still entertained that red blood corpuscles might traverse a capillary wall by "exhalation." At an earlier period, the capillaries used to be spoken of as exhalant vessels, and their function was regarded by some as opposed to that of the absorbents.

Under certain circumstances blood corpuscles may pass through the thin walls of capillary vessels without the vessels being destroyed or permanently damaged. In all cases, however, an opening, it may be temporary only, in the vascular wall does exist. The capillary is not actually torn across, but when it becomes much distended by the accumulation of blood within it, the thin vascular walls are stretched and rendered very thin. Longitudinal rents or fissures result, through which the blood corpuscles, a few at a time, easily escape edgeways. When the pressure is relieved, the elastic wall of the vessel will contract, and the fissures close up, the capillary transmitting the blood as freely as it did before. The term *Hæmorrhage*, then, is strictly correct, and always means the breaking forth of blood from a vessel, large or small.

Chronic Cracks and Fissures of the Tongue.—This state of tongue is very common in persons who have long suffered from weak digestion. The tongue is generally rather pale, quite moist, and from time to time becomes covered with white fur, which is often distributed in patches. The cracks are usually rather deep, very irregular in arrangement, and differ much in number in different cases. For the most part they are permanent, but occasionally new ones form and the older ones increase in depth. The papillæ at the edges of the fissures occasionally become sore. Aphthous patches of irregular shape may appear and increase in

size, extending often to the bottom of the fissures, and sometimes the tongue becomes so sore that eating solid food is a painful process. The cracks may go on separating until a raw surface is exposed at the bottom. This is often exquisitely painful; and if any alcohol, pepper, or salt substance is taken, the almost bare nerve-fibres exposed in the fissures are instantly affected. Not unfrequently in such cases the pain and discomfort are so great that the patient is deterred from eating, and in consequence the general health suffers. A moderate degree of this condition of tongue is extremely common. It does not usually interfere with longevity or predispose to any more serious derangements. Those who suffer are obliged to be careful in diet and ought to live very moderately. If they exceed in any way digestion becomes deranged, the tongue gets foul and very sore, and some days must pass before the usual state of health returns. In such cases the bowels are sluggish, but you will generally find that mild purgatives only in small doses can be borne. Three or four grains of *compound rhubarb pill*, two or three nights in succession, with perhaps a little *effervescing citrate of ammonia*, *soda*, or *potash*, or some such simple saline, three or four times daily, will be of use, and expedite the return of the normal state. Carbolic acid lotion (one part to one hundred of water) is also a good application, especially if the fissures are associated with the presence of aphthous spots, with vegetable growths on the surface, but the lotion is not a pleasant one to use. *See* also page 126.

There is, however, another form of cracked tongue common enough and very chronic, which is not to be cured in this simple manner. There are cracks and fissures here and there, but in some situations the surface is too smooth. The appearance is such as to lead one to think that, in the course of very slow pathological changes many of the papillæ have undergone change, and have at last wasted and disappeared, just as the villi of the small intestines do in certain forms of disease. The state of tongue which I am considering may last for years, getting better and worse many times. It is usually relieved, and in not a few cases cured, by *Iodide of Potassium*. The remedy must be taken for two or three or more weeks at a time, then stopped for a short period, and resumed again. You may begin with two grains, and gradually increase the dose to five or six grains three times daily, and it is a point to give each dose dissolved in as much as half a pint of water.

Some cases improve rapidly on *Iodide of Mercury*. You may order from the thirty-second to the sixteenth of a grain of the *Perchloride of Mercury*, that is, from thirty to sixty drops of the *Liquor Hydrargyri Perchloridi* with five grains of *Iodide of Potassium*, and a little *Syrup of Ginger*, and perhaps twenty minims of *De Vry's Liquor Cinchonæ* in four ounces of water an hour after food, twice or three times a day for two or three weeks at a time. These cases, and especially if they are

cured by the medicine I have recommended, are generally considered to result from syphilis, but I feel confident that all are not of this nature. It is a grave mistake to suppose that everything cured by mercury and iodide of potassium, or some other iodide, *must* be syphilitic in its nature and origin. These remedies are most useful in the treatment of many conditions which have nothing whatever to do with the disease in question. Some who read these words will, however, assert that I am mistaken, and that in cases in which the patient had never had an attack of syphilis the poison must have been introduced into the organism in some obscure and unknown manner, or that it was derived from predecessors one or more generations back. This is a mere dictum. It cannot be disproved, but it rests on no adequate foundation of fact or observation, and we attach little importance to such assertions when they rest on authority only.

CHANGES IN THE MUCOUS MEMBRANE OF THE MOUTH AND FAUCES.

Associated with the changes taking place in the epithelial surface of the back of the tongue, we have in many cases, also, corresponding changes in the mucous membrane of the mouth, the palate, the fauces, and the throat. The mucous membrane of all these parts is continuous, and no wonder that different sections are sometimes affected in the same manner. The action, also, not uncommonly extends downward through the narrow chink of the *Glottis* (γλῶττα, the tongue) into the *Larynx* (λάρυγξ, the larynx) and wind-pipe, or *trachea* (τραχύς, rough). The voice may become hoarse, in consequence of the mucous membrane being swollen, dry, and otherwise altered. Not unfrequently this dryness extends to the *posterior nares* and affects the mucous membrane at the back of the nose, giving rise to a very painful sensation, a slight degree of which most have experienced when an ordinary cold is about to come on.

If you look in the looking-glass at the back part of the widely opened mouth, when a cold is coming on, you may see the mucous membrane of a darker red than usual, and here and there it may appear glazed and dry. Not only so, but if you try a simple experiment you will discover that an important change has taken place in the sensitiveness of the surface of the delicate mucous membrane of the soft palate. In health the slightest touch will excite movements of deglutition by reflex action, but when the membrane is dry and sore there is no such sudden response, and contraction of the pharyngeal muscles (φάρυγξ, the throat) follows very slowly or does not occur at all. You may touch the palate firmly without any effort to swallow being excited. This benumbed state of the highly sensitive surface generally is only temporary, and consequent upon the changes which have occurred just

beneath the epithelium, where extremely delicate afferent nerve fibrils are distributed in immense numbers, but the condition may occur frequently, and some persons are hardly ever free from some slight derangement of the mucous membrane of the soft palate, fauces, and upper part of the *Pharynx* (φάρυγξ, the throat). In the treatment of this state of things, *inhalation* of steam, simple, or with a little ammonia or camphor, is often of use. *Inhalers* are now largely used. Many are made of china, and are so arranged, that various volatile substances may be very easily inhaled with the steam of warm water. The latter alone often affords great relief in irritable states of the mucous membrane of the throat and air passages. A very good form of inhaler is made by Messrs. Bullock and Co., 3, Hanover Square, W.

Bronchitis Kettle.—The air of the sick room may be rendered moist by arranging an ordinary kettle in such a manner that the steam comes direct from the kettle mouth into the room instead of going up the chimney. The spout of the kettle may be lengthened by adding a foot or more of tin tube, or the special bronchitis kettle made by Mr. Allen, of High Street, Marylebone, may be used.

In derangements of the kind, the application of astringent substances to the palate and fauces often affords relief. You may apply with a large camel-hair brush a little of the *Glycerine of Tannic Acid*, the *Glycerinum Acidi Tannici*, or a solution of *Nitrate of Silver* (five to ten grains to the ounce of *distilled water*), three or four times daily. A few minutes after application the mouth should be gargled out with cold water or salt and water (one teaspoonful or more to half a pint); but the best plan of treating such affections, especially if they are chronic, is the direct application of the astringent or other solution, in the form of *spray*, as I will now describe.

Of the use of Spray.—Of late years very many remedies have been applied to parts about the mouth in the form of spray, and great advantage has resulted. The practice was first employed in the treatment of diseases of the larynx, and many very ingenious instruments have been invented for the purpose of obtaining a cloud of watery vapour in a state of very minute division. *Spray producers* have of late been very much simplified in structure, as well as rendered more perfect. There are two principal forms of apparatus. One in which the "spray" consists of high pressure steam, a stream of water with the required substances dissolved in it, being by the steam minutely divided into spray as it issues from a tube communicating with a reservoir. The steam is obtained by boiling water in a strong copper boiler specially made for the purpose and heated by a spirit-lamp. In the other, the requisite degree of pressure required for sufficiently comminuting the liquid to be converted into spray is obtained by a little india-rubber ball bellows. Both forms may be obtained of the surgical instrument makers for a

few shillings, and are well adapted for use in the treatment of affections of the mucous membrane of the mouth, throat, nose, and larynx. The solution containing the material to be projected against the mucous membrane may be much stronger if the steam spray producer be used than if the air instrument be selected, because, in the first case, the solution converted into spray is diluted in strength by the steam which is used. Some of the best spray producers are those formerly used by Sir Joseph Lister, in surgical operations, and very efficient ones are now made by Messrs. Matthews Brothers, of High Holborn.

In cases of dryness of the mouth, tongue, and throat, water alone may be used in the form of spray, or water with the addition of one-tenth part of pure glycerine. *Alum* spray solution is a powerful astringent. Ten grains of *Alum* to the ounce of water is a good proportion. The same quantity of *Tannic Acid* may also be tried. The spray solution of *Carbolic Acid* may contain two grains to the ounce of water. Of *Chloride of Sodium*, that is common salt, from two to twenty grains or more to the ounce of water. *Chlorate of Potash* five to fifteen grains to the ounce. *Nitrate of Potash* solution may be used of the same strength. The spray solution of *Nitrate of Silver* should contain a grain to the ounce of distilled water.

You must be careful to filter the spray solution before you use it, and you must prevent dust from getting into it, as the fine tube of the spray producer is very easily obstructed by any small solid particle, and is cleaned with difficulty. I find it a good plan to cover the end of the tube which dips into the solution with a piece of muslin, which may be tied round it. In this way any solid particles which may be suspended in the fluid will be entirely prevented from entering the spray-tube at all. The spray instruments, the tubes of which are made of vulcanite, and which are worked by the hand, answer very well for ordinary purposes when five minutes' application two or three times a day is sufficient, but for more prolonged use a good steam apparatus is the best. Simple spray producers worked by the hand may be obtained at Mr. Hawksley's, 357, Oxford Street. We shall find that the spray method is well adapted for the treatment of certain forms of skin disease, and some other cases. There is no difficulty whatever in the use of the spray producer, and the patient can easily be taught to use the apparatus himself. For some time past I have had a large spray producer of the form used by Sir Joseph Lister in constant use. It answers perfectly for many purposes, and it may be employed for disinfecting persons, clothes, or rooms. When attending any case of contagious disease, I can expose every part of my clothes as well as my hair and hands to the action of a ten or fifteen per cent. solution of carbolic acid. So quickly can the steam be generated that the whole process does not take more than ten minutes or a quarter of an hour.

Metallic and other Tastes in the Mouth.—Patients not unfrequently complain of very peculiar tastes in the mouth described as metallic, salt, acid, sweet, bitter, and even fæcal (Fæx, dregs). The odorous matter of some putrid smells is unquestionably sometimes absorbed into the blood from the inspired air, and afterwards exhaled, the smell and taste of the breath remaining for many hours after the individual has left the neighbourhood of the odoriferous matter. In various derangements of the stomach the most peculiar tastes are experienced, and by patients are compared to the flavour of rancid butter, valerian, vinegar, and many other things. Generally speaking the symptoms complained of may be relieved by exciting the excreting organs. Purgatives, especially small doses of *Calomel* or *Gray Powder* (one to three grains) repeated every third or fourth night for a fortnight or longer, usually afford relief. *Exercise*, *free perspiration* in a warm bath, *Diuretics*, and *Sudorifics*, are also useful.

Thrush, Aphthæ,—Sores and Ulcers in the Mouth.—Sores of the mucous membrane of the mouth are exceedingly common. These superficial sores are spoken of as *Aphthæ*, from the Greek ἅπτω, I inflame. The derivation is not a very good one, for although no doubt the aphthous spots are associated with inflammation, they are not caused by this process. The meaning of this, like those of many other scientific terms, has changed as our knowledge has advanced. Aphthæ are little superficial ulcer-like depressions, sometimes with infiltration and consequent thickening of the tissues around, which form upon the surface of the mucous membrane. Sometimes the epithelium only seems to be affected, but more often the sore extends deeper, and damages the structure of the mucous membrane itself. Aphthæ are extremely common in weak, ill-nourished infants, but are not unfrequently met with at all ages. In advanced age the disease occurs especially in those who have suffered from prolonged exhausting maladies. In various forms of chronic phthisis, and in some forms of pyæmia, they are present, and may cause great discomfort to the patient. It is difficult to explain precisely the changes which initiate the formation of aphthous sores, as, for example, those which are so frequently formed on the side of the tongue, just where the organ comes in contact with some tooth which is undergoing decay. The formation of a little painful ulcer follows. Such ulcers very often affect the mucous membrane lining the lower lip just where the orifice of a labial gland is situated. Upon examination we find upon the aphthous spot a quantity of soft, moist material, which consists largely of epithelial *débris*, embedded in and everywhere invaded by fungi, especially a form of *Oïdium albicans*, in various stages of development.

Now it has been supposed that the fungi are the cause of the aphthæ. The spores of the fungi, it is said, grow and multiply on the surface of

the mucous membrane, and thereby cause inflammation and ulceration of the surface. Secretion takes place and the epithelium becomes soft and spongy, and thus the growth and spread of the fungus are favoured. The constituents of all organic secretions at the temperature of the body very soon undergo decomposition, and the germs being already present, fungi would soon develop, and would grow there and multiply. So that, instead of the fungi *causing* the disease, it is more probable that morbid actions on the surface of the mucous membrane give rise to changes favouring the development and the growth of the vegetable organisms, and that in these prior changes is the true origin of the disease to be sought. Fungi and their spores are, as I have said, invariably present, and their mere presence cannot possibly explain the development of the obstinate little ulcers which are now and then found in persons who are in good health, though they trouble such only for a very short time. I say in good health, but have little doubt that I use the term incorrectly; and though I cannot tell you the precise particulars in which the normal condition is departed from, the fact of the development of aphthæ is, I consider, proof that the person affected is not in perfect health. The affection is not purely local, and it is most probable that the occurrence of the spots in the mouth is preceded by, and intimately connected with, an altered state of the blood. These little aphthous ulcers are sometimes very difficult to get rid of, and of course a great number of "*infallible*" remedies have been discovered.

Artificial teeth often give rise to much trouble and discomfort owing to the same change, and sometimes when these are worn constantly without great care in frequently cleansing the mouth, very obstinate and sometimes even serious sores are caused and kept open. The patient who suffers in this way must exercise great care and for a time pay the greatest attention from day to day in keeping the mouth and teeth thoroughly clean. He must also consent to live on a simple diet and avoid all excess. Artificial teeth should be removed at night, and placed in a tumbler containing about twenty drops of red Condy's fluid to half a tumblerful of water.

Treatment of Aphthæ.—Honey and borax, the *Mel Boracis* of the Pharmacopœia, is a well-known remedy for aphthæ, and is equally efficacious in children, adults, and old people. Chlorate of potash also seems to exert some influence. In the case of adults the best remedies are those which are known to chemically change the fluids upon the surface of the spots which favour the development of fungi, and upon which they live. *Tincture of Perchloride of Iron*, or the *Liquor Ferri Perchloridi* of the British Pharmacopœia, is a very potent local remedy. It may be applied to the surface of the ulcer with a camel-hair brush. Dip the brush into the *Tincture of Perchloride of Iron*, and just touch the surface of the ulcer; leave it for a moment or two, and then tell the

patient to wash out his mouth with water. But it is better to mix the iron with glycerine. Equal parts of *pure Glycerine* and *Tincture* or *Solution of Perchloride of Iron* make a very valuable application. This may be applied, as I have recommended, with a camel-hair brush, or one teaspoonful may be mixed with half a tumbler of water or more, and the mixture used frequently (every two or three hours) as a gargle or as a wash for the mouth. The patient should rinse the mouth with a little tepid water afterwards, for the frequent application of iron without due care causes temporary discoloration of the teeth. The glycerine assists the adhesive properties of the solution, and the morbid changes taking place are interfered with, the low vegetable organisms destroyed, and healthy action is soon re-established. A few grains of calomel added to half an ounce of lime water and an equal quantity of glycerine may also be applied locally with a camel-hair brush. Another very useful local remedy is *Nitrate of Silver*. The stick of fused nitrate of silver is *lightly* applied to the spots, or a strong solution (ten grains to an ounce of distilled water) may be applied with a brush every day until the cure is effected.

The *Thrush* of infants usually yields to increased care in feeding. A very mild laxative is sometimes required, and oftentimes a little lime-water mixed with the milk is of great use. A little of the *Mel Boracis* may be put into the infant's mouth from time to time. But my friend the Professor of the Diseases of Women and Children will give you better advice on these matters than I can do.

Offensive Breath.—I will now briefly refer to a derangement which occurs sometimes in connection with disturbed gland action, and which gives people extreme annoyance. This is the emission of a very offensive odorous compound in the breath. It comes partly from the glands connected with the upper part of the respiratory and alimentary mucous membrane of the mouth and throat, and partly probably from the blood itself as it traverses the pulmonary capillaries. Even the individual himself is greatly annoyed by the smell which he exhales.

The odour is not by any means the same in all cases, though I cannot tell whether chemical substances of different kinds are really produced. The odorous material is, I believe, formed in a great many cases by the glands of the mucous membrane of the air passages of the throat and of the mouth. I think these glands secrete the material which ought to be removed in another form by excretory glands, in other parts of the body, the action of which is much lessened or stopped in these cases.

As offensive breath depends upon the secretion of a peculiar organic matter from the system, in order to effectually get rid of the tendency you must try to render more active the processes of secretion elsewhere. The offensive material may thus be got rid of by another and its more

natural channel. In fact we must endeavour to get it or the material which yields it separated from the blood by other glands, and particularly those which discharge their secretion into a convenient emunctory. You will generally find that if you excite the action of the ordinary glands whose office it is to separate odoriferous compounds from the blood, and discharge them into the bowel, the disagreeable smell of the breath will soon cease. In short, if you can only excite the more free action of the liver, the largest gland in the body, and of the kidneys and the solitary and other excreting glands of the small and large intestines, and keep up the increased action for a time, the patient will cease to be annoyed with the derangement. Sometimes he is afraid to go into society or be much in the company of other people for fear of annoying them as much as he is himself annoyed by the smell and even the taste of the air he expires.

Acting upon this view, the first remedies to be tried in such cases will be purgatives, diuretics, sudorifics, if the trouble is not relieved by keeping the mouth clean. In all cases antiseptic substances may be used to wash out the mouth frequently. The wash should have a little hot water mixed with it and be used tepid not cold. *Charcoal Powder* mixed with water is a wash for the mouth. A teaspoonful of *Tincture of Myrrh* in half a tumbler of water is also a good wash. *Carbolic Acid* is useful in such cases. A weak solution of carbolic acid (one part to two hundred of water) may be taken internally, and the mouth may be rinsed out frequently with a stronger solution. Weak carbolic acid spray may also be tried (*see* p. 123). Condy's fluid is another useful remedy. The mouth may be washed out several times daily with a solution consisting of half a teaspoonful of the red Condy in a tumbler of water.

But to effect any lasting relief, you must be particularly careful to regulate the patient's diet. Many of those who suffer from trouble of this kind are too fond of rich sapid substances, and perhaps take too much beer or porter, and upon enquiry you will find perhaps that they habitually eat more than a not very vigorous stomach can properly digest. The excess of all the good things taken is imperfectly oxidised, and the chemical compounds formed clog the emunctories, and are in too considerable proportion to be got rid of by the various glands whose business it is to remove them from the body. Certain materials remain in the blood, and instead of being discharged from the bowels are eliminated in a crude form by the skin, by the glands of the mucous membrane, and in part by the lungs. Thus the expired air becomes contaminated. It is most important that people who suffer in this way should not overeat, should not take more of anything than is required for nutrition and the work of the body. As a matter of fact, almost everyone does eat more, and many eat very much more, than is required to keep the body in health. In some people, perhaps, in consequence

of the liver being less active than it should be, the excess of food instead of being excreted in an altered form in the usual way by the solitary and other glands of the bowels, undergoes exceptional chemical change, and odoriferous compounds are formed in large amount, and persistently, to the patient's great distress. As I have suggested, the way to remedy this great annoyance is to encourage the more free action of the glands whose ordinary office it is to separate this class of substances from the organism. Try and transfer the action from the surface of the gastric and respiratory mucous membrane to that of the large bowel.

For persons who have long suffered, besides giving occasional doses of calomel, blue pill, or gray powder, you must prescribe some mild harmless purgative, and of this frequent doses may be taken. You must in fact take care that the bowels act freely, and that the excreting glands do their work efficiently, and you must explain to the patient that the improvement will only be gradual, and he must persist for some time in steadily pursuing the treatment you advise.

Almost any purgative will have a good effect in many of these cases:—Different preparations of *Colocynth*, *Aloes*, *Podophyllin*, *Scammony*, *Rhubarb*, *Jalap*, *Senna*, *Cascara*, have all been prescribed with benefit. Several other purgatives have been recommended by different authorities. As a general rule it is better not to give large doses, as it is necessary not only to excite the action of the intestinal glands, but to keep it up—to help the glands from day to day to do their work—to give them just a little artificial stimulus and no more. From three to five grains of the *Pilula Colocynthidis et Hyoscyami*, or the same amount of *Pilula Rhei Composita* may be ordered, or you may add half a grain or less of the *Extractum Aloes Barbadensis*, or one-fifth or less of a grain of *Podophyllin* to half the quantity of either of the pills mentioned. At first the pill should be taken every night, or just before dinner; and when it begins to act, every other day, or once in every three or four days. Our object is to so regulate the bowels as to cause a daily action. With some persons *Scammony* answers admirably. One or two grains of Resin of Scammony, *Scammoniæ Resina*, may be added to two or three of the *Compound Colocynth Pill*, which as you know contains a certain proportion. A patient of mine who died at the age of ninety-five had taken Scammony two or three times a week for many years with the greatest benefit; but neither this nor Podophyllin, nor any purgative that I know of, acts equally well upon all. You must be well acquainted with a number of purgatives, and must be able to combine them in many ways. With this knowledge you will often be able to hit upon the right thing for particular patients. Our predecessors were more skilled in prescribing combinations of remedies than we are, and there is not the smallest doubt that we often succeed with a com-

bination, although we may quite fail to effect the desired object with a single drug.

Although I must not tire you with mentioning a multitude of remedies for a condition which sometimes resists all our efforts to relieve, there is yet one thing which as already stated is of the greatest service if given with judgment and due care. This is mercury, which, as you know, has the credit, and deservedly, of acting specially on the liver, but which also causes increased action of most of the glands connected with the alimentary, and probably also the absorbent, system. Mercury is one of the remedies upon which our forefathers relied more implicitly than we do. I think they often gave it too frequently and in unnecessarily large doses, but now-a-days I think we err in an opposite direction, and some practitioners not only do not prescribe mercury in cases where immediate relief would follow its administration, but refuse to prescribe it altogether, and encourage the prejudice needlessly excited in the minds of patients against its use. Many a mother, who seems to be shocked at the very name of calomel, nevertheless frequently gives it to her darlings in some patent powder which she has used for years, and which she will tell you is a most excellent remedy for every complaint of infancy and childhood.

In many instances in which the patient suffers from offensive breath, with a dirty tongue and a disagreeable taste in the mouth, and defective secretion of saliva, with perhaps slight nausea, and fulness or discomfort about the pit of the stomach, you may effect a cure and earn the gratitude of your patient by prescribing a few small doses of blue pill, gray powder, or calomel. The medicine should be given with a little rhubarb, compound colocynth pill, or some other purgative, every third or fourth night, three or four doses in all being ordered, though often one or two only will be required. With some persons, however, no compound of mercury will agree, and you must bear in mind that if you overdo mercurial treatment you will do harm. Indeed offensive breath is often caused by the regular administration of mercury, and the trouble often continues until long after the mercury has been given up. In these very exceptional cases you must employ other purgatives, and give various salines to act on the bowels, the liver, and kidneys, especially the *Nitrate of Potash*, *Potassæ Nitras*, and the *Chloride of Ammonium*, *Ammonii Chloridum*; five to ten grains of the first, and twenty grains of the last, dissolved in two or three ounces of water, on rising and on going to bed. *Podophyllin*, *Cascara*, and *Euonymin* may be tried while the patient also takes the saline.

IMPAIRED APPETITE—LOSS OF APPETITE—VORACIOUS APPETITE.

Next let me say a few words about loss of appetite, a grievous complaint in the opinion of many people, who will tell you with dismay and astonishment that they have ceased to enjoy their food. They never feel hungry, and never eat with appetite. Sometimes this lack of inclination for food is due to the circumstance that the complainants ordinarily eat too frequently, and perhaps also eat too much. There is, however, unquestionably a form of loss of appetite, or impaired appetite, concerning which you will be consulted from time to time. This ailment is learnedly known as *Anorexia*, the scientific term for loss of appetite, the word being derived from the Greek ἀ, priv., ὄρεξις, appetite.

Loss of appetite in some cases is rather advantageous and conservative. Many a man who boasts of always enjoying an excellent appetite, would be more fortunate if he lost it from time to time. It is in truth a misfortune to have too good an appetite unless you have great self-command; for the temptation to satisfy it is considerable, particularly in the case of those who are well off, and are unhappily obliged, owing to their social position, to keep good cooks. Many such persons are doomed to suffer as they get older from having eaten too much at an earlier period of life. He who wants to keep himself in a state of health must learn to care little about eating, and must not only sit down to his meals with an appetite, but take care that he leaves off eating before he is satisfied.

Loss of appetite very frequently depends upon a state of the mucous membrane of the stomach approaching to inflammation. After chronic inflammation has existed for a considerable time, degeneration of the gastric glands and other tissues takes place, and, just as occurs sometimes in old age, and after prolonged exhausting diseases, digestion becomes permanently weak, and in many such cases there is loss of appetite. In treating many of these, it is necessary to help digestion artificially, as I shall explain more fully in another lecture. But in persons whose stomach is fairly healthy, you will observe that anything which induces a state of the system in which the nerves become weak, great fatigue, over much brain-work, anxiety, mental emotions, fear, or joy, may give rise to impaired appetite.

In cases in which the loss of appetite depends merely upon some temporary derangement of the mucous membrane of the stomach, many of the remedies useful in weak digestion will afford relief. *See* p. 163. Very often a change of diet for a few days will effect a cure. Advise the patient to take nothing but milk and beef tea, with a little stale bread, or corn flour or lentil flour properly cooked. But where the loss of appetite depends upon undue wear and tear of the nervous system

and is associated with mental depression, general weakness, inability to exert body or mind, a thorough change is requisite—a complete alteration in the general habits of life, an abandonment for a time of the general daily routine whatever it may be. Some of the cases in which the appetite becomes gradually reduced, or completely lost, are very curious and difficult to relieve. They occur commonly in the so-called hysterical *diathesis* (disposition, constitution, from διά and τίθημι, I place, I dispose). In many instances there certainly is no structural alteration either in the stomach or in any part of the nervous system. The affection is no doubt due to some deranged nerve action which lasts for a time and then passes off without leaving any actual lesion. Hysterical (ὑστέρα, the uterus, because the condition is often associated with uterine derangement which was formerly regarded as its cause) girls and women are very apt to lose their appetite for a time. At first having little desire to eat they yield to the impulse and may gradually bring themselves to refuse all ordinary food. If pampered and pitied and regarded as interesting objects, they become worse and soon glory in refusing to eat. Occasionally we do meet with people in a state almost of starvation in consequence of having given way to this feeling of want of appetite. From there being no desire for food there is soon acquired an actual distaste, dislike, aversion. The mere smell of food at once causes all desire for it to disappear. There may be danger of actual starvation if the patient is not managed with judgment, but in such cases, when a fatal result occurs, death more commonly depends, not upon actual inanition, but upon the development of some intercurrent malady when the body is in an excessively weak and exhausted state.

Some of those remarkable "fasting" celebrities have commenced by degrees as above suggested. The fasting tendency has developed itself after loss of appetite, occasioned by a feeble state of the digestive process, due to imperfect action of the secreting glands of the mucous membrane of the stomach, or of the nerves which excite these glands to form and discharge their secretion, and which has existed for some time. Fasting becomes a passion. The patients are pitied and patronized by the people about them, who humour them in every conceivable way, and encourage them in the belief that they are peculiar beings, who, unlike common folk, can actually live without eating. This gradually leads on to deceiving. They systematically refuse everything that is brought to them, and are soon looked upon as mysterious persons. Most of them surreptitiously obtain a little, and in this way may live in a weak, emaciated state for a great length of time. They lose weight very slowly, and then become stationary, which fact of itself is proof that nourishment is somehow introduced into the body. An excellent account of one of the most remarkable of these cases, together with much matter of importance in connection with the general subject of starvation, has

been published by the late Dr. Robert Fowler, who investigated the evidence in the most thorough manner. I strongly recommend all who are interested in the physiological, moral, and legal aspects of fasting cases to study "A Complete History of the Case of the Welsh Fasting Girl (Sarah Jacob), with Comments thereon; and Observations on Death from Starvation," by Robert Fowler, M.D.—Renshaw, 356, Strand, 1871.

Voracious Appetite.—Occasionally we are consulted about an inordinate appetite. The patient is never satisfied. He eats a pound of beefsteak or more, and still feels hungry. In some persons this great desire for food can hardly be considered as a disease or even an ailment. Children are occasionally the subjects of it. No doubt the state is often induced by injudicious management.

Remarkable voracity is, however, not uncommonly associated with morbid states. In certain forms of mental disease it is a prominent symptom, and in *Diabetes* (διά, through, and βαίνω, I pass), a condition characterised by the formation and elimination o , it may be, an enormous quantity of sugar from the system, the appetite is very frequently, but by no means constantly, enormous. Many a diabetic can consume one pound, or even two pounds, of rump steak at a sitting, and, what is more remarkable, thoroughly digest it. Children and adults who suffer from worms have often a very large appetite, and it will be well for you to bear in mind this circumstance. Get rid of the worms and the child again eats moderately.

Inordinate appetite used to be spoken of as Bulimia. This word, like many others I have referred to, is derived from the Greek. You must have remarked that a great number of medical terms, and particularly the names of diseases, are Greek. Those among you who have been taught Greek at school enjoy an advantage over those who are ignorant of it, inasmuch as the meaning of a vast number of words will be at once apparent. It is somewhat unfortunate for many who are going into the profession that for some time past there should have been a dead set against Greek, for no one can really learn Medicine without at the same time finding out the meaning of a number of Greek words.

The word *Bulimia* I learn comes from βοῦς, an ox, or βοῦ, the augmentative particle, and λιμός, hunger. Bulimia, or voracious appetite, is a condition which I suppose may be due to an irritable state of the nerves of the stomach. Not unfrequently the affection is associated with vomiting, the stomach rejecting its contents as soon as they have accumulated to a certain extent. The voracious appetite, as we see it existing in children and young people, usually comes from undue encouragement. The greater the desire for food the more food the individual eats, and so he goes on until he succeeds in consuming several times as much food as his system requires. Thus is

thrown upon important organs the task of eliminating a quantity of material not required by the organism, and which ought not to have been taken. Sad mistakes are frequently made by parents in this matter. A child perhaps is rather thin, and therefore encouraged to stuff, and by degrees the habit of taking enormous quantities of food is acquired, with the not uncommon result to the patient that he gets thinner and thinner, instead of gaining in weight.

Many of the railway navigators, and very strong labourers who have heavy work to perform, suffer from this affection, in consequence partly of yielding to desire which their high wage enables them to gratify, and partly because they act upon the generally received theory propounded by certain popular philosophers, that the more you consume in the way of food the more work will your machinery perform—a principle which may to a slight extent apply to machines, but is altogether inapplicable to any form of living organism, and altogether inaccurate as regards man, for oftentimes the man who works the hardest and does the most eats very little. The railway navigators are fine, strong men, many from 5 feet 10 to 6 feet high, and some of them certainly do consume an enormous amount of animal food, probably three times as much as is required for the performance even of the great amount of work they do. The excess, of course, must be somehow excreted, and before it can be excreted must be acted upon by the secretions of various organs, especially the liver. This and many other glands in the body are thus called upon to do an excess of work, and, as a general rule, they are damaged by over action before the man reaches the age of forty. And in not a few cases the organs completely break down from overstrain, passing into various states of disease which soon lead to early death. Indeed, we do not often see one of these men doing a good day's work who is as old as forty. The great majority break down before that age is attained. The model navvy has unquestionably to work very hard indeed. His wages depend upon the amount he can lift and the rapidity with which he can move heavy weights, so that he is encouraged to exert himself to the utmost. The more work he can do in the time, the more money he earns. Led by the popular philosopher, he acts upon the absurd theory that the more he eats the more work he will be able to do, and squanders his money in beef and beer that strain his organs of digestion, assimilation, and secretion, and thus ruins his health and shortens his life. There is no one to teach him better, so he acts upon unscientific dogmas, adopts the prejudices of his order and follows his own inclinations. If these men had common sense, and consumed about one-fourth of the food and beer many of them indulge in, they would have a chance of living to the ordinary period of life; and if they did not do quite so much work in the time, they would continue able to work for many years longer. Many men who belong to the middle and upper working

classes, and who have lived moderately, are often very strong and vigorous, and able to endure a considerable amount of bodily fatigue at the age of sixty-five or seventy, and there are many who, like the great statesman who fells trees, have long passed the last age, and are still strong.

It need scarcely be said that, as regards the treatment of these cases of inordinate appetite, it is a matter of the first importance to carefully regulate the diet. Small doses (three to five minims) of Hydrocyanic or Prussic Acid, *Acidum Hydrocyanicum dilutum*, and fifteen or twenty grains of Carbonate of Soda in an ounce of water, half an hour before meals, are often useful. Liquor Potassæ, Bismuth, Tincture of Hop, Tincture of Henbane, and preparations of Opium given with caution in small doses, with some other medicines, may be prescribed to allay the feeling of hunger in cases in which it depends upon unusual irritability of the nerves of the stomach.

NAUSEA.

Some persons suffer frequently from nausea, and a most unpleasant sensation it is to experience. You must, however, take care to distinguish between *nausea* and vomiting—actual sickness. People often tell you they are sick, although they never reject the contents of the stomach. This feeling of nausea is a very common one, and is met with in various degrees ; sometimes being very slight, just a little squalmishness, which as often as not passes off soon after food is taken ; sometimes so severe that the patient feels as if he must vomit. The nausea perhaps comes on as soon as he wakes, and lasts for some hours, and possibly may not entirely disappear for many days at a time. Nausea prevents people from eating, or at any rate makes them careless whether they eat or not, and entirely takes away what some people highly appreciate, the enjoyment of tasting, masticating, and swallowing food. There are, however, persons who, instead of always having a good appetite, hardly know what it is to feel hungry. They eat as a duty, but would quite as soon go without food. The feeling of being moderately hungry,—looking forward to and desiring food, undoubtedly is a pleasant sensation, especially if there is a prospect of its being gratified within a reasonable time.

Nausea may be brought on by very many circumstances. If you were to take but a 1-4th or even the 1-6th of a grain of *Tartar Emetic*, *Antimonium Tartaratum*, a drug much in vogue fifty years ago, but now seldom prescribed, you would soon learn what the feeling of nausea is like, if you had not already experienced nausea otherwise caused. Those who go a short journey by sea often suffer from nausea, or something worse. The very few among you who have never learned to

smoke may easily study the phenomena of nausea, and will afterwards remember what is meant by the term if you smoke a portion of a cigar for the first time. If the feeling should be so unpleasant as to make you determine not to repeat the experiment, perhaps, upon the whole, it will be so much the better, for smoking wastes a great deal of time which might be better employed. In cases of inordinate appetite nausea is an advantage, as it prevents the patient from eating so much more than is good for him.

Slight nausea is no doubt dependent in the ordinary way upon a somewhat disturbed state of the mucous membrane of the stomach or a deranged condition of the liver, or upon both. The sensation may be relieved in many ways. Some forms of nausea are at once relieved if food be taken. Pepper and various pungent substances, which excite the secretion of the stomach, are often useful. Cayenne pepper and Curry powder are well known remedies. But nausea seems to be due in some cases to some slightly impeded circulation in the vessels of the mucous membrane of the stomach, and those of the liver. The latter gland is sometimes much enlarged in consequence of the large quantity of blood which accumulates in it. After a few days, especially if the patient rests and takes very little food, it regains its usual volume without having undergone any permanent alteration, and without being in any way damaged. Nausea, dependent upon temporary vascular congestion, may be removed by promoting a more free flow of blood through the vessels of the liver, stomach, and bowels, by giving a purge, such as Sulphate of Soda, or Epsom Salts. A warm bath, or a Turkish bath, will very often effect a cure, particularly in the case of those whose habits are too sedentary. Plenty of fresh air, and but little food for a day or two, without resort to any other treatment, will sometimes cause the discomfort to cease. If these means fail, a mercurial purgative should be tried, *see* p. 130.

But in order to cure some forms of nausea the patient has to go a step further, and induce sickness, as by a mustard emetic, by tickling the fauces, or by drinking two or three tumblers of luke-warm water. The distressing nausea that precedes, and is indeed sometimes substituted for actual vomiting, in ordinary cases of sea sickness, may last for a considerable time. This is often relieved as soon as vomiting occurs, but, unfortunately, the vomiting continues until the patient is really ill from exhaustion.

The pathology of ordinary sea-sickness is still doubtful. Dr. Irwin published an interesting memoir, founded on four thousand cases ("Preliminary Observations on the Pathology of Sea-Sickness," *Lancet*, November 25th, 1881), in which the various theories entertained are carefully considered. Disturbance in the semi-circular canals seems to be connected with this motion sickness. "Motion produces sickness

by disturbing (*a*) the endolymph in the semi-circular canals, (*b*) the viscera in the abdomen, and possibly (*c*) the brain and the subarachnoid fluid at its base" (Irwin). After the motion has been experienced for some time an "irritative hyperæmia of the semi-circular canals is set up," which, according to Dr. Irwin, is the true primary pathology of ordinary sea-sickness. The particular part of the central nervous system involved in the reflex action of vomiting is situated in the Medulla Oblongata, near the Respiratory Centre. Vomiting may be caused by various poisons in the blood, and is sometimes one of the first evidences of the occurrence of acute febrile disease, due to poisonous matters formed within the body or introduced from without. Vomiting may also be caused by various forms of irritation, in or at a distance from the stomach, and may be due to slight or serious disturbance in the brain. Tickling the fauces, or, as people often say, "putting the finger down the throat," is generally soon followed by vomiting. So easily is this act produced that occasionally one meets with a person who can cause his stomach to reject its contents by a purely voluntary effort, without any direct irritation of any kind.

Many healthy persons who suffer from time to time from nausea depending upon over-sensitiveness of the stomach, liver, and other glands, discover not only how to cure themselves in a very simple way, but also how to keep themselves well. They find it necessary from time to time to give their stomachs rest for from twelve to twenty-four hours, and then they get well, and remain well perhaps for a considerable time. The prejudice that exists against going without one's dinner now and then, is really most absurd. An occasional fast is almost necessary for many who live even but moderately well, and some, especially ladies who are little out of doors, and take little exercise, would be in much better health and would feel in better spirits, stronger and more capable of moving about if they would not dine quite every day, as well as take a good lunch. It is also advantageous to take fish and no meat twice a week. As regards medicines for the relief of nausea you will find that from one to three or four drops of *Hydrocyanic acid*, *Acidum Hydrocyanicum dilutum*, in two table spoonfuls of water, or with a little *Bicarbonate of Soda* or *Potash*, or in half a tumbler of Soda or Potash water before food, will be useful. In some cases three or four drops of *Solution of Ammonia*, *Liquor Ammoniæ*, in a wine-glassful of water when the feeling of nausea is most troublesome, may cure the ailment. A small dose of blue pill or calomel will often relieve very obstinate nausea, although many other remedies may have failed. In not a few instances counter-irritation is also of use. A mustard poultice may be applied over the region of the stomach and liver for twenty minutes every third or fourth day. Or a wet rag, covered with oiled silk, or a piece of Spongio-piline, wetted with warm

water, and worn for an hour or two, will frequently be found efficacious. See also the treatment of Indigestion, p. 154.

OF ALCOHOL AND HABITS OF TIPPLING.

People who suffer from nausea or biliousness and want of appetite,—and there are not a few who are habitually ailing in this way, who seldom indeed during a long life have felt really well,—often find out for themselves, or they are told by too officious friends, that a little alcohol just before a meal will give relief. Brandy, gin, bitters of various forms, pick-me-ups, &c., are taken for this purpose, and a worse system has never been invented and acted upon. That bad habit of taking now and then ginger brandy, cherry brandy, or the worse one of frequently imbibing strong sherry for relieving nausea, a sensation of hollowness, or faintness, or fulness, or all-overishness, or what not, has been the ruin of thousands. Having once acquired it, many find it far more difficult to give up this vicious practice than would be supposed.

Bad indeed is the fashion of taking just before dinner a small dose of brandy, or ginger brandy, or dry sherry, or some other strong alcoholic stimulant, just to excite the appetite in order that justice may be done to the repast—that is, that people may swallow more than is good for them, and more than they can easily digest. If a man cannot eat his dinner without first taking a stimulant, he had better go without it. He might wait a few hours, and then he would probably be able to take simple food without the help of condiments or stimulants. The habit of taking alcohol too frequently and too regularly often comes from this most objectionable practice of taking a little stimulant before dinner. The unfortunate person who is regarded as the "life of the party" cannot help himself, for he must be sprightly and entertaining from the beginning to the end of the feast, no matter what the penalty may be, and illness and early death have been the result in many cases. Indeed there is little doubt that good dinners have slain and continue to slay more than all the wars, sicknesses, head-work, exposure, bad trades, and accidents added together.

Doctors are often accused of teaching and encouraging people to "tipple," because in certain morbid conditions they have found it necessary to prescribe stimulating doses of alcohol. For one person, however, recommended to take alcohol by us, how many thousands who have never consulted a doctor in their lives, take it on other grounds,—take it because they like it, or because they see others take it, or because they like the sensation it produces? Many will admit that they began when they suffered from a "sinking sensation," or from nausea, or uneasiness about the stomach, and after having been troubled from time to time, discovered that the unpleasant feeling was invariably relieved if they swallowed a little brandy. The little brandy generally

increases in amount. Nausea and other unpleasant sensations instead of occurring once or twice in the day, occur a great many times, and the victim will tell you that, after a time, he was obliged to resort to the remedy in order to get through his work. Of those who allow themselves to act thus not a few become slaves to alcohol, and then a more deplorable phase is soon reached. They cannot abstain, self-command is lost, and the unfortunate people are no longer able to control themselves in any way, while few will submit to be influenced and controlled by others. This state may last for a time, and then a new and very remarkable phenomenon is occasionally developed. The intemperate individual abstains entirely, and hates alcohol even more than he loved it before. He despises himself, is overwhelmed with remorse. In a little time he gives up the *rôle* of sinner and adopts that of saint, and saint of the most despotic and uncompromising kind. For a long time he was quite unable to govern himself, but now he is determined to govern others, and in a very decided manner. He expresses virtuous indignation against all who take or sell or produce alcohol, and thinks it very hard that he is not able to punish every one who prefers wine to water, and who dares even to look at a stimulant, as well as the man taking part in the production of alcohol. We have the curious spectacle of a very small minority who, by their own confession, for some time could not keep themselves within the bounds of reason, now seeking to impose their arbitrary veto upon the very large majority who have never had the slightest difficulty in either taking a little, much, or abstaining altogether, as seemed to be the best for their organisms at the time. With as much reason might power be given to convalescent lunatics to put the sane in straight waistcoats, or shut them up in padded rooms.

All persons who lose control over themselves as to taking any form of alcohol should be placed under care as soon as possible. There is no doubt the great majority can be cured if treatment is commenced early in the disease. It is to be hoped that ere long our great legal authorities will permit us to act in the matter, and trust us instead of suspecting us of interfering or desiring to interfere in some way not to the interest of the patient or of society.

As regards the treatment of inebriety, especially those terrible and most difficult cases which are met with from time to time in women belonging to the cultured classes, some excellent observations have been made by Mrs. L'Oste, who has been very successful in treating some most obstinate cases ("The Treatment of Female Inebriety in the Cultured Classes, *résumé* of twenty-seven years' Experience," H. K. Lewis, Gower Street, 1889). Unfortunate persons who cannot taste a certain fluid without making themselves worse than animals, will, before they reach the incorrigible stage, sometimes come to you and crave medical advice. If you think sufficient self-control is left to them, you

may be of some use by ordering certain medicines which will act, to some extent, like alcohol, but which are not open to the objections pertaining to that substance. Ammonia is often of great use. You may order a teaspoonful of Salvolatile, *Spiritus Ammoniæ Aromaticus*, with twice as much Compound Tincture of Cardamoms, *Tinctura Cardamomi Composita*, in a wine-glassful of water every three or four hours for a few days or a week. Tincture of Hop, *Tinctura Lupuli*, Tincture of Orange, *Tinctura Aurantii*, or Syrup of Orange, *Syrupus Aurantii*, are good additions to improve the flavour of the dose.

THIRST.

It is probable that thirst is less dependent on the state of the stomach than is the feeling of hunger, though it is quite true that thirst may be excited by Cayenne pepper, and irritating matters introduced into the stomach. It often occurs in connection with certain forms of indigestion, and is almost always experienced an hour or two after a good meal, during which little fluid has been taken. The fact that thirst is relieved by injecting fluid into the blood and by the absorption of fluid from the general surface,—that it is present in all febrile states, and comes on after diarrhœa, after the action of ordinary purgatives, and after free perspiration, however excited, would seem to indicate that the feeling is somehow due to the reduction of water in the blood. The sensation of thirst seems to be experienced principally in the back of the mouth and fauces. Considering this part of the mucous membrane very readily gets dry even in health, it is probable that very fine afferent nerve-fibres, close to the capillary network of wide capillaries having an unusual number of bioplasts in their walls, take part in the initiation of the phenomena which constitute what we call thirst. The capillaries and nerve-fibres referred to in that part of the mucous membrane which covers the convex surface of the epiglottis, and which is admirably situated for the detection and registration of varying degrees of moisture of the mucous membrane, are represented in pl. XCIII of "How to Work with the Microscope," 5th edition.

No rigid rules can be laid down as to the exact quantity of fluid that should be taken per diem, for the proper amount varies in individual cases. It should undoubtedly bear a certain relation to the solids taken, but in practice it is impossible to say, in any given case, precisely what this relation should be, for some persons generally feel thirsty, while others scarcely ever experience this sensation. One man finds he digests better and feels better if he takes from two or three pints of fluid daily. Another taking about the same amount of solid food or more, finds that half as much fluid suits him best. Some forms of indigestion and many cases of inactive liver may be completely cured

by taking a quart of water, hot or cold, flavoured with lemon-juice during the twenty-four hours; or weak tea will answer equally well in some cases. When in practice, you will find that some people habitually take too much to drink, and some too little. I feel sure, however, that the great majority of well-to-do people take far too little fluid, pass too little urine, perspire too little, and eat too much to be in health, but you will occasionally meet with cases of impaired digestion, general weakness, and feeble health, which are due to the habitual introduction of too much liquid with the food, the patients nevertheless feeling thirsty. On the other hand, not a few persons complaining of muscular and nerve pains in various parts of the body, and who are evidently suffering from a tendency to gouty or rheumatic affections, may be completely cured by a course of water-drinking, three or four pints or more of water being taken in small quantities at a time during the twenty-four hours. By ordering this plan to be continued for two or three weeks, three or four times in the year, we may succeed in washing out the tissues thoroughly, and keeping their owners in a healthy condition.

The most opposite advice is given, and by very confident authorities, as regards the taking of fluids at meal-time. However much the directions to the patient may differ, they are expressed not only in plain but in very positive and forcible language; and though one adviser gives directions directly contradictory to those of another, each proves to the entire satisfaction of the patient that his advice is justified by the most irrefragable arguments, and is supported by the newest facts and theories and by the very latest results of the most carefully performed experiments. Many a patient has been told that he should drink little fluid with his meals, but it is an undoubted fact that some of us not only digest far better but quicker if we take a fair quantity. Increased fluid economises food—a small quantity of solid food highly diluted going as far or farther than a large amount moistened with only a little. Very strong stomachs only can bear the ingestion of half a pint of cold fluid in a draught just before dining or after a meal, and it is undoubtedly a good general rule to take only a mouthful or less at once, and then wait a time and repeat the process.

Now in cold weather many who suffer from weak digestion, who come shivering to lunch or dinner, require warm liquid of some kind. Hot soup suits many, hot water, hot lemon-juice and water, hot coffee agrees with some; many prefer hot spirits and water—but spirits at least as a regular drink should be eschewed by all. Occasionally such a dose at meal-times does good, but it must not be daily, or I should add, nightly repeated as a rule. Taken regularly spirits are not only useless, but they may do serious harm to the digestive power, to the liver, and to many tissues and organs of the body.

Few will be prepared to accept the suggestion that warm, of course

not too strong, tea is excellent for some stomachs at meal times, but there is no question about the fact. Long experience has proved that half a pint of tea with milk or with a little lemon-juice or a small slice of lemon, may be taken three times daily at meals not only without doing harm, but with the result of curing dyspeptic and other symptoms. I know that this plan, which nearly all my medical friends would condemn, has worked well for upwards of forty years, and frequently succeeds admirably in old age. The tea should not be coarse flavoured and surcharged with tannin, and should not be infused for more than two or three minutes. Nor is there in many cases any objection to the proper allowance of sugar. Indeed I should say that much needless cruelty has been exercised by some members of the profession who cut off every bit of sugar a person habitually takes, because perhaps he may confess to have had a few twinges about his joints or other symptoms due to accumulation of uric acid and other things in his blood. To forbid sugar and allow plenty of meat, soup, fish, and particularly the abominations called entrées, is ridiculous. A dozen lumps of sugar are harmless indeed compared with many of the complex delicacies which help to make up a "nice simple little dinner."

If there is a strong tendency to get fat the individual should be careful not to take too much liquid, for there is no doubt whatever that, other things being the same, a large quantity of water taken daily favours the formation of adipose tissue, while if little fluid be taken for a time the absorption and removal of fat are promoted. Persons who have less adipose tissue than desirable may sometimes succeed in increasing the proportion by drinking more fluid daily without altering the quantity of the solids ; but in trying the experiment care must be taken not to take too much liquid at once, and to increase the proportion by slow degrees. If any derangement occurs the plan must be given up for a time and cautiously resumed after an interval of a few days, or a week or two.

INDIGESTION : ITS NATURE AND TREATMENT.

Indigestion—Dyspepsia.—Many lectures might be devoted to the consideration of dyspepsia, but I shall only attempt here to give an imperfect outline of the subject, with a few suggestions concerning points of treatment which are of importance. The process of digestion, when it occurs naturally, goes on without the slightest disturbance, and without our being aware of what is taking place. Those who are in perfect health probably do not know from any feelings experienced, that they possess such an organ as a stomach with five and twenty feet or more of small intestine beyond it. Many come to study medicine without knowing what a stomach is like until they see one in the dissecting

room, so little can we learn concerning the structure and action of our own organs from sensations experienced, or from the contemplation of what is going on in our bodies. But there are some unfortunate persons, who without being actually ill, hardly swallow anything without soon afterwards being made painfully conscious of the existence of the stomach and its exact whereabouts. They cannot define its precise limits, but they very frequently suffer from uneasiness or actual pain which is referred to the neighbourhood of the stomach, and really seems to be situated in structures some distance beneath the surface of the skin. This discomfort usually comes on after taking food, but in certain forms of indigestion the pain precedes the introduction of solids or fluids, and when this is the case it may be relieved by food. When pain or uneasiness comes on some time after food has been taken, it may continue as long as the process of digestion lasts, but then the pain subsides, and does not usually return until after the next meal has been taken.

Indigestion is learnedly spoken of as dyspepsia, which comes from two Greek words, δὺς, with difficulty, and πέπτειν, to concoct, or digest. The pain or discomfort consequent upon slow or imperfect digestion, or indigestion, may be induced by many different circumstances. There may be some deranged action of the mucous membrane of the stomach, and hyper-sensitiveness (ὑπέρ, over, or above); or severe pain may be occasioned by an altered state of the circulation caused directly or indirectly (by reflex action) influencing the nerves of the stomach. Not unfrequently one comes across cases of what may be called ordinary indigestion, where there is no actual disease, but still where a troublesome and almost constant fixed pain, aching, heaviness, or sense of weight of fulness, or of pressure is complained of, so wearying to the patient that it deters him from taking food. In consequence he gets thin and pale, and perhaps loses heart and becomes weak and despondent, and is much out of health.

We find in some cases a tendency to redundant formation of mucus and epithelium on the mucous membrane of the nose and air tubes. A corresponding state of the mucous membrane of the stomach, small and large intestines, bladder, and other mucous membrane is not infrequent.

In fact the stomach, like other mucous membranes, and especially the mucous membranes which consist mainly of glandular organs, is liable to catarrhal inflammation, in which an undue quantity of mucus differing from that of health is secreted by the glands and modified epithelium is formed on the surface. These changes greatly interfere with the healthy action of the glands, and while they last little healthy gastric juice is formed. The function is much deranged and for a time it is necessary to let the organ rest by giving liquid food,—milk, beef tea, peptonised broths or soups in small quantities at a time for a few days, until the condition passes off. If the catarrhal affection is chronic, care-

ful and perhaps prolonged good management will be required. Occasionally a considerable amount of viscid mucus, not unlike that from the nose and bronchial tubes in catarrh is brought up. This is generally followed by relief.

If we could see the mucous membrane in some cases of indigestion we should no doubt find it unduly vascular. There would be a state approaching to inflammation over a limited area only, possibly over a portion of mucous membrane not larger than a sixpence. Here the vessels would be seen distended, the blood moving very slowly along the capillary tubes, and some exudation from the vessels would very likely be found in the surrounding tissue. The nerves distributed to the mucous membrane would have undergone those changes which result in their being unduly excitable. Their bioplasts and those of all the tissues in the neighbourhood would be found enlarged. Partly from this last circumstance, and partly from the pressure upon them exerted by the undue distention of the vessels, the sensitive nerve-fibres transmit impressions known to the patient as pain. The state of the mucous membrane I have just referred to may soon give place to the normal condition, or it may persist and lead on to a state of things which may result in the formation of an ulcer. Ulcer of the stomach is a serious disease, the nature and symptoms of which I shall have to refer to in another part of my course.

Amongst healthy people who are capable of a fair amount of work, who have average or more than average powers of enduring hard work, mental and bodily, of bearing fatigue and who now and then are capable of over-working for a time without suffering much, one often finds digestive derangements of two very different kinds—arising from different causes and requiring very different kinds of treatment. There is the person with excellent digestive power—always feeding with appetite, eating and perhaps drinking freely, and in fact finding out and being thoroughly convinced that plenty of food is requisite to keep himself in ordinary health. A good strong stomach is liable from time to time to get deranged, and its very activity is almost sure to result in illness unless its owner has really very hard work to do from day to day. Even in this case he probably digests and absorbs twice as much food as he takes, and fails to eliminate as much of the excess as he should do if he is to keep himself in health. This is the type of person who requires from time to time really active purgation. For him Dr. Chambers' blue pill and black draught every now and then would be excellent. A good dose of sulphate of magnesia, with or without infusion of senna, in warm water twice or three times a week would help to keep him right and greatly retard the commencement of the almost inevitable tissue-degenerations. But organisms of this class if they lead exceptionally vigorous, active lives, do often live to be old. On the other hand, of those whose hard,

active, daily work consists of the expedition by rail or by carriage from the home to the counting house and from the counting house to the good dinner, a considerable percentage will become patients suffering from dyspepsia, gout, rheumatic pains, weakness; malaise or the more serious subtle changes proved to occur in important organs after the age of 45 or 50 and resulting after a few years in actual disease of capillaries, arteries, muscular and nerve tissue, liver, or kidney. The tendency can no doubt be checked if the patient will change his habits early enough, before tissue changes have proceeded in any great degree. But the difficulty is great. What will the cook say, what will the family, the friends say if the excellent dinners are abandoned and the social enjoyment of the evening repast stopped? The patient himself will no doubt yield so far as to live rationally for a month or so at Homburg or other celebrated water cure; during this short time the accumulation of noxious matters will be washed out without any inordinate intake, but how could the patient bear such wretchedness during the gloomy winter months? Practically I fear most will find extreme difficulties in the way, though these are really not insuperable, and the improved health ought to give encouragement to keep up the change of system, and enable the patient and his family and friends to bear with fortitude the awful sacrifice.

The other state of stomach belongs to a different order. Perhaps from the very first tender, highly sensitive, easily disturbed, and in some instances hardly ever going perfectly right for a single week at a time. The mucous membrane is probably often pale, the vessels containing little blood and the action of the glands slow and imperfect, the gastric juice less potent than it should be. Instead of enjoying his meal the owner of such a stomach is in constant disgrace. As a child he causes anxiety to his parents on account of the little food he takes and from the frequent attacks of illness, particularly feverishness. He always looks somewhat thin and ill-nourished, and is probably querulous, low-spirited and unlike other children. By the time he is grown up he is fastidious, perhaps preferring bread and butter, apples and oranges, a little cold meat or cold fish, to the dainties set before him. He "cannot" take wine or beer, having learnt by bitter experience that both disagree, and he is perhaps continually fearful of getting ill. He dreads severe pain if he attempts to live like other people. Probably from 30 to 40 he is generally regarded by those he knows as a fidgety hypochondriac, of no interest to anyone, as incapable of enjoying himself as of helping others to enjoy themselves. But now his time is coming—gradually his stomach behaves itself better. To his surprise he sometimes finds that he is able to digest an ordinary meal without discomfort. Slowly he becomes bold. He eats more, he gains in weight, his bowels act more freely. He loses the feeling of fatigue after slight exercise. He feels

contented—nay, begins to enjoy life : laughs, cracks jokes, feels a little jolly on occasions. He looks so much healthier and better that some of his friends hardly know him, and as he approaches old age he feels like a different being. Such a dyspeptic not unfrequently reaches 80 or more, and may retain his health and working powers to the last. The hypersensitiveness of stomach, upon which all the early discomfort was due, is no doubt in the long run conservative, and perhaps through this weakness the individual not only gains strength and vigour as life advances, but is preserved from many ailments possibly involving structural changes from which, but for his weak stomach he would have suffered.

OF PAIN AND OF THE ARRANGEMENT OF THE FINEST NERVE-FIBRES IN THE STOMACH AND INTESTINES.

The whole question of pain is one of great interest and importance, and as the pain in indigestion and other derangements of the digestive organs is experienced through the instrumentality of nerves which in the normal state transmit impressions only of which we are not cognizant, it will be worth while to consider the arrangement of the nerve-fibres concerned, and discuss their probable action. Nor can disorders of the intestinal canal be understood, without the knowledge of the way in which healthy action is governed and carried out. Although the bowels in every part are very freely supplied with nerve-fibres, so long as the functions are properly discharged we remain quite unconscious of the existence of any exquisitely sensitive tissues in connection with the alimentary canal. Fortunate are they who pass through life without discovering that sensitive nerves are distributed to the intestines. We know nothing of the changes taking place in the stomach and bowels unless something interferes with their due performance. Then indeed we become aware of the contrast between ease and certain forms of disease as it affects these wonderful structures.

You will find in some of the older anatomical books, descriptions given which would give you a very imperfect notion either of the number or arrangement of the nerve-fibres of the gastric and intestinal tissues. In fact the most important and most extensive portion of these nerve-fibres is known to a few anatomists even now, and only a few years ago it would have been impossible for us to form an accurate conception of the true arrangement of the nerve-fibres of the digestive tract, or of the actual phenomena going on during life in any part of it. As a fact all the tissues are most abundantly supplied with very fine nerve-fibres, although you might read much that would lead you to infer that the mucous membrane and muscular coat of the stomach and intestines received but very few nerves. It used to be supposed that the con-

traction of involuntary muscular tissue resulted from direct irritation or stimulation. And even now little attention is given to the highly important part played by the nerves and nerve-centres which influence every action and every movement connected with every part of the digestive process. In every part of the digestive apparatus from the mouth to the anus, the secreting and absorbing, as well as the muscular apparatus, receives an abundant supply of nerve-fibres.

The muscular fibres which are distributed around the stomach and intestine as well as those situated just beneath the mucous membrane are frequently though not constantly in active movement, each fibre alternately shortening and lengthening—undergoing contraction and relaxation,—actions which occur at different times in different parts of the alimentary canal, and in all alternate probably with comparatively long periods of rest or quiescence. But invariably the contraction of the muscular tissue, like that of every form of voluntary and involuntary muscle, takes place under the influence of the nerves.

Besides the nerves distributed in networks and plexuses to the mucous membrane and muscles in great number, there is a highly complex system of ganglia or nerve-centres little appreciated and indeed hardly known to more than a few observers. You all know, of course, what multitudes of ganglia help to constitute the sympathetic system. Many of the large ones you see in the course of your work in the dissecting room, and the more skilfully you dissect, the more ganglia will you find. You are also well aware of the complex interlacement of coarse nerve-fibres and trunks in many parts of the abdominal sympathetic system, but from the most perfect ordinary dissection that can be made, you will form but a very imperfect idea of the vast number of minute ganglia and ganglian cells connected with what seem to be excessively fine nerve threads.

If, now, from a piece of small intestine of any small animal pinned out upon a strip of wood or cork, you will detach carefully the mucous membrane from the muscular coat, and soak it for a few days in equal parts of glycerine and water, replacing the solution from time to time with fresh fluid, and then gradually add stronger glycerine, you will find the tissue will assume a state favourable for the demonstration of the ganglia. Small pieces of the submucous tissue are to be snipped off, placed on a glass slide, and after being gently teased out with pins or needle points, and moistened with fresh glycerine, covered with thin glass. If you examine such a specimen under an inch object-glass, you will have no difficulty in demonstrating a vast network of ganglia and nerve-fibres. You will observe hundreds of little microscopic ganglia on different planes, and these you will discover are all connected with one another by numerous inter-communicating bundles of nerve-fibres constituting quite a network or plexus of fibres and ganglia. The

ganglia in question were discovered some years ago by Meissner; Auerbach had some years previously described plexuses and ganglia close to the muscular coat. But of course these observations were contradicted by some and ignored by others, and long papers were written by great authorities to prove that the nerves, ganglia, and plexuses were really vessels, the points of divergence in which, in their opinion, had been mistaken for ganglia. There is, however, no difficulty in demonstrating these ganglia most conclusively. I have many times shown in connection with the course of physiological anatomy which I used to give in this college, the cells composing them, with the bioplasm of the nerve-cells and fibres artificially stained with carmine, and I can assure you, with the greatest confidence, that the cells are true nerve-cells, and that fine nerve-fibres pass from them to supply with nerve-fibres the tissues of the mucous membrane, as well as the thick layers of muscular tissue which encircle the intestinal canal. So numerous are the fine nerve-fibres that there is not a portion of tissue the one five-hundredth of an inch in width which does not receive an abundant supply.

Every villus of the intestinal canal is supplied with nerve-fibres, and the action of each of its several component tissues is presided over by nerve-cells. Every gastric gland as well as every intestinal follicle is also abundantly supplied. In structural connection with the nerve-fibres is a nerve-centre, or rather a group of ganglia by which nerve action is determined, the changes resulting in the secretion of gastric juice and intestinal fluid regulated, and actions emanating from other nerve-centres or groups harmonised. The nerves have also much to do with the simultaneous discharge of the secretion upon the surface of the mucous membrane from thousands of microscopic glands.

But in spite of this marvellous nerve-supply, so long as things go on rightly, you are not cognizant of any of the changes which are taking place. The intestinal tube is sometimes full and distended, sometimes relaxed, sometimes contracted, and yet all these alterations in volume, all this stretching and contraction, take place for the most part without our knowing anything about it. If, however, these same phenomena occur in an exaggerated way, or if anything interferes with their due performance, we very soon become conscious that things are not as they should be. We cannot always say exactly what part of the intestine is in fault, or what sets of ganglia are disturbed in their action, but we experience discomfort if not actual pain, and almost instinctively we so act as to give the whole digestive system little to do. We let it rest for a time. We take no food or confine ourselves to small quantities of easily digested slops, and in the course of a short time things generally right themselves.

But surely it is very remarkable, seeing how unconscious we are in

the healthy state, at least as far as feeling is concerned, of the existence of the intestinal canal, that when its action is much deranged, the pain experienced should be so very severe, and so difficult to bear, as is the particular pain which is developed at the peripheral distribution of the sympathetic nerve-fibres, the ordinary actions of which go on quietly and almost incessantly, but quite unconsciously.

The peritoneum (*περί*, around, and *τείνω*, to extend) or thin membrane external to the muscular coat of the intestine, which is supplied with nerves from these same ganglia, and which in the healthy state is always sliding smoothly in contact with the moistened surface of another layer of the same delicate tissue, becomes exquisitely sensitive in inflammation. The pain of *peritonitis* (*περί*, around, *τείνω*, to extend, and *ῖτης*, rash, the suffix *itis* denoting inflammation), is one of the most terrible forms of pain that any human being can have to bear, and yet these same nerve-fibres which are concerned in the causation of most horrible suffering, act as a general rule quite unconsciously, do their work without our knowing anything of them, or of the action of the apparatus they govern.

Pain-conducting Nerve-fibres.—The nerve-fibres concerned in the transmission of the sensation we call pain, are not, I think, those which have been regarded as special sensitive nerves, but the fine nerve-fibres which were first demonstrated by me close to the capillary vessels, and so situated that any change in vascular turgescence would affect them. As is well known, the pain of a bad sore throat is much less severe than the pain experienced in pleurisy, pericarditis, or peritonitis, and yet the number of sensitive nerve-fibres distributed over a given area of tissue is many times greater in the mucous than in the serous membrane. When the tonsil is inflamed the pain is very great, but it depends less upon the tension of the mucous membrane covering it than upon stretching of the vessels and nerve-fibres in its substance. Again, the pain we suffer from in rheumatism originates in tissues which are not rich either in nerves or vessels, and yet it is more severe than many kinds of pain the seat of origin of which is in parts more highly vascular. The pain in the lungs when pulmonary capillaries are congested, even if they be seriously damaged, is slight as compared with that which results when the capillaries of the pleura are involved. Nerve-fibres of the same kind are not only distributed close to the capillaries, but in many tissues, as for instance the cornea, are situated at some distance from any vessel; but these nerve-fibres belong to the same order as those distributed to capillaries, and act as afferent nerves to centres, the efferent nerves of which are distributed to the muscular fibres of the little arteries. It is, I believe, when these afferent fibres are made to act violently, that *pain* is experienced.

The pain associated with circumscribed inflammation of various

kinds is due partly to the stretching and pressure to which the fibres of these nerves are subjected, and partly to the increased nutrition which proceeds in the nerve bioplasts, in consequence of the increased amount of nutrient pabulum which bathes them, and which has transuded through the stretched vascular wall.

Pain in the Stomach.—If the vessels of even a small part of the mucous membrane of the stomach become unduly distended from any cause, discomfort results. If there is too much action of the glands or insufficient action, pain in the stomach, learnedly called *Gastrodynia* (γαστήρ, the stomach, and ὀδύνη, pain), or *Gastralgia* (ἄλγος, pain), is occasioned. If the food we take does not digest, that is, if it does not gradually dissolve after it reaches the stomach as it should do, but remains there, being moved round and round by the muscular action of the organ, we experience pain—and sometimes extreme pain. If you take rich, improper food, and drink a quantity, say, of bad champagne, more especially if your dinner comprises tough beef and concludes with a good supply of heavy pudding or pastry, you will probably learn what is meant by an attack of *gastrodynia* unless you happen to have an unusually vigorous digestion. You will at the same time be thoroughly convinced of the existence of a vast number of extremely sensitive nerves in connection with the walls of your stomach. Not only so, but in all probability the action of the whole intestinal canal will soon be violently disturbed, and you will be fortunate if you get off with a sharp attack of vomiting and acute diarrhœa: for in this way you may perhaps find a short cut to returning health. But thousands who eat moderately, and some even who eat immoderately, go on from year to year without the slightest discomfort of any kind in any part of the intestinal canal, and without discovering from any sensations they experience that they possess one.

Indigestion may be due to altered gastric juice, or to the secretion being too acid or not sufficiently acid; or the active dissolving substance, the pepsin, may be in insufficient quantity or imperfectly formed; or, on the other hand, the derangement may depend upon the pouring into the stomach of a considerable quantity of alkaline fluid, which neutralises the action of the gastric juice, and in other ways impedes digestion and interferes with the changes taking place in the stomach. Strange to say, two fluids of opposite qualities are secreted by glands in different parts of the stomach. Indigestion may also be caused by too much or too little liquid being taken with the food, or by a draught of cold fluid. Warm water, on the other hand, taken with the food, often gives relief, and weak tea agrees well with many stomachs and helps digestion.

Heartburn, Pyrosis, or Waterbrash.—There are certain glands at the cardiac extremity, near the point where the Œsophagus opens into the stomach, and called by some the Cardiac Glands, the secretion of

which possesses an alkaline reaction. It seems that these glands in certain cases secrete a great quantity of a clear somewhat viscid alkaline fluid. Few of us are aware of the existence of the secretion of these cardiac glands in our own organisms, nor have we any actual experience of the formation of a fluid of the characters just mentioned. As is well known the contents of the stomach, under ordinary circumstances, are extremely acid. Many persons suffer from the regurgitation from time to time of a small quantity of highly acid fluid into the pharynx, when its distinctly acid taste is experienced. Chalk or Magnesia is taken for the relief of the *Heartburn* which, when physicians thought very much of hard words, was known as Ardor Ventriculi, or Cardialgia (καρδία, ἄλγος, pain). The acid fluid will effervesce freely if bicarbonate of potash or soda be added to it. A similar action occurs if chalk is mixed with it, but as it is more slow the effervescence is not so easily observed.

Some of the out-patients of the Hospital will tell you that they frequently reject from the stomach a large quantity of clear liquid which you will find will cause the blue colour of reddened litmus to return. It is therefore of alkaline, not acid, reaction. This alkaline fluid is vomited or rejected in certain cases, which are termed *Water-brash or Pyrosis* (πύρωσις, burning, from πῦρ, fire, *Fer Chaud* in French). The affection is very common in Scotland, and in England there are many old women who suffer from it. Patients sometimes bring us a few ounces or even half a pint or more of alkaline fluid. Sometimes they say the fluid burns them as it comes up. In other cases it is described as slightly salt, or mawkish, or tasteless. The secretion when very alkaline neutralizes the acid of the gastric juice if it is not rejected soon after its secretion, and greatly impairs the digestion of albuminous matters.

With regard to the acid which gives its reaction to the gastric juice. Although this consists principally of Hydrochloric acid, it must be borne in mind that it is by no means the only substance present having an acid reaction. We may divide the acids found in the stomach into two classes :—1. The acids formed or, at any rate, secreted there ; the acids of the gastric juice, probably hydrochloric acid, phosphoric acid, and lactic acid :—and, 2. Acids which are formed, and sometimes in large quantity too, in the contents of the stomach, and which are detrimental to the process of ordinary digestion, and interfere with the conversion of albuminous matters into peptones. Valerianic and Acetic acid, Formic acid, Butyric acid, and a number of other organic acids seem to be produced in cases in which digestion is much deranged, and it is astonishing, when once these chemical changes have been initiated, with what persistence they continue, in spite of alterations in diet and various remedial measures.

Waterbrash is often difficult to cure. The diet must be carefully

regulated, so that the work of the stomach may be uniformly the same for each meal. Purgatives, and especially preparations of Rhubarb, are often useful. Magnesia, Bismuth, and Ginger, and small doses of Opium have also been advocated. Astringents, such as Catechu and Kino, sometimes do good, and bitter infusions, particularly Calumba, have been given with advantage. Valerian, Assafœtida, and Galbanum are in the catalogue of medicines that may be prescribed in pyrosis, but I shall presently have to refer to the treatment of dyspepsia, and shall bring these and some other medicines under your notice.

In many of the cases of persistent Heartburn and Indigestion too much food has been taken and has been allowed to accumulate in the stomach. As it is not possible to neutralize organic acids which are formed by the decomposition of the food, without at the same time neutralizing the acid of the gastric juice, it is often useless to give alkalies. Sometimes, it is true, benefit does result from the use of this class of medicines. By more than neutralizing all the acids present, an increased secretion of gastric juice may be excited, but in many cases the pathological state persists, and in consequence of the continuance of the processes of fermentation and decomposition, fresh quantities of the organic acids referred to are set free. The patient gets thin, because the greater part of what he eats is resolved into compounds which fail to nourish him, many of which indeed cannot be absorbed. In the management of these cases an almost forgotten proceeding is obviously the right one. First, clear out the stomach. Give an emetic. Vomiting is the natural way of curing many cases, where a quantity of organic acids resulting from chemical decomposition of some of the constituents of the food is formed. The normal action of the stomach may become completely impeded, for decomposition may be excited in every form of nutriment matter introduced by the decomposing substances already present. People may suffer for months from a state of things which in former days would have been cured in a week or two by the aid of emetics and purgatives. Remember then, that a patient may actually increase in weight if you cause him to reject the contents of his stomach once or twice a week. Clear out the stomach from time to time, put him on a carefully regulated diet for a week or two, and his sufferings will very soon cease.

Next, as to the emetic you should employ. *Warm water* will answer in many cases. You tell the patient to take two or three or more glasses of luke-warm water one after the other. The stomach gets distended, nausea is experienced, and in a few minutes the greatest relief is afforded by vomiting an amount of acid fermenting matter which astonishes the patient and convinces him that the proper treatment has been adopted. Some persons can vomit without even taking warm water, by a simple effort of the will; others have to tickle the

fauces and the soft palate with the finger. *Mustard* also may be used to excite vomiting. A dessert spoonful of the ordinary flour of mustard, mixed with half a pint of water, will make most persons sick in a very few minutes. *Ipecacuanha* is one of the least disagreeable of emetics. You suspend 20 grains of powdered Ipecacuanha in half a tumbler of water, and direct the patient to drink freely of luke-warm water afterwards. In the course of twenty minutes free vomiting will occur, and the whole of the contents of the stomach will be rejected without pain or discomfort. For a few hours after the emetic, the stomach may be allowed to rest. Perhaps some desire for food will be experienced, and then it will be found that the mucous membrane has resumed its normal condition, and that a supply of healthy gastric juice has been formed by the stomach glands.

Flatulence, Wind in the Stomach.—I must say a few words about flatulence or wind in the stomach—a somewhat disagreeable digestive derangement which depends in some cases upon unusual decomposition going on in the food, and in some cases probably upon the actual separation of gases from the blood, or their secretion into the stomach or other part of the alimentary canal by some of the glands of the mucous membrane. Some unfortunate persons seem to have a baneful predisposition to inflation, and are habitually troubled with an enormous quantity of gas in the stomach. The organ is invariably greatly distended, and I am sure in some of the cases that have come under my notice the stomach must have frequently contained two or three quarts of gas besides more solid contents,—not only now and then, but constantly for weeks or months; this state of distention being in fact the general condition.

It has been supposed that the peculiar knocks and taps characteristic of certain spiritual manifestations may be due to the movement of gas from one part of the stomach to another, or from the stomach into the intestines. But if in few instances these flatulent croakings are under the influence of spirits or take place in obedience to the will, there is no doubt that in the great majority of instances they occur in spite of the strongest voluntary efforts to restrain them. The gas is moved about in the stomach and intestinal canal by the action of the muscular fibres, and in the most capricious manner. Borborygmi (βορβορύζω, I make a dull noise) are a serious annoyance, and on occasions a misfortune, as, for instance, when they trouble the sufferer in a select company during a pause in general conversation. You must, therefore, pay attention to the matter, and study the circumstances favourable to the development of the unpleasant phenomenon, and the methods by the help of which you may be able to give relief. Sometimes by setting right the process of digestion, you may cure the patient. Pepsine alone continued for a week or two sometimes relieves. In very obstinate cases, occurring in

people who live too freely, it may be necessary to begin with an emetic, followed up by a restricted diet for some weeks. Sometimes a single emetic followed by one or two tumblerfuls of warm water will effect a complete cure.

Another very valuable remedial measure consists in purgation. You give a smart purge, say a three-grain *Calomel pill*, at night, and on the following morning a black draught or some purgative water or castor oil or some *Sulphate* and *Carbonate* of *Magnesia* in *Peppermint water* with a little ginger. In this way the contents of the alimentary canal are got rid of. After careful dieting for a time the patient completely recovers. In not a few cases you may relieve these symptoms by mitigated starvation only. Of course, if a patient came to you and you advised him to starve himself, you would never see him again. But there are many ways of inculcating good advice without shocking the nerves of sensitive people who suppose that abstinence from food for a few hours means death. Tell your patient not to take any solid food for a week. Order him a little beef tea three times a day. Towards evening he may take with it a biscuit, or a little dry toast. If very hungry you may permit him to have a little bread and butter, but a cup of lentil gruel will be better for him, and will be found more satisfying. By a little exercise of ingenuity you may suggest various things to take that will satisfy him, but which altogether will not amount to much. In this way, in the course of a few days, the effect desired will be accomplished. You permit as little matter as possible to pass into the alimentary canal for a time. Some prefer to be ordered to have nothing but oatmeal or lentil gruel well prepared and boiled for a quarter of an hour or more. The patient may take this for a time twice or three times a day. Lentil gruel is a really valuable thing. It is nutritious, satisfying, and acts as a sort of soothing poultice to the stomach and intestinal canal. Tell the patient to live on this or on Revalenta Arabica if he prefers it, for three or four days, and in this way you will probably get the action of the stomach and bowels right, and completely relieve all dyspeptic symptoms. The flatus from which the patient has long been suffering will be no more generated.

General Observations on the Treatment of Ordinary Forms of Indigestion.—I shall not pretend to discuss this large subject exhaustively, but endeavour rather to direct your attention to some general remedial measures which you will find useful in practice. Oftentimes the indigestion is caused by taking too much food at a time. And it may be relieved by taking very little or by drinking half a pint of warm water or warm weak tea with the meals. Sometimes there is actual discomfort when the stomach does not digest the food as rapidly as it ought to do. The patient feels full and uneasy for several hours after a meal has been taken. Very commonly under these circumstances sleep is disturbed, or perhaps cannot be obtained. Those who dine too late in the even-

ing often find that the stomach does not work well. The food in consequence long remains in the organ in an undigested state. It is being continually moved about and worked up and churned by the unceasing contraction of the muscular coat of the stomach, but still its volume is but little changed, and the stomach remains much distended. A feeling of general discomfort is caused, which interferes with sleep. This, in fact, is a very common cause of wakefulness. The patient in consequence soon becomes weak, feels fagged, and unable to work. The sense of lassitude, and failure, and sometimes extreme despondency, suggests to him the need of "support." Friends advise him to partake more freely of nutritious food. Port wine, turtle, and oxtail soup, and other highly nutritious delicacies are wasted upon him; for instead of improving he gets worse, and feels more ill and unfit for business than ever. Knowing the importance of rest he flies to soporifics, takes *Chlorodyne*, *Nepenthe*, or *Chloral*, and thus possibly in addition to his many troubles experiences a terrible headache, tremor of muscles, general "nervousness" which never before troubled him, and dread of impending failure of health. He tells you that he really feels very ill indeed. But a few enquiries and a little consideration on your part enable you to afford speedy relief. A mercurial purge, followed by a few doses of some gentle laxative, will soon cause all the more serious symptoms to disappear, and then you must attend to the digestive process. Diet the patient carefully, only allowing easily digestible substances, and in very moderate quantity for a week. A single purgative dose may not suffice. You must bear in mind that in many of these cases the muscular action of the stomach and small intestines, or the sensitive surface which plays an important part in the reflex action is at fault, and medicines which encourage the muscular contraction and the driving down of the intestinal contents may be required. Castor oil, Rhubarb, in powder or in pills, Colocynth, Podophyllin, are often of great use in some of these cases; but as I shall have to consider their action under the head of purgatives, I need not say more here.

Advise the patient to take small doses of Dilute Hydrochloric acid (fifteen or twenty drops in two table-spoonfuls of water), half an hour before food, and his digestion will soon be restored. Hydrochloric acid is, as you know, the natural acid of the gastric juice, and if you continue to give it for some time, you will often find great improvement not only in the digestive power of the stomach, but in the performance of their function by other parts of the alimentary canal. You must not forget that from ten to twenty drops of this acid in water before meals is also of great use in treating very many cases of weak digestion. *Acids* of various kinds are valuable in many forms of dyspepsia. The dilute Hydrochloric acid, *Acidum Hydrochloricum dilutum*, and the Nitro-hydrochloric acid, *Acidum Nitrohydrochloricum dilutum*, are most

useful, and by their aid you may cure many a patient. There is more than one distinguished physician in London whose reputation, it may almost be said, has been gained by ordering acids. There can be no doubt of the efficacy of these medicines. Phosphoric acid, the *Acidum Phosphoricum dilutum*, in doses of twenty drops in water, seems to suit some people better than the other mineral acids. Lactic acid has also been described; but upon the whole the acids first mentioned are most efficacious. If you give from fifteen to twenty minims of the dilute Nitro-hydrochloric acid with half a drachm of Tincture of Orange, *Tinctura Aurantii*, a like quantity of the Syrup of Lemon, *Syrupus Limonis*, and perhaps ten drops of Chloric Ether, *Spiritus Chloroformi*, with an ounce or an ounce and a half of water,—you will prescribe a dose which will please your patients and will be of great service to them. The mixture should be taken twenty minutes or half an hour before food twice or three times a day. In some cases it is well to add ten drops of Tincture of Ginger, *Tinctura Zingiberis*. I have known people continue a mixture of this sort for six or seven months at a time, and with great benefit. It is well to encourage them to give it up now and then for a week or so, but if they persist it can do no harm, and may possibly deter them from indulging in alcohol. Lemon juice, Citric Acid, *Acidum Citricum*, the Acid Tartrate of Potash, *Potassæ Tartras Acida*, and other organic acids and acid salts have also been found of great use in the treatment of these cases.

If decomposition take place in some of the constituents of the food after they have been some time in the stomach, instead of the ordinary solvent action proceeding until complete solution is effected, a large quantity of fetid gas may be generated. In these cases you will sometimes find benefit resulting from an opposite plan of treatment:—from alkalies instead of acids. The alkali is usually given after food, but I have found that in some instances where gas is generated in quantity after food is taken, it is better to give it about ten minutes before food. Alkalies given before meals seem to increase the quantity of gastric juice. You may order twenty drops of *Liquor Potassæ* and ten drops of Tincture of Ginger in water. Sometimes you will find that five minims of Liquor Ammoniæ will answer better than the *Liquor Potassæ*. It is probable that the alkali acts by exciting the secretion of an excess of acid which at once exerts a solvent action upon the meat and allied substances. The condition we are speaking of may sometimes be relieved by taking a stimulant remedy which excites a free secretion of gastric juice, such as brandy, or ginger, or pepper, without giving alkali at all. The value of alkaline and antacid remedies has been known and acted upon for centuries, although better reasons can now be given in favour of prescribing them in certain cases and for the times when they should be taken than was possible formerly. Unfortunately some

may act very disadvantageously if continued for too long a time or taken in excessive doses. Care should be exercised in regulating the doses, and they should not be taken regularly for more than a day or two at a time, except under advice. Chalk, particularly the precipitated chalk, *Creta precipitata*, is one of the most harmless antacid remedies. Ten grains may be taken suspended in a little gum-water, or chalk lozenges of various kinds may now be obtained of all druggists.

In some obstinate cases the plan of giving Hydrochloric acid before meals, and Carbonate of Soda, or Potash, or *Liquor Potassæ*, or *Liquor Ammoniæ* after meals, has succeeded after many other modes of treatment had completely failed. If I want to give an ordinary alkali, I often prescribe twenty grains or more of Bicarbonate of Soda, *Sodæ Bicarbonas*, in an ounce of water. You may order Peppermint, or Pimento, or Cinnamon water, *Aqua Menthæ Piperitæ*, *Aqua Pimentæ*, *Aqua Cinnamomi*, as you may think best, and you will find that two or three drops of Dilute Hydrocyanic Acid, *Acidum Hydrocyanicum dilutum*, and a few drops of Tincture of Ginger, *Tinctura Zingiberis*, will improve the dose. Some physicians prefer Bicarbonate of Potash, but Liquor Potassæ is, in my opinion, better than either, at least in many cases, and *Liquor Ammoniæ* may be of use in cases in which other alkaline remedies do not agree.

Preparations of Bismuth, too, are often very useful. You may order from five to twenty grains of the old Nitrate of Bismuth, *Bismuthi Subnitras* of our Pharmacopœia, or about the same quantity of the Carbonate of Bismuth, *Bismuthi Carbonas*, suspended in an ounce of water by the help of a little mucilage, and flavoured with Ginger, Peppermint, or some such substance. Or you may choose one of the more elegant preparations of Bismuth, of which so many are now made. We have a solution of Citrate of Bismuth and Ammonia, *Liquor Bismuthi et Ammoniæ Citratis*, in the Pharmacopœia, which contains three grains of Oxide of Bismuth in a drachm, and of which a dose of from half a drachm to a drachm may be given in a diluted state. Many other solutions of Bismuth supposed to be improvements upon this have been recommended. Bismuth lozenges, *Trochisci* (τροχός, a wheel) *Bismuthi*, are also a convenient form in which to give this remedy.

Preparations of Iron, Arsenic, and Zinc in small doses are of value in some instances, and when the mucous membrane is unduly sensitive and irritable, you will find that small doses of Conium, Hyoscyamus, Morphia or Opium will do more good than anything; but of these I shall have to speak in another place.

External applications are sometimes beneficial. Stimulating liniments may be gently rubbed on the skin over the region of the stomach. Sedative applications externally are also often recommended. A Belladonna or Opium plaster will cure some persons, while others derive more

benefit from ordinary counter-irritants. A mustard poultice, a poultice consisting of equal parts of mustard flour and linseed meal, or a mustard leaf, a piece of wet writing paper being interposed between the mustard and the skin, is often tried with advantage. And you must not forget the very simple and efficacious measure of applying wet rag covered with oil silk, a towel folded into four and wetted on one side with warm water, or a piece of Spongio-piline, six or eight inches by ten or twelve inches, moistened and worn over the upper part of the abdomen for two or three hours daily. This is pleasant to wear. It is soothing, and often useful.

In cases of very obstinate flatulent indigestion accompanied by unpleasant explosions and croakings (Borborygmi), advantage may result from the use of pungent substances, like Horseradish, Peppers of various kinds, as well as Ginger. The Compound Spirits of Horseradish, the *Spiritus Armoraciæ Compositus* of the Pharmacopœia, is not so much used now as it used to be; but it is well to bear it in mind, for it is a very useful preparation. You may order half a drachm or more in an alkaline or acid mixture, or with one of the preparations of bismuth above mentioned.

Condiments and Alcohol.—I would remark that if taken with judgment, and only occasionally, condiments do no harm. Most persons as they advance in years indulge in them more or less, but it is bad in many ways for a patient to get into the habit of taking very strong peppers, for after a time the stomach fails to work without this artificial stimulus, and may become very weak indeed. Unquestionably as regards children and young people, we may be quite sure that "Optimum condimentum est fames;" but as we get older and gradually become more dominated by the customs indulged in by the more fortunate of our friends and approved by the rest, our appetite becomes less, and perhaps we almost forget what it is to feel hungry. We begin to appreciate delicate flavours, and to learn to like sauces. Sapid materials are desired, and often too freely indulged in, until we arrive at that high pitch of degradation, liking and longing for delicate viands,—desirous of dining daily, and giving our hearts to friends who are rich enough to have a skilful cook, and possess an extensive larder.

Few men are more injudicious in the management of their digestive organs than well-to-do Englishmen. Not a few who go to India and other hot climates, in defiance of reason, actually live as they have been accustomed to live here. They tell you they must daily have their good meat meal, or would certainly lose strength. They cannot digest as much meat as they like to swallow, so they get into the way of taking large quantities of pepper. Curry, which is a mixture of pungent seeds and peppers ground very fine, is very popular. No doubt it is appetising, and the flavour of a well-made curry is certainly pleasant to

the palate of most persons—even to those who have no pretension to be considered epicures, or good judges of delicacies. But this mixture, curry, has become a very favourite dish with Europeans who live in India and other hot climates on account of its stimulating action, and because it helps the stomach to digest a greater quantity of meat than could be properly dissolved and absorbed without its aid. Our system of dining off a number of rich meats as many do day after day is bad enough, and damaging to the organism in this cold, damp, changeable climate, but in the hot parts of the world the practice is disastrous. There, diet should be light, and should consist principally of vegetable foods. Too many consider that if they do not take much meat they must take much beer, and not a few will insist on damaging their stomachs with liqueurs or brandy, and brandied wines. Derangement is soon followed by serious illness. The liver, kidneys, and all parts of the alimentary canal become highly congested, and weeks or months of rest and carefully regulated very moderate diet are necessary to gain for the patient a valetudinarian existence. Every one going to a hot climate should sufficiently study physiology to understand the importance of living according to reason, and the penalties that may have to be paid for indulgence. Let him draw conclusions from what he observes concerning the food of the people around him. He may take fruits and vegetables, farinaceous matter of various kinds, milk and eggs, and just meat enough to satisfy his prejudices in favour of that kind of food. But he will be very unwise if he allow himself to get into the way of constantly stimulating the gastric and other glands by strong peppers in order that the undue action required for the digestion of considerable quantities of meat may be established.

Those who come from a hot to a temperate or cold climate will do well to modify their diet. They should consume more butter, or cream, and milk than they would desire or find agreeable in a warm climate; the quantity of meat may be increased, and possibly some will find benefit from taking a little alcohol. Alcohol, though apparently desirable in the case of some persons living in cold climates, is very deleterious in hot ones. It is a remedy which is often employed in certain forms of dyspepsia, but it is a dangerous one. Drinking habits are easily acquired, and although a little alcohol will often remove discomfort and assist digestion, many find that after a time they cannot digest without it, and not only so, but gradually increasing doses are taken as the small ones fail to have the desired effect. It is far better to suffer slight indigestion and discomfort than by imbibing too much alcohol to run the risk of bringing on a worse form of dyspepsia due to structural changes in the stomach and liver, which ultimately may lead to far more widely distributed, as well as more serious morbid changes in various tissues.

Warm Clothing.—Although in winter digestion may be very good, and weak stomachs generally work better in cold than they do in hot weather, there can be no doubt that some of the most obstinate forms of indigestion arise from the body not being sufficiently protected. Those who adopt light clothing in an ungenial climate are very likely to suffer, and I feel pretty confident that next to injudicious eating and drinking, injudicious clothing is the commonest cause of various disorders, among which are some of the most serious we have to treat. The fear people express of being too thickly clad in this climate would be ludicrous if the consequences were not often so serious. The young of both sexes are the chief offenders in this particular, and many an attack of rheumatic fever, of bronchitis, of pneumonia, and of other serious maladies have been due to light clothing. Now, although I admit that woollen material of the thickness suitable for those who live in such a climate as this is uncomfortable, nay, disagreeable, for perhaps a fortnight or three weeks in some summers, I have never known any illness brought on by the practice of wearing it. To be bathed in perspiration from morning to night and from night to morning is not pleasant, but neither is it dangerous, and it is better to endure such discomfort during our short summer than run the risk of taking cold in consequence of a change in the weather finding us insufficiently protected. Depend upon it, people had better clothe very warmly in winter and not change their clothing in the summer, than be insufficiently protected during the chilly days which occur even during the hottest period of our year. I should say woollen should be always worn next the skin by all, though in the hottest weather it may be somewhat thinner than in the winter. In strongly recommending a very decided additional protection to the delicate nerves and vessels of the skin to that afforded by the thin epidermis (ἐπί, upon, δέρμα, the skin), which forms a very essential and absolutely necessary part of us, I confess to one considerable difficulty, and this is to name the material which may be worn by everyone without discomfort. It is curious that with all the ingenuity exhibited in the woollen manufacture no texture has yet been invented to wear next the skin which is wholly satisfactory and cheap. Nothing I believe is yet to be obtained better than good flannel, but it is practically difficult to get flannel garments made to fit comfortably; and unless great care be taken to shrink the flannel thoroughly before it is used, uncomfortable diminution in some directions will soon be manifest, and will progress to a degree which is most inconvenient. Nevertheless, you must advise your patients of both sexes to wear woollen of some kind next the skin. For the weak and sensitive this protection, day and night, is absolutely necessary, and the strong and healthy will, by adopting this course, escape many small derangements. Wash leather has been recommended. It is comfortable, but too warm during the

greater part of the year. Like silk, it is very expensive, and there are other objections to its use which I need not describe. Those who wear woollen under-clothes may go out in all weathers, and will not require the very heavy and oppressive overcoats, which are such an encumbrance in walking.

Indigestion from Failing Glands, as in Old Age.—But there are cases in which the stomach loses its power. The action becomes weaker. The glands require some artificial stimulus to excite them to discharge the proper amount of work. As we get older we become more particular as regards the flavour and other characters of what we eat and drink, and many cease to feel that desire for food, that pleasant feeling of hunger, which is worth more than perfection in cibo-critical powers. A boy or a young man in perfect health and vigour digests without knowing that he possesses digestive organs, but if the stomach becomes weak its owner gets particular, and the food he eats must be nicer as well as more digestible. And so it comes about that increased interest is taken in cookery, and the cook becomes a person of the highest consequence. In old age the stomach often becomes so weak that only certain well-cooked and very delicate things can be digested. Sometimes the stomach fails altogether, and we have to adopt various expedients in feeding, if we are to succeed in keeping old patients alive.

You must also bear in mind that a very common cause of indigestion in advanced age, and in but too many instances long before, is the failure to perform their office on the part of the natural comminutors of the food. The teeth, from defective formation and growth during the early period of life, have nearly worn away, or they have decayed, or perchance the gum has altered in structure and the teeth have dropped out. The consequence is that practically there is no proper mastication, the food is very imperfectly subdivided, and far too little saliva is mixed with it. Often it is bolted and the large hard masses which reach the stomach cannot be properly acted upon. It is often necessary to ask a patient whether he is able to bite.

If, as sometimes happens, the food passes into the stomach in boluses of considerable size, but a small portion, in fact, only the surface of each mass can be subject to the action of the gastric juice, and if the meal is a large one, a very small portion only will be properly digested. Do not forget that many cases of imperfect digestion depend upon the bad state of the teeth. If you do not find this out you may go on prescribing a number of useless remedies, to the disappointment of your patient and to the loss of your credit. There are people even under thirty who are incompetent, from a dental point of view. A patient may be provided with artificial teeth which will work better than his own, though he may have to suffer some unpleasant twinges before his

mouth is set right for mastication under the new circumstances. When, therefore, you are consulted about difficult or weak digestion, or indigestion, it is very necessary to examine the mouth with the view of ascertaining the general state of the teeth, and of determining whether the patient can or cannot properly masticate.

And now let me revert to those cases where the digestive power of the stomach becomes weak because the gastric glands have gradually wasted, and are perhaps shrivelled and incapable of secreting gastric juice either good in quality or sufficient in quantity. When one considers the immense quantity, amounting perhaps to ten or more pounds, of gastric juice, formed during every period of twenty four hours, one cannot wonder that the secretion should diminish as the vigour of life becomes impaired and reduced. As age advances the action of the gland-cells gets more feeble and the secretion is more slowly formed. The glands participate in the general shrinking and wasting and change into connective tissue, which goes on in other organs and interferes with the due discharge of their functions.

If digestion is impaired, the proper amount of nourishment absorbed will be less than is required, and persons who suffer for some time gradually become weak. The muscles lose their vigour and the tissues change. Much of their substance is absorbed, and in some cases there is considerable wasting. Patients frequently get perceptibly thinner, and become unable to properly discharge their usual duties. In too many instances, in consequence of such phenomena going on for a considerable time, the organism loses its power of resistance to adverse circumstances, and the patient becomes liable to special morbid changes, affecting lungs, liver, or kidneys, and may suffer from some intercurrent malady, which may cut short life. A state of weak health may be engendered, the blood becoming much altered in quality; and not unfrequently morbid conditions occur, which are known to be due to an unhealthy state of the circulating fluid. The blood may coagulate in capillary vessels and small veins. In the changes resulting from the stagnation, substances are formed which, re-entering the blood, may poison or otherwise damage the system. In short, the most complex changes, and serious forms of disease, may be dependent upon long-continued imperfect action of the stomach and upper part of the bowels.

You may often improve digestion by giving those acids which I have before referred to. Even where there is a gouty tendency, and you would be disposed to prefer alkaline to acid remedies, you will not unfrequently find in practice that mineral acids before meals will greatly benefit the patient. In some of these gouty cases, in which many different plans of treatment have entirely failed, I have found advantage from giving mineral acids before, and a dose of alkali after meals. You

will also discover, in the course of your practice, that half a grain or a grain of Calomel, or two grains or less of Gray Powder (*Hydrargyrum cum Cretâ*) with three or four grains of compound Colocynth Pill (*Pilula Colocynthidis Composita*) once or twice a week, will be of immense service in many cases, with or without a gouty tendency, where the liver is congested or sluggish, and the stomach out of order. The following mixture half an hour after breakfast, lunch, and dinner is often of great use to those who have any tendency to the state of system which precedes the development of gout. Fifteen or twenty minims of *Liquor Potassæ*, five grains of *Nitrate of Potash* (*Potassæ Nitratis*), ten minims of *Tincture of Ginger* (*Tinctura Zingiberis*), a drachm of *Tincture of Hop* (*Tinctura Lupuli*), and one ounce of *water*. There is, however, one remedy which often succeeds, particularly in the case of old people, in which other plans of treatment have completely failed. The remedy to which I refer is Pepsine.

Of Pepsine and its Uses.—Pepsine has been introduced into medicine for some thirty years or more, but a certain number of medical advisers during this time have confidently pronounced it a worthless remedy, and one that, if it acts at all, acts only by pleasing the fancy of the patient. If pepsine were really useless, like hundreds of other things which have been from time to time introduced, advertised until fashionable, and then have fallen into disrepute, it would have been before this time entirely discarded, if not forgotten. But what is the fact? In spite of many adverse circumstances, pepsine is probably more used than ever, and is now made and prescribed in every part of the world. Many different preparations of pepsine are sold to the public. At this time there is not only a vast number of different forms of pepsine to be had, but you may obtain the remedy in many different forms. There is pepsine in powder, pepsine in pills, pepsine in lozenges, pilules of pepsine, pepsine wine, and pepsine in glycerine. It is certain that a great number of people have found it of use to them. The demand thus created for a really valuable remedy has led to the supply, not only of the real thing, but to the production of a number of cheap and worthless substitutes. Some preparations indeed exist which have been proved to possess little or no solvent action. He who recommends pepsine, or takes it, ought to be quite sure that the material is really what it purports to be. Although it is very easy to adulterate this substance or to pass off something else in its stead, it is fortunately also very easy to ascertain whether the pepsine possesses the proper degree of digestive efficacy. One grain of good pepsine ought to thoroughly digest one hundred grains of boiled white of egg in three or four hours at a temperature of 100° F.

In order to test the value of any particular specimen of pepsine you may proceed as follows:—One hundred grains of hard boiled white of

egg cut into thin slices may be placed in a wide-mouthed bottle or flask with one ounce of water, and twenty drops of dilute hydrochloric acid (*Acidum Hydrochloricum dilutum*). One grain of pepsine powder is to be added, and the mixture placed before a fire, at a temperature of about 100° F. The flask is to be shaken from time to time. In about an hour the white of egg begins to look transparent at the edges, and in about four hours it will be completely dissolved if the pepsine is good. Pepsine will dissolve white of egg at ordinary temperatures if a longer time (from twelve to twenty-four hours) be allowed for the action.

Now, since less than one single grain of good pepsine will digest 100 grains of white of egg, two or three grains ought to digest as much meat as would be found in the "eye" of a small mutton-chop. Three or four grains, therefore, of good pepsine is a sufficient dose, and will enable a patient to digest a small meal of meat even if the stomach secretes hardly any of the active substance, but, as a general rule, pepsine is only required to set the digestive process going, and probably much more than the amount of meat which an invalid would require would be dissolved by the dose of pepsine taken.

You may not only easily ascertain whether the pepsine you purchase is good or not, but if you choose to take a little trouble you may make your own pepsine. There is no difficulty or uncertainty in the process if a little care is taken. When I held the Professorship of Physiology and of General and Morbid Anatomy, in King's College, I used to show to the class, as my predecessors had taught me to do, the action of the gastric juice upon different kinds of food. But we always found it most difficult to prepare a satisfactory digestive solution. We used to make an infusion by soaking for a time in tepid water pieces of the fourth or true digestive stomach of the calf. A little hydrochloric acid was then added, and the viscid mixture was strained through muslin. But it was often difficult to strain it properly, and at best we had a thick ropy mass which was by no means clear and transparent, and could not be made so by filtration. Many of the students of those days were sceptical and probably concluded that I had carefully rounded off the edges of the albumen so as to make it appear as if digestion had commenced, and some were not satisfied that the viscid opalescent mixture really possessed the solvent action attributed to it. I was therefore induced to try whether I could not obtain a digestive solution as clear as water, in which every stage of change occurring in substances placed in it could be watched from first to last. In my first attempts I followed the instructions given by scientific chemists, and after conducting a number of complex chemical operations, I invariably lost the greater part or the whole of the pepsine I was in search of from chemical decomposition. Finding that the processes for isolating the pepsine turned out so very

unfortunately, I determined to try to find some new method of getting a clear solution possessing active digestive properties.

I taught myself to prepare an artificial digestive fluid by a process so simple and obvious that one wonders no one had employed it before, though up to the time I put it into practice, 1856–7, no one seems to have thought of the process. While considering the digestive process as carried out in different animals, it occurred to me that there was one domestic animal whose diet coincided more nearly with that of the human race than any other. The sheep and the ox were evidently less likely to possess a potent digestive material adapted for dissolving albuminous and allied substances than the pig. There is, I believe, no kind of animal food that the pig will not easily digest, and very quickly too. A pig's diet contains animal as well as vegetable matter, and I need not tell you of the extraordinary quantity of nutritious substances of all kinds that a pig will consume and digest without difficulty. It seemed, therefore, not improbable that the best and strongest gastric juice would be found in the gastric glands of the stomach of the pig.

I procured some fresh pigs' stomachs and, after having slit them open, and removed the contents, I dissected the mucous membrane away from the muscular coat. This must be done, because the mucous membrane of the stomach of this animal will be found to be thrown up into a number of thick folds, and it is required to be laid out smoothly on a flat board. When the thick mucous membrane is thus spread out, a little water is allowed to run over it so as to remove much of the dirty mucus and the remains of the food—and pigs' food as you well know is not of the nicest character. You have then before you a soft, tolerably clean, smooth mucous membrane, which, in its entire thickness, consists of hundreds of thousands of pepsine-producing glands. But these gland-tubes are very minute. How are we to get the modicum of secretion which each contains? The mouths of the little glands, as is well known, open on the free surface of the mucous membrane. It occurred to me that, if I could only squeeze these glands, I might be able to press from the tube the active digestive substance which each contains, and before any chemical change of the nature of decomposition could even have commenced in it. I took a paper-knife, and by firmly scraping the surface in one direction, I succeeded in squeezing out the little drops of mucus from the gastric glands, without any difficulty whatever. In this way I sometimes obtained as much as three or four tea-spoonfuls of thick viscid mucus from a single stomach. But this substance is not a very manageable material for experiment. It will not dissolve in water, though it may be diffused through it. The mixture will be very viscid, and it will not pass through filtering paper, while it very quickly passes into a state of decomposition. Few things could be less suitable for delicate experiments.

Having then obtained the potent material in the active state in which it exists as formed in the body of the animal, I thought that, in order to prevent decomposition, the plan would be to dry it as soon as possible. I therefore spread the mucus in a very thin layer over the surface of a piece of clean glass about a foot square. The glass with the mucus was next quickly dried, at a temperature of 100°, before the fire, a current of air being allowed to play freely over it. In from twenty minutes to half an hour the mucus became perfectly dry, and could then be easily scraped off the glass. Being powdered in a mortar it formed a tolerably fine powder, which had scarcely any smell, but tasted a little salt. If I took a pinch of this dry mucus and mixed it with a little tepid water, I no longer got a ropy mass, but a mixture which, by filtration, yielded a perfectly clear fluid. You may, indeed without difficulty, make a clear acid infusion of the mucus from the pig's stomach, by adding to the dried mucus and water a few drops of dilute hydrochloric acid. You will then have a very potent digestive fluid which, after standing for an hour or so with occasional stirring, will be found to readily pass through the pores of the filter. If all the operations have been successfully performed the filtrate will be as clear as the purest water; indeed, you would not from its appearance know it from water. If you perform the experiment with white of egg, as described in page 163, and place the flask at a temperature of 100°, you will find that the clear solution possesses active digestive properties. You may try various experiments, for the fluid being so clear you can watch the changes which take place, and study the process of digestion with ease.

Having obtained this dried powder from the mucus secreted by the gastric glands of the pig's stomach, and found that such excellent artificial digestive fluids could be easily prepared with its aid, it seemed desirable to try it medicinally as an aid to digestion, as it was evidently more efficient than many of the preparations of pepsine at that time in vogue. So I put it to the test in my own body and swallowed some of the dried powder. It did me no harm. Then I made some into three grain pills, and took one before each meal for several successive days. Infusions were prepared, which I drank, and no inconvenience whatever resulted from their use. After a time I prescribed the medicine for others, and soon found that it was really useful in assisting digestion. It relieved the uneasiness accompanying the process in many cases, slightly encouraged the action of the bowels, and prevented the development of flatus in many instances in which inconvenience and suffering had resulted from this circumstance. Indeed, there could be no doubt that this would be a useful remedy in many cases where the digestive power of the stomach was impaired. Mixed with the food of infants, the powder assists digestion in many cases, and, in old age, it is invaluable. Many old people whose digestion is greatly impaired may,

indeed, prolong their lives if the process of digestion be assisted by mixing with the food, or by administering just before meals a little of the powdered mucus from the pig's stomach.

By careful microscopic examination I satisfied myself that there were no substances in the powder likely to do harm, and though I have examined the mucus from the pig's stomach in very many cases, I never once discovered an entozoon of any kind, or an ovum of an entozoon. When one considers how quickly the epithelial surface is formed and cast off in the discharge of function, one is not surprised at this. Indeed, though of course the possibility of such objectionable bodies being present in the mucus occurred to me at the outset, and has doubtless suggested itself to others, the facts of the case render it most improbable, and any objections under this head to the method of preparing pepsine powder rest on no foundation in fact. I therefore had no hesitation in taking and recommending the remedy. The next thing to do seemed to be to try and get some one to prepare this pepsine in quantity so that the profession might prescribe it, and patients have the advantage of its use. I therefore spoke to Mr. Bullock, of the firm of Bullock and Co., of Hanover Street, Hanover Square, whom I had known for many years as a scientific chemist of the highest character, and begged him to try my plan of preparation, and see if he could arrange for a sufficient supply of pigs' stomachs to make the powder in quantity. This was more than thirty years ago, and the remedy is, I hear, still made in large amounts both here and in America, and it is used in every part of the world. The process I adopted for making it was first described in the first volume of the "Archives of Medicine," page 269. Mr. Bullock has, I believe, made some improvements in the details of the process of preparing the material, and by great care and rapid drying at a low temperature the proper degree of activity of the solvent matter has been ensured, and maintained at a given standard in every specimen that is made. Any of you can test the action of the *Pepsina Porci* in the simple manner I have described in page 163. You will find that a single grain, in point of fact, 8-10ths of a grain, will completely digest one hundred grains of the white of egg. It is interesting to watch, in a common bottle before an ordinary fire, the opaque albumen becoming gradually translucent, and then the transparent albumen gradually breaking down until a complete solution, a peptone, is formed. In this way you may get what is known as albumen peptone.*

* The only objection made to the process I have recommended is the very strange one, urged by Mr. Squire, who remarks that the pepsine made according to the plan above described contains epithelium, and that if exposed to a damp atmosphere "it becomes putrid more or less, and acquires a most repulsive odour." But who would think of placing pepsine or other organic substances of any kind in a damp atmosphere? Does Mr. Squire mean to suggest any pepsine in the world will not *putrefy*

Mr. J. R. James, of the firm of Bullock and Co., has lately been studying the properties of the so-called "Ostrich Pepsine" ("Pharmaceutical Journal," February 20th, 1880). This substance, of which there is a specimen in the Museum of the Pharmaceutical Society, is thus described ("Medical Times and Gazette") by M. Ebelot:—"The stomach of the ostrich is celebrated for its incredible power of digestion. The abundance of pepsine to which it owes this faculty has created among the Indians a curious commercial fraud. They dry it, and sell it literally for its weight in gold. It is used for the purpose of restoring worn-out stomachs." A correspondent to the "Pharmaceutical Journal" says:—"In the Argentine Republic ostrich pepsine is prescribed by medical men, and known by the public as 'pepsina nostra.' A good wine is made by digesting the stomachs in wine. I consider this a useful article; but being a rough preparation our pepsine is preferable." Beyond these loose statements no definite experimental results have been published, so far as I know. A fair and impartial trial should, of course, be given to the substance by those who have the means at their disposal of testing it, but care ought to be taken that a worthless preparation should not receive credit for performing a service which it is incapable of rendering.

Mr. James says:—"Whilst conducting my experiments upon ostrich pepsine my attention was drawn to another preparation, called 'Ingluvin,' thus described in the 'Medical Times and Gazette' for May 10, 1879: 'This is a new remedy, prepared by Warner and Co. from the *ventriculus callosus gallinaceus*. It is said to be superior to pepsine as a remedy for feeble, painful, and imperfect digestion, and may be prescribed in the same manner, dose, and combinations. . . . Ingluvin prepared from the gizzard of the chicken is the nearest approach to ostrich pepsine that can be obtained in Europe, we suppose.' Naturally, I felt a little curious to test this preparation, and applied for some to the agents, who most readily supplied me. Below I have tabulated the results obtained. Fresh eggs were kept in boiling water for one hour and then allowed to get quite cold; after depriving them of their shells the whites were cut into the thinnest possible slices—not minced, as it is easier to observe the progress of the digestion of albumen if it be sliced than if it be minced—and care was taken to reject any portion of yolk. Fifty grains of coagulated albumen thus prepared was placed in each wide-mouthed bottle and covered with five drachms of distilled water containing 1 per cent. of hydrochloric acid, specific

and acquire a most repulsive odour if placed in a damp atmosphere? The substance that does not change under these circumstances cannot be pepsine. I regret to have to comment upon such criticisms as the above. The test of pepsine is, of course, its solvent power, and 8-10ths of a grain ought to dissolve 100 grains of coagulated albumen.

gravity 1·16. The quantity of pepsine was then weighed out and added to the mixture of albumen and dilute hydrochloric acid. The bottles and their contents were then placed in a water-bath and kept at a temperature of 98° to 102° F. for four hours, when digestion was regarded as complete.

Kind of pepsine employed.	Weight of pepsine employed.	Result.
Pig Pepsine.....	½ grain.....	Digested.
Ostrich Pepsine ...	2½ grains	Not Digested.
,, ,, ...	5 ,, ...	,,
,, ,, ...	10 ,, ...	,,
Ingluvin	2½ ,, ...	,,
,, ...	5 ,, ...	,,
,, ...	10 ,, ...	,,

"From the results detailed in the foregoing table, and illustrated in the bottles shown, it will be seen *that the albumen is scarcely acted upon at all, and that both ostrich pepsine and ingluvin are destitute of the power of digestion.*" Much larger quantities of "Ostrich pepsine" and "Ingluvin" might have been taken with probably no difference in results. "In the stomach of the river crayfish is found a plentiful supply of a yellowish-brown, feebly acid juice, which possesses an energetic fermenting power and rapidly dissolves fibrin, but the *addition* of a few drops of a dilute hydrochloric acid solution stops the action. Also a somewhat similar ferment to pepsine, discovered by Fick and Murisier, in the stomachs of frogs, pikes, and trout, differs from it (pepsine) in being more active at a low temperature, as at 20° F., while it loses its digestive power at the temperature of the blood (96° to 98° F.)."

Value of Pepsine in Febrile Conditions.—Besides indigestion and weak digestion, there is another class of cases in which pepsine is of the greatest service. In fever the action of the stomach is more or less disturbed. Indeed, in all fevers the process of digestion seems to be greatly deranged. One of the first points noticed is loss of appetite. The feverish patient does not feel the ordinary desire for food. If a patient has been suffering from fever for many weeks, especially if emaciation is extreme, and the strength almost exhausted, it will be well to adopt the practice I have long acted upon, and add pepsine to the milk and beef tea in the proportion of three or four grains to a pint. Milk will be coagulated at first, but soon afterwards it will become partially digested and the curd may be easily broken up into very small pieces. Both the whey and curd will be in a state favourable for digestion, and for rapid absorption and appropriation by the bioplasm or living matter of the blood.

If the feverish attack is of a kind which may continue severe for a considerable period of time, the body may lose very much in weight, the patient becoming excessively weak and his life being perhaps for some time in jeopardy. Under such circumstances it is of the first importance to support the strength to the utmost. By mixing a little pepsine with the nitrogenous food you will greatly assist the digestive process. It may be during a very critical period of the malady, that the nutriment is given in the form of a peptone and in a state fit to be immediately taken up by the vessels, and converted into blood constituents, and thus by this expedient life may be actually saved. I have lately (1878) had under my care a poor girl who became excessively emaciated in a prolonged attack of typhoid, the temperature varying from 102° to 105° during a period of six weeks. During the first week distension of the stomach and bowels by gas became considerable, and added much to the distress. I gave six grains of pepsine daily with a little hydrochloric acid in the beef tea, and kept this up during the whole period of the illness. The distension diminished after a few days, and I think that this simple plan had much to do with recovery in this instance. In the case of beef tea you may with advantage add a little hydrochloric acid, and place the mixture before the fire at a temperature of 100° for an hour or two before the patient takes it. He will not dislike it, and to some the acid beef tea seems even pleasant. But generally when patients are as ill from fever as I am supposing, the taste is very much impaired, and practically there is no difficulty in getting persons to swallow the easily digestible peptones in the form of beef tea. Peptonised fluid meat was first made in quantity some years ago by Mr. Darby. Many excellent preparations of peptonised meat juice may now be obtained, but in places at a distance from large cities, the practitioner can easily give instructions how an excellent and readily digested peptone may be quickly prepared in the manner I have just described.

Another plan based on the same principle may be adopted. Instead of giving strong beef tea or soup containing pepsine, you may make a sort of Meat jam. Underdone or perfectly raw mutton or tender beef may be cut up into small pieces, put into a mortar and well beaten with the pestle until it forms a small pulpy mass. A small quantity of salt may be added to make it palatable. Pepsine in the proportion of ten grains of the powder to an ounce of meat is then to be beaten up with it, when a drachm or more of dilute hydrochloric acid is to be poured in and the whole thoroughly mixed together. If you choose you may further add a little sugar to the mass. This panada or paste may be spread upon bread and butter, or it may be diffused through beef tea or soup. Children and many invalids will often take a compound of this sort when it is difficult to persuade them to take ordinary meat food at all.

In some cases of illness we are unable to feed the patient by the mouth, and in fevers it sometimes happens that everything that touches the mucous membrane of the stomach immediately excites the most violent vomiting, and occasionally this state lasts for so long a time that there is danger of the patient perishing from inanition. In these, as well as in those bad cases where there is a physical impediment to the entrance of food to the stomach, or to its escape from the organ into the duodenum, we may keep the patient alive for many months by injecting nutrient substances in small quantities (an ounce to three or four ounces) at a time into the lower part of the bowel. The nutritious matter dissolved, or suspended in some mucilaginous substance like boiled starch, is introduced into a small elastic syringe made for the purpose and slowly injected into the rectum, the operation being repeated every three or four hours. To the beef tea employed for this purpose it is well to add two grains of pepsine to the ounce. The rate of its absorption is increased, and it is more easily assimilated and taken up by the vessels of the mucous membrane. Nutrient suppositories of various kinds are now prepared and constitute a very convenient and effective means of feeding by the rectum.

You will find in the memoirs of Sir William Roberts, published in the "Transactions" and "Proceedings of the Royal Society," and in his Lectures at the Royal College of Physicians, many new points in connection with the question of the action of the gastric juice, pancreatic, and other secretions concerned in stomach and intestinal digestion, as well as instructions for applying the principles deduced from scientific investigation to the treatment of disease.

INSUFFICIENT ACTION AND OF CONSTIPATION—TREATMENT.

We may now consider a very important and almost universal accompaniment of the most common forms of deranged digestion and indigestion, and of which the majority of persons at some time or other have to complain. Constipation, a condition which varies greatly in degree, would, perhaps, be more correctly described as imperfect or insufficient action of the bowels. Probably nearly every one of us has suffered more or less from this trouble. And those who are accustomed to sedentary pursuits and intellectual work have usually a more extended experience of sluggish action of the bowels than those who take plenty of exercise, and those who have to live by bodily labour. But I suppose there is hardly one who follows any walk of life whatever, or who follows nothing at all in the way of work, who has entirely escaped this derangement. The most idle, as well as the most industrious, often have to complain of constipation, and the condition may afflict people of all ages and of all classes, and in all climates. It is probably one of the

most common of the slight derangements to which civilised man is subject. Whether savages suffer from it I do not know, but unquestionably the majority of those belonging to a civilised community experience the discomfort.

The word "*constipation*" comes from the Latin "*constipare*, to crowd together." Generally speaking, people attribute constipation to the accumulation of fæces in the large bowel, and infer that it is invariably to be relieved by purgatives. But you will see, as I go on, that in cases of constipation a number of points have to be considered, and that some cases so far from being relieved by the frequent administration of purgatives are aggravated by that proceeding. Most persons empty the lower part of the large intestine, or at any rate, partially empty it once during each period of twenty-four hours. But some persons' bowels have a habit of not being relieved oftener than every other day; others have an evacuation once in two or three or four days, and a few females maintain that once a week is enough to empty their bowels. Nay, I have heard it asserted that an action once in a fortnight was sufficient, and I am bound to admit that there are instances in which habitual constipation is not associated with derangement of the health, although, as a general rule, this sluggish state of the bowels brings about general disturbance of the health, and sometimes leads to disastrous consequences. Of course, in cases in which fæcal accumulation goes on for many days, the lower part of the large bowel gradually attains enormous dimensions, and considerable increase in its capacity and stretching of its walls must ensue before it is sufficiently large to hold the excrementitious matter formed, as well as all the refuse material of the food which accumulates during the considerable periods of time just mentioned. I need scarcely say that this is a very unsatisfactory state of things, and if allowed to persist for years, is likely to lead to serious trouble as age advances. There is no doubt, that if the large bowel, and indeed the intestinal canal generally, is to retain its healthy state and to be preserved in good working order for sixty or seventy years, or more, the greater part of its contents ought to be expelled, as I have before stated, once in every period of twenty-four hours.

Many of the physiological processes of the body, like this one, occur periodically and uniformly at about the same time during each period of twenty-four hours. Regularity as regards time much assists the daily evacuation of the bowels, and it is very desirable that every one should do all he can to acquire the habit. I do not think it matters much whether the bowels act the first thing in the morning, after breakfast, or the last thing at night, so that the habit is acquired and a fixed time kept. Even in the case of animals, at least domestic ones, this operation is usually performed with the greatest regularity at a particular hour. If you have a pet cat or dog, you will find it convenient to teach

it to evacuate its bowels at a given time, and it will prove more than inconvenient if the creature should be unteachable in this respect. An unmanageable disposition or disobedience renders an otherwise valuable animal almost worthless.

Having referred to the desirability of regular action, I must now try to impress upon you the equal importance of complete, or nearly complete evacuation of the lower part of the large bowel, for what is called regular action may be associated with very imperfect removal of the contents. Although a small quantity of fæcal matter is daily discharged, this may bear so small a proportion to the quantity formed, that there is a constantly increasing residue, which goes on accumulating, to the great discomfort of the patient and the derangement of his health. In not a few cases this is no doubt due to the weak muscular contraction and imperfect action of the parts above, so that too small a quantity is sent down to the rectum to excite that part of the tube to sufficiently vigorous contractile action. As regards efficient action, a good deal usually depends upon the rectal contents. If a person lives upon highly nutritious diet, such as very strong soup or potted meat, he may find that his bowels will soon get obstinately constipated. If now he adds to this highly nutritive diet a quantity of amylaceous and soft fibro-cellular vegetable matter, which in itself possesses very little nutritive value, and of which comparatively little may be absorbed, he will find that the bulk of excrementitious material will be augmented and the action of the bowels will become more satisfactory. In fact, if we are to be in good health, we have to take a certain quantity of material with the food which is not in any way of use to the nutritive processes. The proportion of nutriment in bread and potatoes is small as compared with that existing in fat meat. To obtain an equal amount of nutritious matter a comparatively large quantity of bread must be taken, and of potatoes many pounds daily must be swallowed, if this is the only article of diet. Up to a certain point the admixture with the really nutritive materials of a large amount of innutritious dross is advantageous, and even in the case of vegetable feeders this matter has to be considered. A horse does not do so well upon pure corn as upon corn and hay. Chaff is of far more value than you would be led to suppose from its chemical constituents. Most of us indeed require a certain amount of chaff to keep ourselves in fair health. Brown bread is very dear, because it contains so much valueless material, and is a rougher kind of bread than white bread. If you microscopically examine brown bread, you will find in it a large percentage of the testa of the wheat, which is quite indigestible. Oatmeal is useful in the same way. All these things help to increase the bulk of the evacuation, and in this respect are of service. Unless there is a certain bulk to excite the fine nerve network of the mucous membrane of the intestine, the reflex action upon which the expelling

force of the muscular fibres entirely depends is not brought about, or is only very feebly and inadequately performed.

Lastly, the action may be perfectly regular, and the contractile powers of the bowels sufficient to expel the contents, but, owing to the formation of a very insufficient quantity of excrementitious matter, the bowel is seldom excited to act, and the patient suffers perhaps through the greater part of his life with the most troublesome form of "constipation." If the formation of fæcal matter is insufficient, many of the most important functions of the organism get out of order. You will find that people who suffer from this condition, though they may have a regular but quantitatively deficient action, complain of certain unpleasant sensations. There is no organic disease. Indeed, if you examined every part of such person you would not find the least indication of the slightest structural change. Nevertheless, the almost constant discomfort many of these people have to endure is really great; and not only so, but various more or less serious conditions may result from this state of things. It is in this way that unpleasant condition known as Hypochondriasis in the male, and as a form of Hysteria in the female, very often commences. There is even the possibility that a condition of disease bordering upon insanity may be brought about by long-continued defective formation of fæces and improper action of the bowels. Patients will often come to you complaining of very great discomfort. They tell you they feel more or less oppressed, and heavy and overwhelmed. Some complain of an unpleasant sensation all over the surface of the abdomen. Instead of the food which they have taken gradually disappearing, it seems as if it went on accumulating and distending the stomach; the patient is blown up with wind; and the distress is great. Many persons who suffer in this way soon lose their healthy complexion and become more or less sallow and pasty. Indeed, it is quite extraordinary how many different derangements of the health may result from imperfect action or a torpid state of the secreting and expelling structures of the large bowel. There may be violent and persistent nerve pains referred to the back, or hips, or groins, and certain other symptoms which lead pessimist practitioners excelling in the discovery of extraordinary neurotic ailments to diagnose structural changes in some part of the spinal cord, or the antecedent state which is supposed to lead to them. Certain remediable forms of Sciatica are undoubtedly due to this cause, and violent lumbar pain is also not unfrequently occasioned by imperfect action of the excreting functions of the lower part of the alimentary canal.

There are many craftsmen peculiarly subject to constipation; shoemakers and tailors, for example, suffer greatly. Undoubtedly many of them live to be old, and most of them are extremely intelligent, thoughtful people, but, nevertheless, they do not pay sufficient attention to the

action of the colon. Literary men,—teachers, male and female,—professional men generally, who take little exercise, more especially if they live and work in small, badly ventilated rooms, are great sufferers. You seldom see a shoemaker or a tailor with a good colour; and the same remark applies to many more whose habits are too sedentary. Nevertheless, it will be remarked that pasty, sallow complexions often characterise men having high mental endowments. Shoemakers are renowned for intelligence, energy, patience, endurance, determination, and cogitative power. Organisms of this class, moreover, frequently have great resisting capacity, and often live to be old. Many are excellent lives to insure. Such persons may suffer much, and, in consequence, are often neither happy nor contented. They are, perhaps, very despondent, or excessively irritable, and are not always very pleasant companions. Some of them who are so unfortunate as not to have to work for their living spend too much time in thinking of themselves, their aches and pains. Sufferers often complain of slight nausea, and of some discomfort about the stomach, with a sense of fulness of the head. Many of them consider themselves illused as well as unfortunate, and not a few, though they live, are always telling their friends that life is not worth living. An indescribable feeling of depression is sometimes said to be so severe that the patient is almost unable to control his actions. Persons, particularly females, who suffer from constipation get very tired after slight exertion, or feel tired without having exerted themselves at all. They tell you they are unable to walk; or, if they walk a little way, they get so exhausted that they are obliged to come back and lie down. Indeed almost invariably in this disorder there is a feeling of lassitude, an indescribable malaise, a disinclination to exertion of every kind.

Among the multitude of aches and pains, discomforts, and miseries, mental and bodily, complained of by persons who have long suffered from sluggish bowels and the resulting disturbances, the following are often present:—an almost constant feeling of prostration—indisposition to take exercise—exhaustion after the least muscular effort—dulness—sleepiness—dreamy non-refreshing sleep—pain in the loins and back of the thighs and legs—pains in many joints. The patient feels faint—tired—giddy—feels stupid—has palpitation of heart—short breath—cough, and there is sometimes expectoration of mucus from the stomach, weight over the stomach, or a sense of fulness and pressure sometimes over the upper, sometimes over the lower part of the abdomen. His cheeks burn and the skin of the face is flushed, hot and dry—throat dry and often sore—tongue sore at the tip—slimy thick mucus in the mouth—eyes sunken—dark band of skin round eyes—conjunctivæ more or less yellow—a general feeling of chilliness—the hands and feet cold, clammy, damp. Some complain of a dull pain in head which is almost

constant—of being irritable, nervous and despondent—having a dread of some impending evil—terribly low spirited. The bowels act interruptedly and very imperfectly—the motions being often pale and scanty. The urine is secreted in small amount and is often high-coloured, malodorous—of high specific gravity with an abundant deposit of urate of soda, and not unfrequently uric acid. It is generally highly acid. Not a few experience a feeling of giddiness and mental uncertainty, at times amounting almost to fright. There are noises in one ear accompanied with deafness, and at times a cracking noise in the ear—a feeling as if fluid was floating about at the top of the head—trembling and twitching of the right eyelid—coldness over lower part of back—a feeling at times as though something in the inside had dropped lower down. The above are indeed but a few of the complaints made and the feelings experienced by patients. The catalogue might easily be much increased in length, but in every instance I have adduced, the absence of any organic disease was proved and the sufferers had lived for years after the complaints made. In many cases complete recovery had taken place with forgetfulness of having suffered. In some, the same symptoms persisted with varying degrees of severity, and in one case lasted to the age of eighty-five or six.

Frequently the patient is discontented with the position in which he happens to be placed, though the discontent is shown rather by frequent grumbling than by any active attempts to change his surroundings. He is not inclined to make any effort to place himself elsewhere, in order that he may be better pleased and happier. The only way to help such people is to allow them to growl, and then try to relieve the troubles from which they suffer, and in this effort you will generally meet with at least partial success. You may meet with individuals belonging to this class who seem inclined to pick small quarrels with almost anyone, and cannot, or will not, control their discontent. Successful critics are often of this sort, and many a severe article would never have seen the light if his liver and the glands of the critic's large bowel had been in good order at the time. This troublesome ailment then has its advantages. It brings profit to editors, proprietors, and that important section of a civilised community which delights in finding fault, and flourishes according to the skill it can display in reviling. Any of you who desire to excel in this department of literature cannot do better than cultivate indigestion and imperfect action of the bowels, and a condition to which I shall presently have to refer, under the head of biliousness. A constipated bilious dyspeptic is the sort of person soon to become a first class critic, and his articles will command high remuneration, and be read by everyone who is dissatisfied with his environment.

Constipation with Impaction of Fæcal Matter in the Large Intestine.—As our tissues get old their action becomes less vigorous, and peri

pheral nerves respond more and more slowly and less readily to their wonted stimulus. The muscular fibres of the intestines become weak and lose much of their contractile power. Particularly the muscular tissue of the large bowel, like that of the bladder, gets more or less feeble, and the viscus may be at times unable to expel its contents. The collection of fæces therein gives rise to serious trouble. In old age some artificial stimulus is required from time to time to excite the weakened muscular fibres to contract with sufficient vigour to cause the bowel to empty itself. In old age fæcal matter often goes on accumulating for a long period of time. The collection is so gradual that the patient may not be conscious of it. By putting your hand over the belly, and particularly over the course of the large bowel, you may often feel the colon for a considerable portion of its extent much distended by an accumulation of hard fæcal matter. At the same time you may ascertain whether there is also wind in the large bowel. If you place one or two fingers of the left hand over the surface and strike the back of one finger sharply with the tip of the finger of the right hand, you will be able to decide at once according to the note elicited by percussion. A dull sound as you know indicates solid matter, while a hollow drum-like note (tympanitic) indicates air in the bowel beneath.

Constipation has caused death. I recollect seeing an old lady who had been bed-ridden for years, and was in fact dying when she came under my observation, whose abdomen had increased to an enormous size. To my great astonishment, when I came to examine it I found the swelling due to an enormous accumulation of hard fæcal matter. There was no fluid, and very little gas; but the whole abdomen seemed occupied by a huge mass of hardened fæces—I should think amounting in weight to 30 or 40 pounds. Unfortunately I only saw the patient a few hours before death, when she was reduced to the last state of exhaustion, and when it was impossible to interfere. In this case fæces had probably been gradually accumulating in the intestines for many months without attracting notice. The patient being bed-ridden, the circumstance seems to have escaped observation. Probably if a medical practitioner had been allowed to interfere some six months before, the patient might have been saved. Injections might have been given, and the contents of the bowel thus gradually removed before any harm to it had resulted.

Influence of the Re-absorption of Fluid by the Intestinal Surface in causing Constipation.—In many cases of constipation you find that the fæcal matter is too hard and dry to pass easily along its wonted channel. It would seem that in many persons there is frequently too rapid absorption of fluid from the intestinal surface. If the vessels of the large bowel take up too much of the fluid which is associated with the fæcal matter, the bulk may be so much reduced that the peristaltic

action of the bowels cannot be readily excited, and it may be insufficient to drive on the contents fast enough. The consistence of the excrement is no doubt a matter of some importance as regards the action of the large bowel and the process of defecation. In different animals the character of the fæces varies greatly, and we meet with every degree of difference from the extreme of dryness and firmness to the very opposite condition. For example, the fæces of the rabbit are hard, and are almost dry before they are expelled from the bowel. The same, too, is the case with the sheep. But in many other vegetable feeders the contents of the large intestine, instead of becoming inspissated before their expulsion, are very largely diluted with water. The fæces of oxen contain much fluid, while those of the horse contain comparatively little. Such facts, like many more, wait for an adequate explanation by the evolutionists of the coming age, who will discover many new laws of evolution, and of the correlation of secretion, excretion, and growth.

The too rapid absorption of fluid should doubtless be regarded as one of the circumstances concerned in the causation of constipation. The quantity of liquid swallowed may be defective, and the undue inspissation consequently dependent upon actual deficiency of fluid in the organism rather than upon re-absorption. Some persons, small eaters, habitually take too much liquid, others, perhaps large eaters, far too little. In the last the fluid part of the blood is constantly too highly concentrated for the quick removal of many of its constituents by the secreting cells engaged in the process. The various chemical changes under such circumstances are interfered with, or cannot take place with due rapidity. The secretions of the body are often formed in too large a quantity, and in too great a degree of concentration, and cannot therefore be thoroughly dissolved and washed away by the comparatively small amount of water present.

After constipation has lasted for some time, as I have already remarked, various constituents, out of which fæcal and other excrementitious matters are ordinarily formed, unduly accumulate in the blood, and cause disturbance in many of the physiological actions. Derangement of the general health of the organism follows. There may also be suppression as regards the formation of excrementitious matters, or of the substances out of which these are elaborated by gland-bioplasm agency, as well as the mere retention or accumulation of these after they have been produced. When a person has been living for a long time in close rooms, having been too much indoors, taking too little exercise, and especially if he should have acquired the habit of eating too much, it is probable that his blood will be constantly only imperfectly aërated; and the chemical changes which end in the production of compounds to be separated by various glands, and are at last about to

be removed altogether from the organism, have not taken place at the proper rate nor to the full extent that is desirable.

It is probable that in many cases in which acute disease, particularly of the respiratory organs, proves fatal after a few days' illness, the true explanation is as follows:—Imperfect action of excrementitious organs has existed for a long while before the patient is seized with the acute illness. The blood, already laden with excretory matters, cannot bear a further accumulation without exerting a disastrous paralysing influence on the nerve-centres which belong to the system regulating the degree of contraction of the organic muscular fibre throughout the body. This, I believe, is the reason why so many cases of influenza ran their course to a fatal termination in a few days, and an explanation of the very favourable change for the better that has often immediately followed a small dose of gray powder or calomel administered during the early period of the attack, while, at the same time, the heart's action was kept up by giving ammonia and alcohol at short intervals.

Excretory processes may have been for a long while but imperfectly performed, in which case much matter which ought to have been removed will have accumulated in the blood and tissues of the system, and may have already done harm to tissues and organs. Chronic gout, rheumatism, or other ailment may in consequence have been developed. In the reduced action of the excreting apparatus the intestinal glands participate. Too little fæcal matter is formed, and of the amount formed, as I have already explained, only a portion is expelled on account of the sluggish state of the nerves and muscles of the bowel. Moreover, in chronic ailments re-absorption of soluble matters from the large intestine proceeds, and the materials taken up add to the accumulation of excrementitious matters in the blood, the serum of which is in consequence often actually changed in colour as well as in composition. The general health suffers, the clear ruddy complexion of health disappears, and the patient becomes constantly sallow. The colour of the skin generally is more or less dusky, the capillary circulation through the tissues will be miserably sluggish, and the intellect dull. There is an indisposition to exertion of every kind, and the nervous and muscular systems do not act or respond to stimuli as vigorously and as quickly as they used to do. People suffering thus may go on with their work, and as a fact numbers do so—but their work is performed, as it were, against the grain, and as though the workers were heavily weighted.

If, now, for a time the conditions under which existence is carried on be modified, it is wonderful how soon and how great a change will take place. Perhaps for the first few days, even in the best of climates and amid the most beautiful scenery, the interest will not be excited or the despondency shaken off. Sleep may not be sound and the patient

on rising in the morning does not feel refreshed. The muscles of many parts of the body ache; some, and particularly those in the front of the leg, may feel sore, and after much walking become actually painful. The patient is conscious of a certain stiffness in his movements, and generally the elasticity both of mind and body seems to be for the time impaired. But, before long, a change takes place. The appetite improves and the sensation of hunger returns. Towards evening a tired feeling is experienced and is soon succeeded by a desire for rest. Many hours of sound refreshing sleep succeed and the patient gets up a different man. His spirits rise, he is seized with a desire to see, to do, to walk. He is thoroughly interested in things about him. The mental and bodily lassitude no longer troubles him. The complexion becomes ruddy, the skin smooth, and moist, and healthy. The bowels begin to act freely and in three or four days the excretory glands separate from the blood, and the excretory channels discharge in twenty-four hours more than had previously been removed in a week. In this way the blood is soon depurated and changed for the better, and I have no doubt that, at least in many cases, the improvement in mental action is consequent upon the restoration of the blood to its normal healthy state. There is another fact which may be adduced in favour of the conclusion that in constipation, or imperfect action of the bowels, the blood becomes altered in character. If you happen to have any little inflamed abrasion on any part of the body, it will be more or less inflamed if the excretory processes should not be going on freely, and wounds will not heal. A slight wound or scratch will look red and angry, and will feel hot and painful. Instead of healing in the course of twenty-four hours, an abrasion will discharge altered and sometimes irritating liquor sanguinis from its surface. Healing under these circumstances goes on very slowly, if, indeed, the process is not altogether entirely interfered with for a time. If you happen to be troubled with any little cracks about the margin of the mouth or nose, you will find that they will gape and give you pain. They may remain open for several days, until free action of the bowels occurs, and then they soon improve. This angry state of scratches, or wounds, or little cracks or sores on the lips or margin of the tongue, depends, I think, upon an altered state of the blood which is gradually brought about by constipation. If the stools from being scanty increase in amount, and the urine from being scanty and of high specific gravity increases considerably, and becomes pale and of low specific gravity, all is soon changed. The suffusion in the derma disappears, the fluid poured out in the interstices being absorbed, and the healing process is soon established.

Fever after Surgical Operations.—There is yet another point to which I must direct attention, because it is of the greatest importance in con-

nection with the views I have advanced concerning the state of the blood. You will often meet with cases in which, a few hours after a surgical operation, the temperature of the blood rises three or four degrees, and the patient becomes feverish. The pulse increases in frequency. There may be some wandering at night or actual delirium, with a hot dry skin, and indeed the patient's state may be such as to cause his attendant considerable anxiety. The surgeon examines the wound and finds that instead of progressing favourably, it looks more or less angry, and the discharge on its surface is changed in character, losing its viscidity and becoming thin and watery, with perhaps a little softened and discoloured broken down blood clot mixed with it. Now, if when things are in this state you give a purgative which will act freely upon the bowels, you will perhaps find within four hours after the purgative has been taken, and even before it begins to act, all the grave symptoms are mitigated, and the patient from that moment will progress favourably. I have many times watched with interest the fall in temperature in such cases—a fall of some three or four degrees of Fahrenheit's scale in the course of a few hours—from the action of a purgative. If we apply what we have learnt by the careful study of the pathological phenomena on the surface of the skin to the consideration of the changes which go on in boils, carbuncles, abscesses, and in internal parts and many organs in inflammation, not only will a flood of light be thrown upon the essential nature of the changes in such diseases as gout, rheumatic fever, pneumonia, and many more, but upon the mode of operation of our remedial measures discovered by experiment and observation or proved to have been of value.

Many troublesome ailments occurring in childhood are due solely to the imperfect action of the bowels. When you get into practice, oftentimes you will be called to see a child who seems extremely ill, is irritable, sleepless and feverish, perhaps wanders somewhat and screams at night, perhaps is even delirious. Such symptoms necessarily cause grave anxiety to the parents. And yet, serious as they appear, all these untoward symptoms will very probably be completely relieved as soon as the bowels have been made to act freely.

The facts briefly reviewed prove conclusively that the imperfect action of the large bowel may derange some of the most important physiological changes going on in the system, and disturb some of the most important organic actions. By affecting the composition of the blood, constipation may occasion derangement in the action of many secreting organs and seriously interfere with the due performance of many of the most important nervous actions and impair for the time the intellectual powers, as well as disturb the temper. Moreover you will find that the particular remedies which act most advantageously

in these cases of derangement, depending upon constipation or imperfect muscular and excretory action of the bowels, are those which possess the special property of exciting various secreting organs to increased action. Among these perhaps the most useful are preparations of mercury, though sudorifics and diuretics not unfrequently exert a beneficial effect without any purgation whatever being produced. And I am sure that you will not fail to acknowledge that this fact also lends support to the view that the composition of the blood is modified by persistent constipation, and that excrementitious matters which ought to be quickly excreted accumulate in it, nutritive operations being in consequence deranged. Lastly, you must bear in mind that the blood can be brought back to its normal state, and health restored by the action of those remedies which have the property of exciting the excreting action of the glands of the intestine and other parts, and thus eliminate from the blood the accumulation of deleterious excrementitious matters.

Piles or Hæmorrhoids.—In many instances constipation is associated with *piles* or *hæmorrhoids* (αἷμα, blood, ῥέω, to flow) as they are termed, which consist of troublesome little nodules about the orifice of the anus. Sometimes pendulous papillæ form on the mucous membrane, half an inch or more above the orifice. These *internal piles* gradually enlarge and occasion pain and inconvenience. Each includes one or more loops of vein, with a number of dilated capillaries. They frequently bleed, and sometimes a considerable quantity of blood may be lost in this way. An ordinary pile or hæmorrhoid is a small growth, which may vary much in shape, but which depends from the general surface. The subcutaneous or submucous areolar tissue is thickened, and the small vessels dilated. Little irregular varicose dilations of the veins can be seen in well-prepared sections, and the outer coat of the vein is more or less thickened from successive attacks of inflammation. Dilated veins of the mucous membrane or skin near or above the anus often exist around and between the actual hæmorrhoidal swellings. Sometimes the pile consists of spongy tissue, almost like that of the placenta, and undergoes great alteration in volume, like an erectile tissue. There may be a number of small hæmorrhoids around or within the anus, each gradually increasing in size until it is as large as the top of the finger, when great inconvenience results. Walking is accompanied by much suffering, and every now and then the vessels become more congested and the swelling increases in size. The tissues around the dilated vein become inflamed; cracks and little ulcers form, and severe pain, necessitating complete rest in the recumbent posture for a time, is the result. Gradually this inflammation ceases. The swelling subsides again to its usual dimensions, and perhaps some time may pass before another acute attack comes on.

Not unfrequently, clots form in the little venous pouches and irregular cavities. The fibrin of the clot gradually contracts, and thus very hard nodules result. These remain for weeks without undergoing much change, but gradually the coagula are absorbed and the patient considers himself cured, or nearly so. But soon another attack occurs. Coagula again form and he is as bad as before. A pile or hæmorrhoid which attains the size of a pea is seldom cured without removal. A little surgical operation is necessary, and then the patient goes on perhaps perfectly well for the rest of his life. In many instances there is reason to think the development of piles might be prevented if the bowels had been made to act pretty freely and the intestinal canal kept in a healthy state from an early period of life. It is, however, sometimes impossible to do this, owing to hereditary tendency to constipation, or to structural changes in glands occurring at a very early age. You may prevent them from enlarging rapidly and giving trouble, by making the patient frequently take moderate laxatives and attend carefully to his diet, especially as regards animal food, of which only a small portion should be taken. Most persons eat far too much meat in this country, and thereby induce many slight or serious derangements of the health.

Primarily the condition is probably due partly to original weakness of vessels and to a relaxed state of tissues, to the so-called scrofulous diathesis, in which there is too rapid formation as well as imperfect hardening and condensation of tissue, and in part to an altered state of blood which interferes with the formation of healthy texture having the due property of resistance. The dilatation and other changes in the coats of the veins are in many cases general and not restricted to the hæmorrhoidal veins. Want of exercise, defective oxygenation, and generally that state of blood which favours the development of the gouty and a certain form of the rheumatic state, seem to predispose to the formation of "piles" in various parts of the superficial venous system. Not a few cases of "phlebitis" belong to this category. In constipation or imperfect action of the bowels, the vessels of the walls of the intestinal canal generally are somewhat distended, the capillaries almost constantly unduly distended with blood, and the capillary circulation slow and impeded. The blood accumulates in the veins which unite to form the large portal vein. The flow of blood through the liver is affected, and the portal capillaries in the lobules become habitually distended with blood, and the action of the liver itself is of course much disturbed. The undue tension of the walls of the portal vessels is oftentimes temporarily relieved by the flow of fluid from the capillaries into the intestinal canal, as occurs in diarrhœa, or after the administration of certain purgatives; and if at the same time very little food is taken, so as to allow the organs loaded with inspissated blood to rest for

a while, complete recovery may take place. If the diet be regulated and the general mode of living be corrected in cases in which it has been injudicious, the blood, and through the blood the various tissues and organs, may soon regain their normal state. Sometimes, as I have said, relief is afforded by actual hæmorrhage from the distended veins, and occasionally the capillaries of the surface or the mucous membrane give way, and thus the tension is relieved.

Among many proximate causes of hæmorrhoids, I believe congestion or impeded circulation of the blood in the portal capillaries of the liver is perhaps the most frequent. In many persons the liver often seems to act sluggishly, and for days together the circulation through it is much impeded. The whole organ temporarily increases in size in consequence of its vessels being unduly distended with blood. The practitioner under these circumstances directs his attention to relieving the congestion and increasing the action of this important organ, as I shall describe further on.

An astringent ointment, like the old Compound Gall Ointment, *Unguentum Gallæ Compositum*, applied at night, is certainly useful in the early stage when the hæmorrhoids are small, but in many cases it requires to be diluted with an equal quantity of lard or pure vaseline. Attacks of congestion and the accumulation of blood in the vessels, which are productive of pain, may often be prevented, or if not very severe, at once relieved by proper treatment, particularly by paying attention to the action of the liver and bowels. Careful washing with plain water twice a day is necessary. For the sore state of the skin and mucous membrane between or over the hæmorrhoids, as well as for promoting the healing of the fissures that so commonly form, there is no remedy like Vaseline, but you must be careful to recommend your patients to ask for the *pure colourless or white Vaseline*, without the slightest tinge of yellow, for the ordinary substance contains irritating matters which do harm, and sometimes interfere with the healing process.

Of the Action of Enemata.—You must not forget that, as was shown by Marshall Hall, defecation is a reflex action and is mainly dependent upon the contraction of the muscular fibres of the bowel caused by a current transmitted along efferent nerve-fibres emerging from the nerve-centre which receives the sensitive or afferent branches. The excitation beginning in the peripheral nerves of the mucous membrane of the large bowel being carried to the nerve-centre by the afferent fibres, changes are produced in the centre which result in the transmission of an impulse to movement being conducted by efferent fibres and which causes contraction of the muscular fibres. The afferent nerves in the mucous membrane, like many special fibres in other parts, seem to be generally in a quiescent state. They do not instantly respond to any very slight stimulus, like certain other nerve-fibres, as for example

those spread out on the conjunctiva, but decided and somewhat prolonged pressure or other form of irritation seems to be necessary to throw them into full action. In many cases of constipation, the ordinary stimulus of the fæcal matter present is not sufficient, and if contraction is to be produced, additional excitation must be brought about. It is upon this principle that the practice of introducing purgative enemata into the rectum is founded. Ordinary water may be gradually injected, and in this way the contents of the lower part of the bowel are much increased, until, having reached a certain volume, powerful reflex action occurs, and fæces and injection are forcibly expelled together. Do not, however, suppose that the response takes place immediately. A certain interval, perhaps five or ten minutes or a quarter of an hour, may elapse before the bowel contracts, and generally it is better that the contraction should not occur too quickly, for then only partial expulsion of the contents may be effected.

In administering an injection you should direct that the fluid should be introduced very slowly, the operator stopping for a time whenever the patient feels contraction coming on. If the bowel is only gradually distended, you will often find that a pint and a half of fluid or more may be introduced before reflex action is excited. This simple operation, which is known as giving a *Clyster*, or *Injection*, or *Lavement*, is a practice which is very commonly adopted, and some people are in the habit of resorting to it very frequently. Some of the French ladies, I am told, never get an action without injecting water into the bowel, and have to carry out the practice daily or every other day. The lavement is an efficient but rather troublesome measure to resort to daily, and probably few English people could be persuaded to adopt the plan of treatment.

Of enema syringes there are numbers constructed upon different principles and made of different forms. The simplest are made of vulcanised indiarubber, and can be obtained for three or four shillings. Higginson's is one of the best, and this simple instrument has been of the greatest service both to practitioners and patients.

Purgative Enemata.—Instead of injecting ordinary water, you may employ water containing various purgative medicines, such as *Colocynth*, *Aloes*, *Olive Oil*, *Castor Oil*, or other purgative dissolved or suspended in weak gruel or in *Soap and Water*.

In making a purgative enema you may use from a half to an ounce of soft or ordinary yellow soap to a pint of warm water; with this two ounces of castor oil or three or four ounces of olive oil, with or without half an ounce of turpentine, may be mixed. Gruel is also used as an enema. If you require to give an aloes or colocynth enema, half a drachm of the first or the same quantity or a drachm of the compound extract of colocynth may be well rubbed down in a mortar with a little

water or syrup, and then mixed with a pint of gruel. The old preparation, Confection of Rue, in the proportion of three drachms to a pint, is a good addition in cases where there is much accumulation of flatus in the large bowel.

Sometimes the accumulation of fæcal matter in the large intestine is so considerable that the bowel becomes almost paralysed, and the individual cannot expel anything by the strongest efforts he can make. Under these circumstances you may inject some gruel, or plain water, or soap and water, or castor oil and soap and water, into the bowel, and in considerable quantity, without succeeding in exciting reflex action. The fæces remain as it were impacted, and cannot be dislodged by such means. This condition is sometimes spoken of as *impaction*. You may occasionally find the lower part of the large bowel of an old person so full and choked by impacted fæcal matter that it overflows as it were, although there is not the slightest effort on the part of the bowel to empty itself. In some of these cases you have to pass up a long tube, and to inject warm water with one fifth or sixth part of glycerine, day after day, and so bring away the matter piecemeal.

If the bowel does not contract, or has nearly lost its contractile power, the fæcal accumulation must be removed. A sort of scoop, or the handle of a spoon, or any other convenient instrument of the proper shape and with rounded edges so as not to cut the parts, may be used to remove the hard fæcal matter. The operation is always a disagreeable one, and sometimes it is very difficult to perform, but it must be undertaken, and we must be prepared to interfere in this way many times in the course of our practice. Those of you who may by-and-by be engaged in country practice are sure to meet with such cases from time to time, particularly among the inmates of asylums for the aged, and in poor-houses, and you must be ready to afford the only relief that is possible.

A little glycerine (half-a-teaspoonful or a teaspoonful) injected into the rectum will often cause its contraction. In children, and sometimes in adults, the gentle introduction into the orifice of the bowel, and immediate withdrawal of a piece of firm soap, cut so as to form a slight cone about the thickness of the finger, will cause the rectum to expel its contents.

The Hygienic and Dietetic Treatment of Constipation.

There are certain methods of preventing and treating ordinary constipation with which everyone ought to be acquainted. By having recourse to some of them persons who have suffered may not only obtain relief, but may succeed in preventing the recurrence of the trouble.

Exercise, we are often told, is a great preventive of constipation, and sometimes will cure it when established. Many practitioners are very confident on this point, and invariably assure those who suffer that if only they will take sufficient exercise, they will be cured. Some obedient patients at once adopt the system of a regular constitutional. But here and there the plan completely fails. A man regularly walks his six or seven miles or more daily, but so far from his constipation being cured he may perhaps find it even worse than before. Exercise, it is perfectly true, is advantageous within certain limits. But if a person takes more exercise than is good for him he may actually encourage and increase this derangement instead of curing it. Nor is walking exercise so necessary or advantageous to all as is generally supposed. Individuals differ from one another extremely in this respect. One cannot keep himself in health without his long dreary daily constitutional, while another enjoys excellent health though he may not walk a mile a week. Not only so, but it is a fact that many persons, particularly women, who have taken little active exercise at any period of life, have nevertheless enjoyed excellent health and have lived to be very old. In advocating exercise in constipation and in other slight ailments, you must be careful in the case of those who have not been accustomed to long walks to recommend moderate distances, at a quiet pace, or your means of cure may have the effect of doing harm. Two or three miles a day will probably be enough for most persons. The man who is engaged in hard intellectual work will, as a rule, require little exercise. During a holiday you may engage in a greater amount of muscular labour than you could advantageously perform if you were studying hard. And I have known several instances of persons getting thoroughly out of health in consequence of acting upon the mistaken notion that such exercise is required at the same time that intellectual work is carried on. When you are working for an examination, and reading several hours day after day, you will find that a gentle walk for an hour or so in the afternoon, or the plan of spending one or two hours in the open air sitting still or driving or "mooning about," will be more conducive to your progress than a long quick walk. Fast walking, running, and all violent athletic exercises should, like dinners and high living generally, be avoided by those who are preparing themselves for examination.

Perhaps of all kinds of exercise which have the effect of calling into play the most important muscles of the body without producing fatigue, cycling is the best, and now that the "safety bicycle" has come into general use, we shall probably find this kind of exercise will become more general. The only objection is that for cycling we require fine weather. Cycling has been strongly recommended as having advantages over walking exercise, and I think rightly so. And although, no doubt, there are troubles incidental to the saddle, these, I believe,

never affect those in fair health who are moderate as regards the distance they travel. Ten to twenty miles is not too far even for men who have reached fifty, and there are many examples of riders of seventy who often cover more than twice the distance without getting over fatigued. According to the Right Honourable the Speaker of the House of Commons, who is a strong advocate of cycling, there are about 500,000 cyclists in the United Kingdom. (Midland Counties Meet, "Globe," June 11th, 1889.) The number increases annually, and there is no doubt whatever that cycling is one of the most healthy modes of exercise, and far less tiring than walking. The worst of it is that during the winter months cycling is difficult, but possibly as time goes on, we may have a strip of asphalte on the broad roads provided for cyclists, just as is in many places provided for pedestrians, rails for tramcars, and tracks for heavy, slowly moving wagons.

The Cold Bath is commonly said to be of use in the treatment of constipation. People tell us that if we indulge in cold tub every morning or plunge into cold water, the bowels will act properly and without artificial help of any kind. The system again is excellent for some, but the daily use of cold water will not suit all equally well. With some persons it disagrees and causes them to feel chilly and uncomfortable. On cold foggy mornings at this time of the year (November) it requires some strength of mind to cover oneself with cold water just after turning out of a warm bed. Still many Englishmen declare that it not only suits them but affords them delight and keen enjoyment. Those with whom the cold bath agrees experience a pleasant glow all over the body, and feel warm and in good spirits for some time afterwards. When this is the case you may advise that the cold bath should be continued. But if, on the other hand, the patient feels chilly, miserable, and uncomfortable, with slight headache and chilliness of hands and feet, and especially if his skin should get cold and bluish, and he comes down to breakfast without an appetite, you should tell him that cold tub in the early morning is not suitable for him, and suggest that he should take his bath tepid or even warm. As a general rule people over forty or forty-five should use tepid or warm water, at any rate during the winter months.

Rubbing.—Another good general remedy, and one that is not open to any objection is rubbing. I believe this method is very little employed, and that its value is much underrated. There are many who, if instead of taking a cold bath would simply rub themselves well with a rough towel, using strong muscular efforts in doing so, would find a gentle glow come over the skin, and experience a far more comfortable sensation than is afforded by a cold bath, while an equal amount of old epithelium would be removed from the cuticular surface. The beneficial effects of rubbing the surface are probably due to movement of the

blood in the cutaneous capillaries, caused by the pressure exerted. This movement of the blood in cases where there is a tendency to its stagnation in the capillaries of the tissues and organs is of the greatest consequence, and must be borne in mind as an important principle which must not be lost sight of in the treatment of many derangements and diseases.

Of late years a particular kind of rubbing has been exalted under the name of massage, and much has been written as to the precise method of carrying out the system in order to get the most beneficial results. Massage, however, has for its object to promote changes in the muscles as well as in the skin, while ordinary rubbing with rough towel or glove affects the circulation of the blood in the capillaries and the lymph in the lymphatics of the skin and subjacent tissues. In this way the general circulation is promoted, and with this the healthy action of the intestinal canal.

Of Kneading the Bowels.—Another very simple way of assisting the action of the large bowel is to press or knead the abdomen with the hands. Anyone can do this for himself. The two hands should be evenly moved upwards and downwards over the surface of the belly, and the large bowel gently pressed backwards in different places. Those who have studied anatomy know the course taken by the colon round the abdomen, and should press or knead it in a direction from its commencement in the cæcum in the right iliac region, upwards, and across the upper part of the belly to the left, and then downwards, following the *ascending, transverse, and descending colon* towards its termination, in the rectum. This kneading encourages the contraction of the large bowel, and is certainly in many cases useful.

Moist Application to the Abdomen.—Persons who suffer from torpid bowels are often much relieved by the application of a wet compress over the stomach. This is a very old remedy. You may apply a moist rag or towel, folded into four, to the surface of the belly, and cover it with oiled silk or a piece of mackintosh, or a piece of moistened spongio-piline may be used. It matters not whether the water be cold, tepid, or warm. If applied cold it soon becomes warm, and I am not aware that any benefit results from the, to many persons, very unpleasant application of a cold rag to the warm skin. Care must be taken that the compress or other application is not too wet when applied. All that is required is that it should be moist—not dripping wet. It may be worn for two or three hours daily, and in this way relief is often obtained, without the use of any medicine whatever.

Diet.—There can be no doubt that diet has very much to do with the regular and efficient action of the bowels. A liberal allowance of meat and a too highly nutritious diet favour constipation. On the other hand, various kinds of fruit and many vegetables cooked and un-

cooked, as lettuces, water cresses, and mustard and cress, tend to prevent and relieve constipation.

Bread.—The bread that we eat should not be made of very fine white flour from which all the bran has been carefully separated, and to which a certain proportion of alum—itself possessing astringent and constipating properties—has been added, to make it appear perfectly white. The best bread for keeping us in health is not the whitest. As regards pleasant taste and nutritive qualities, the sort of bread you eat at farm-houses, and which is by no means white, is much to be preferred. *Brown bread*, such as we get in London, is good, but it ought to be made of flour from which the branny particles have not been separated before being finely ground. I fancy that a good deal of brown bread is made by adding coarse particles of bran to ordinary flour. Brown bread taken from time to time will certainly help to excite the action of the bowels. "Whole-meal" bread is advantageous to many who suffer from constipation, and "Triticumina," entire wheat-meal bread, which has been recently introduced, seems useful.

Indian corn flour is one of the most wholesome and nutritious forms of food, but it is at present far too dear to be used as staple food; it is much to be desired that this substance should be brought into ordinary use.

Oatmeal, again, is another good and very desirable kind of food. It is taken by many, particularly by Scotch people, who well understand how to live cheaply. The best oatmeal is the Scotch, made into "stirabout." It may be cooked in many ways. Milk may be added, or it may be formed into thin cakes, which can be dried. These may be toasted when required, and eaten with butter. Oatmeal sometimes proves a good remedy in certain forms of constipation. In it all matters required to form the staple of ordinary diet are found, and it is a good substitute for bread. Some persons, however, dislike it, and with some it disagrees.

Coffee.—A small cup of sweetened black coffee (*Café noir*) before rising sometimes acts as a purgative. Some persons gain the same advantage by drinking a cup of tea.

Fruit.—There can be no doubt that fruit is a very useful article of diet. This will be freely acknowledged, but many are unable to indulge in fruit in the winter season. In a climate like ours, except for a very short period in the height of summer, fruit is a rather expensive luxury. However, though few can afford to obtain as much fresh fruit as they could eat, very good substitutes are within the reach of all, even of the poor, though few English people take advantage of the opportunity they enjoy of being able to purchase excellent dried and preserved fruit, apples, plums, and other kinds of fruit, at a very cheap

rate. Oranges and lemons are also to be had during the greater part of the year.

French Prunes and Normandy Pippins.—Prunes may be bought for fourpence a pound, and a pound of prunes will last for many days. If properly prepared, cooked prunes are very good. The French and the Germans use prunes very generally. They stew them and add some syrup, and eat them with the meat at dinner almost daily. If you determine to try them, you may have to turn cook for a time, for you will find few British cooks disposed to follow your directions. Should the cook be exceptionally amiable and willing to learn, you may suggest to her some such plan of proceeding as the following:—The prunes may be soaked in cold water for several hours, perhaps twelve hours or longer. When they are found to have swollen up, and to have become quite soft, in consequence of imbibing much cold water, they may be stewed in the ordinary way, and sugar added. If properly cooked, they will be perfectly soft and of a very pleasant flavour. In this way you can all provide yourselves with perfectly good fruit all the winter. You may also recommend French plums, which are nicer than ordinary prunes, but more expensive.

Lenitive Electuary (*Confectio Sennæ composita*) contains prunes. Although this is a very good purgative, you will find that some people do not like it. Children will often take stewed prunes, although it may be a difficult matter to give them any form of medicine. You may increase the purgative properties of stewed prunes in a very simple way—and the hint I shall give you is a useful one to bear in mind in the management of children. Suggest that a teaspoonful of *Senna leaves* be tied up in a small muslin bag and soaked for an hour in the water in which a pound of prunes is stewed. In this way you add a little infusion of Senna to the prunes, and although you hardly alter their taste, you considerably increase their purgative action.

Apples dried.—Another fruit you can always get is dried apples. Normandy pippins are ordinarily sold now at all the grocers for a few pence a pound. These you will find to be an agreeable change, and may take the place of the prunes. They must be soaked in water for a few hours, and then stewed in the ordinary way. A pound of these Normandy pippins will be sufficient for several dishes. Of late apples have been introduced in a new form. Thin shavings of apples dried in the sun retain their flavour so thoroughly that when moistened and cooked you could not distinguish them from fresh apples. These are imported from Canada and America under the name of "Apple rings," and are sold for sixpence or eightpence a pound.

Another dried fruit, which is now very cheap and to be obtained in good order all the winter, is the dried fig. Figs are now brought over in large quantities, and are very cheap. The purgative action is in-

creased by soaking in water over night. The figs, in a state of soft pulp, may be eaten on the following morning.

Vegetarianism.—While I regard it as proved beyond all doubt that a mixed diet is required for the majority, and that in childhood and youth a diet containing a rather liberal allowance of meat is necessary especially if the usual amount of exercise considered requisite in most public schools is taken, I am sure that many men about middle age and older take far too much meat, and of food belonging to the meat class. An ordinary good dinner as indulged in day after day by many well-to-do middle-aged men who take little or no exercise is absurd, and a considerable percentage of those who live thus, gets gout and suffers in many other ways just as we should expect. But a rigid vegetable diet is not what is required. Probably meat in small quantity three or four times in the week would be sufficient, while in the majority of instances an egg and a little bacon for breakfast, and a small slice of meat daily with dinner would be a proper and healthy allowance. The gouty may often be kept without meat for a week or two at a time with great advantage to their health, and many cases of gout may really be cured by judicious vegetable diet for a few weeks.

Of taking Fluid.—The quantity of fluid taken has some influence upon the action of the bowels. Many people are seldom thirsty, and more object, and with good reason, to drinking water. Tea is often discarded on the supposition that it causes indigestion. If tea and coffee and alkaline and effervescing waters, and all forms of alcohol, are objected to by the medical adviser, as not uncommonly happens, the unfortunate patient will, in his efforts to comply with unreasonable advice, probably take too little fluid in the twenty-four hours, and thus disturb many of the chemical changes going on in his body. One cup of tea or milk and water, at breakfast, half-a-pint of beer in the middle of the day, and perhaps another half-a-pint of beer, or wine and water at dinner, will scarcely amount to a sufficient quantity of fluid to keep the body in health, especially if the appetite is good, and a fair amount of solid food is consumed. People who are never thirsty will occasionally suffer from constipation, as well as from other derangements, which will be referred to in their proper place.

When you have reason to think that a patient is suffering in health from taking too little fluid, and this is a very common fault, you may suggest to him the propriety of taking a certain quantity of water at fixed times. You recommend him to drink a glass of ordinary water on rising, another about eleven o'clock, and another at bed-time. Or you may suggest that at dinner he should take hock and seltzer water, and an hour after dinner, or at bed-time, another glass of seltzer, or some other effervescing water. In some cases you may recommend cider or perry to be taken at dinner. You may advise that broth should form

part of the most important meal of the day, and generally, you suggest various things—milk, whey, more tea, linseed tea, or barley water, &c. —with the object of getting more fluid into the body. Warm water at meals, and in some cases before a meal is to be recommended. Within the last few years warm water has been spoken of as a new discovery. I know it was commonly taken by many persons more than fifty years ago, and I daresay it is more than a century since the plan was adopted. A large quantity of cold water (a tumbler full or more) at or before meals is not to be recommended, for in the case of persons with weak stomachs it might stop the digestive process altogether.

In some forms of heart disease it is desirable not to increase the amount of blood in the heart and vessels, especially if the muscular contraction be feeble, and in certain forms of anæmia too much fluid is not desirable.

In general it does not do to advise the patient to take ordinary water, for, in the first place, few would adopt your prescription, and, secondly, there is the real and serious objection that ordinary water may be bad and, though not disagreeable to the taste, may contain typhoid fever or other disease germs. All objections to ordinary water are, however, removed, if it be boiled. Some do not dislike taking warm tea or warm water with their meals. Either suits the stomach far better than cold fluid, which sometimes checks digestion. In cold weather I have long been in the habit of taking warm water, and have recommended the practice to others, but many object and prefer to let the water get quite cold before they drink it. Householders should make a rule that every morning a kettle of water that has been boiled for ten minutes or longer should be allowed to cool, and then poured on the filter. The boiling renders the water perfectly safe, for it destroys every living organism as well as any animal poisons that may be suspended in it.

We recommend our patients to drink special aërated waters, and there is no doubt that some of these are more pleasant to the taste than is ordinary water; but the rapidity with which waters of particular kinds come into favour and are forgotten, and give place to others, is sufficient to show that the water is, after all, the active and perhaps the most important efficient ingredient. The patient who goes to some celebrated spa is no sceptic, and according to the instruction he has received from his teacher, attributes the beneficial effects he experiences, not to the ingredients dissolved in the water, but to some mysterious properties which these substances are supposed to have somehow acquired as they were dissolved, or while the solution was being forced upwards through the soil to the surface of the ground. The potash and soda, &c., accordingly are not ordinary potash and soda, with the ordinary properties of the molecules, but are imbued with some very remarkable

powers somehow communicated to them in the bowels of the earth. Fashion and caprice sanction and encourage the universal healing powers of this or that spring, and then a new fashion decrees its impotence and transfers infallible potencies to some newly-discovered water. The self-denying supplicant who determines to devote himself for a few weeks to the worship of Hygieia must turn out at about five a.m., and according to the established rites of the place, has to walk a certain distance, and drink a definite quantity of water before he is permitted to enjoy the frugal breakfast, at which even butter is often proscribed. More water drinking and more walking follow in due course, in obedience to well-defined rules. The simple midday meal is succeeded by more walking, more air, and more water. Improvement is soon manifested. The bowels act, the appetite returns, the spirits rise, and due credit is given to the mysterious agencies supposed to be communicated to some of the chemical ingredients of the water during their solution or afterwards. The air, the simple, wholesome, and restricted diet, the substitution of water for alcohol, the exercise, the rest enjoyed, and peace of mind are the mere accidents attending the curative action of the wonderful water. But those who drink good water in London, and live according to reason, may work hard and enjoy all the year round the advantages which some go so far, and at great expense and inconvenience, to try to find during what they call their holiday.

Smoking Tobacco.—Other unfortunate individuals, slaves to a bad habit, tell you they never can get their bowels to act without smoking the accustomed cigar or pipe. Whether it be the force of habit, or whether the nicotine, the active principle of the tobacco, actually gets into the blood and excites the bowel to act through the nerve-centres I do not know, but we are often assured that smoking does exert a purgative influence. Tobacco smoking in moderation certainly does no harm whatever, and he who finds that it is followed by the desirable consequences referred to, will be wise to smoke; but tobacco in excess may cause intermittent pulse, though we must not forget that intermittent pulse is often associated with stomach derangement, and even in smokers may not be due to the tobacco.

Without being able to explain why, there is no doubt that we sometimes get into a not very easily definable state of health, during which we feel unable to do many things as well as usual. To write a letter is an effort. To add up a string of figures becomes for the time a very serious task. We forget many things that ought to be carried out, and have an ill-defined fear that something that ought to have been done has been neglected. In some persons there is consciousness of impaired memory, and in many instances, patients about middle age get a settled conviction that they are about to suffer from some serious nerve-attack.

They are haunted by visions of apoplexy and paralysis, permanent blindness, deafness, and other terribly depressing possibilities of failure. The condition may last for weeks, or even months. Sometimes this state of system may be but the prelude to a cold, or some slight departure from the normal condition, but occasionally such an altered state of mental and bodily health exists for a week or two before the accession of some serious special disease.

The Medicinal Treatment of Constipation.

Of Purgatives.—Although purgatives are among the most valuable of the medicines we possess, if they are used with care and judgment, you will do well to discourage their too frequent use. It is, indeed, one of the most important of our duties to teach people how to keep themselves in health without physic, and especially how to keep up free action of the bowels without having continual recourse to purgative remedies. Undoubtedly it is not possible to lay down precise rules by which this desirable result may with certainty be obtained, but I shall venture to offer a few general remarks likely to be of use to you in practice. I believe many cases of constipation are due, as I have before said, to the general habit of taking too little vegetable food. General opinion would certainly pronounce in favour of the meat-eating propensities of all classes of Englishmen, and the greater number of those who do take what I believe to be nearer to the correct proportion of vegetable food, do so, I fear, from necessity, in fact, because they have not the means to buy the quantity of meat they consider would be advantageous if only they could obtain it. Intelligent persons generally ought not to err in this direction, more especially as the greater number of the middle and upper classes do little muscular work, and really require but a very small quantity of meat to keep them strong and well. In these days there is less excuse for injudicious diet than there was formerly, for even when fresh fruit and vegetables are very scarce we can provide ourselves with excellent substitutes, in the shape of preserved vegetables and fruit, and jams of various kinds. It is curious how many people who think nothing of eating a shillingsworth of meat consider sixpence spent in fruit and vegetables, fresh or preserved, an extravagance. The fact is, not only the cheapest but the most wholesome diet is that in which bread, fruit, and vegetables constitute the chief articles. I advise you to suggest to your patients during autumn, winter, and spring, to take advantage of the large quantities of fresh apples now imported from Canada. Many persons might eat two or three of these a-day with advantage to their health.

It has been often observed that on days when much food is taken, the amount of fæcal matter expelled is not considerable, while perhaps after taking very small quantities of food for several days it may be an

unusually large quantity of excrementitious matter is got rid of. The large bowel seems not unfrequently to act most freely when little food is taken. As regards the action of the stomach, small and large intestine, and of the liver, and, indeed, of all the glands that discharge their secretion into the alimentary canal, it is to be observed that great difference in degree of activity exists at different times. In the same period, twice or three times as much gland work may be discharged at one time as at another. Possibly the very different action of similar doses of the same purgatives on different occasions may be connected with the varying desire for food and the varying capacity for its digestion and assimilation.

In cases of prolonged insufficient action of the bowels the general health is impaired and the blood becomes altered in composition. Many substances remain in it, and circulate with it through the vessels, which ought to have been eliminated, and the action of many secreting and other organs is, in consequence, more or less disturbed. The defect after a time may lead to important structural change, and may result in long-standing disease. It may be necessary to advise the patient who has been suffering from deranged health, depending upon a prolonged state of constipation, to submit to systematic medical treatment. In some instances the condition may be relieved by attending to the state of his secreting organs without giving him any medicines having purgative properties. The character of the urine and other secretions is often much altered. Deposits of considerable quantities of urates are formed. The urine itself may be of very high specific gravity, and in other respects may have departed, more or less, from the healthy state. In such cases a few doses of Bicarbonate of Potash (*Potassæ Bicarbonas*) will perhaps set everything to rights in a day or two, without any purgation.

In many cases of constipation in which the blood is in such a state that any little wounds or scratches do not quickly heal, an ordinary purgative that acts on the alimentary canal will not suffice. You may have to select one which, besides producing purgation, also acts upon the secreting glands, particularly those which discharge their secretions at once into the alimentary canal. As soon as the medicine begins to act, and that is oftentimes many hours before any purgative effect is experienced, the red and angry appearance of the wounds and scratches will subside, and the healing process will be proceeding satisfactorily within twelve hours after the dose has been swallowed.

Where constipation has existed for a considerable period of time, and the general health has in consequence become considerably deranged, you must not expect that the patient is to be at once cured. Very free purgation is often followed by constipation, and the patient, instead of being permanently benefited, is only relieved for a very few

days. You will often find it necessary to give moderate doses of certain purgative medicines at short intervals for a time, taking care, however, not to carry this system too far, so as to worry and irritate the alimentary canal, and cause the patient much pain and discomfort. Again, it not unfrequently happens that an ordinary purgative will not properly act, or it acts only very slightly, without affording the relief which is desired. In such a case it may be advisable to repeat the medicine two or three days running, but sometimes it is better to wait for a few days, and then repeat the dose. The same observation has been made as regards many other medicines. Bicarbonate of Soda or Potash often fails to relieve if given in single doses though they be large, while if fifteen or twenty grains be taken three times a-day, and continued for three or four days or a week, a very distinct and highly satisfactory effect is produced.

The same medicine administered to a person in precisely the same dose will sometimes act freely and sometimes will not act at all. The state of the bowel varies greatly as regards secretion, and its response to stimulants to secretion and muscular contractility. No doubt this depends to some extent on the appetite, and the kind and amount of food taken, but not entirely so, for sometimes after a person has lived sparingly for some time, a moderate purge will produce a very free action. The action of the intestinal, like that of other glands, is not uniform within corresponding periods of time, but sometimes it is very free, sometimes almost suspended for a while. If we can just hit upon the time for the administration of the purgative, when the glands are about to act freely, the effect will be exactly what is desired. Most glands form and discharge their secretions, and then rest for a while. It is, therefore, wrong in principle to be continually trying to excite them to action by giving remedies which excite free action, day after day, for a considerable period. This injudicious and unreasonable practice, which was much in favour fifty years ago, did weak people a good deal of harm, and to it we are indebted for the present unreasonable opposition to the employment of one of the most valuable medicines (mercury) known to us.

When the constipation depends upon sluggish action of the large bowel only, the daily or almost daily administration for a time of a mild purge, containing Rhubarb, Aloes, Senna, Colocynth, or Podophyllin is unobjectionable, and by adopting this practice, which, however, has been solemnly condemned by some authorities, you will perhaps enable a patient to get through a great deal of work which otherwise he could not perform, and you will now and then succeed in transforming a thoroughly miserable and discontented person into a happy one. *See* also the remarks on the use of mercury under the "Treatment of Sick-headache."

One is often assured by a patient in answer to enquiries that his bowels are "regular"—that is, that an action occurs every day, and he will perhaps tell you that he is quite confident no purgative medicine is required, and perhaps that he has been warned by some great authority that purgatives are dangerous. Although from the first you suspect that he requires a purge, according to his wish you try various remedies to relieve the symptoms of which he complains, but without effect. Being dissatisfied with you, he may go from doctor to doctor, seeking relief and finding none, until at last he is ordered to take a purgative, and is soon well. Oftentimes it is necessary to order a mild purgative pill to be taken daily before dinner, for a week or longer, and the patient is not unfrequently quite astonished at the effect. Up to the time of adopting this plan he had felt convinced that his colon was clear, although, in fact, fæcal matter had been very gradually accumulating in it for many weeks.

You will often find small doses of purgatives given just after food for several days in succession, of great use in imperfect action of the bowels, from which many persons engaged in sedentary pursuits in towns very commonly suffer. From three to ten grains of Rhubarb, with or without Carbonate of Soda, or five grains of Compound Rhubarb pill, will be sufficient. You must teach people to experiment a little on themselves in order that they may find out the least quantity required to produce the effect desired. As before remarked, fruit taken daily is of use in such cases, but many persons do not try the plan long enough to obtain success. The digestive organs which act sluggishly require a good deal of humouring so to say. Violent purgatives are worse than useless, and not unfrequently a moderate purge is often followed by a headache and general upset, lasting perhaps for many days, and succeeded by the sluggish, torpid, imperfectly acting state. In general there is no difficulty in managing those who eat well and take plenty of exercise, but those who live very moderately, and whose work is intellectual rather than muscular, will require some thought and the exercise of a little ingenuity on your part to get them right, and to regain for them the much desired feeling of contentment dependent upon healthy intestinal action.

As regards the dose of purgatives, you must be very careful, for you may order a patient a dose that will certainly clear out the whole intestinal canal, but which will also gripe him very severely, and make him for a time very weak and miserable; while a dose which you might perhaps hardly believe would have any purgative action at all, would have been quite sufficient to effect the desired end, and without producing the slightest pain or discomfort. You must vary the doses of the drugs you prescribe, according to the state of the patient, and according to the sort of organism you have to treat. If you are pre-

scribing for a gentle, sensitive, highly nervous, anxious, excitable person, who thinks he has got all sorts of ailments of a serious character, you must not give violent purgatives, for if you do, you may bring on pain and sickness, and much increase the intensity of the suffering you have been asked to alleviate. On the other hand, if you are treating a robust labouring man, accustomed to work hard and feed well, and in the habit of drinking three or four pints of beer a-day, and more when he can get it, who has a florid complexion and great muscular vigour, it would be foolish to order him a gentle pill or mild draught. To such a person two or three grains of Colocynth pill would be perfectly useless, and ten grains might be required to act at all, and if you were to add to these two or three grains of Calomel, the patient would probably feel the more grateful to you. Many of the chemists, in town and country, sell good strong pills, which they call "Cabmen's Pills" or "Navvy's Pills," and which are most useful for those for whom they are prepared.

The necessity for varying the doses of medicines according to the individual patient should convince all of the importance of each practitioner learning how to prescribe, and mix, and combine medicines, instead of exclusively relying upon the pills and mixtures prepared for the profession in enormous quantities by large firms, to be purchased by the gross and by the gallon, but which cannot be altered to suit individual patients, and combined so as to agree with peculiar temperaments. Moreover, there is no doubt that many extracts and pill-constituents lose something of their virtue by being kept for a considerable time. Practitioners have discovered certain combinations of things which are very valuable, and the receipt for many a useful pill or mixture has been handed down from generation to generation. In these days, not only do we neglect to use many of the old prescriptions, but we no longer suggest new ones, and many combinations of drugs of tried value and in frequent use in former days will soon be altogether forgotten. The old system of teaching such elementary but practically important matters has been entirely abandoned, and many a wrinkle of the greatest importance in practice, instead of being preserved and transmitted as formerly from master to pupil, has been lost. Let me advise you not to neglect an opportunity of picking up from old practitioners any receipts for medicines they are willing to give you, nor to despise their teaching, especially as regards the treatment of many slight ailments difficult to manage and to cure. Do not receive with contemptuous indifference their suggestions for the treatment of functional disorders, although they may not be able adequately to explain the exact nature of the pathological changes which cause the symptoms.

Olive-Oil will with some act as a purgative, and may be taken as salad dressing. For infants, young children, and weak adults, olive-oil

is a good purgative. *Castor-Oil, Oleum Ricini*, which is the oily substance expressed from the seeds of the *Ricinus communis*, is one of the best and most frequently used of purgative medicines, and were it not for its nauseous flavour would be yet more popular. It is, at the same time, one of the mildest and most certain of purgatives, and is suitable to persons of all ages. You may give it to the infant as well as to the most infirm and delicate. It is usually given by the mouth. But Castor-oil may also be employed in enemata. It is one of the few purgatives that act upon every part of the intestinal canal, from the stomach downwards, but its action commences in the upper part, and it is efficient in driving down imperfectly digested and other matters that may be irritating the mucous membrane and causing pain. The dose varies from a few drops to half an ounce or more, but most persons take more Castor-oil than is really necessary to produce the required effect. One teaspoonful is often sufficient for an adult, and sometimes acts as well as a larger dose. Not the least advantage of prescribing the smallest dose that will be useful is that it is much easier to take.

There are many receipts for taking Castor-oil so as to avoid tasting it. Upon the whole I think you will find the following one of the most efficient plans :—You direct that a teaspoonful or more of "black coffee," that is, coffee without milk, be poured into a wine glass, the whole of the interior of which, including the lip, has been well wetted with the coffee. A teaspoonful or a little more of the oil is then to be steadily poured on the surface of the coffee, when it will form a large globule lying perfectly free and not in actual contact with any part of the glass, because the latter has been well wetted with the adhering coffee. The patient then opens his mouth wide and pours the oil and coffee down his throat, swallowing the whole in one gulp. If the operation has been successfully conducted, he will not have tasted the oil in the slightest degree. Tea, a little Ginger or Orange Wine and water, or Peppermint, Camphor or Orange-flower water, or Brandy and water, or plain water may be used instead. Strong spirit being lighter than the oil will not do. Some strongly recommend that the dose of Castor-oil should be well shaken up in a bottle with twice its quantity of milk, and when well incorporated poured into a cup or glass and quickly swallowed.

Rhubarb, Rhei Radix, Pulvis Rhei, is one of the best of purgatives, and its virtues are very widely known. It has been a popular remedy for more than two centuries, and is one of the best purgatives for children. Mixed with Carbonate of Soda, *Sodæ Bicarbonas*, it is very useful in derangements of digestion. From five to twenty grains of Rhubarb with twice as much Bicarbonate of Soda, will often give great relief. The dose may be repeated once every other day after food for a week or two in cases of constipation or imperfect action of the bowels. *See* also pp. 197, 198.

Pulvis Rhei Compositus, formerly known as *Gregory's Powder*, consists of Rhubarb, 2, Light Magnesia, 6, and powdered Ginger, 1. It is an excellent and safe remedy and may be given in doses of from ten grains to a drachm in water.

Ordinary Compound Rhubarb Pill, *Pilula Rhei Composita*, *and Compound Colocynth Pill*, *Pilula Colocynthidis Composita*, suit most persons very well. You may order three to eight grains of either of these pills, and it is better to combine with them a grain or two of the Extract of Hyoscyamus or Henbane, *Extractum Hyoscyami*, which will prevent any griping or discomfort. Three or four grains of either of the above with a grain of Extract of Henbane may be made into a pill, and one may be taken every night or every other night for a week or two, in many cases with great advantage. In this way the bowels may be thoroughly relieved and got into the way of working regularly.

One of the great advantages of giving purgative medicines in the orm of pills is that the particles of the drug are thoroughly comminuted and diluted, as it were, by less active ingredients. The importance of the minute division of active substances was known even to the ancients. A smaller quantity of the active material is sufficient, and it is far less likely to do harm, while its action is sure to be more moderate and equable, if intimately mixed with a quantity of inert or slightly active material, than if administered in a pure state. Many pills and powders have been compounded on this principle. Compound Ipecacuanha powder, *Pulvis Ipecacuanhæ Compositus*, Compound Jalap powder, *Pulvis Jalapæ Compositus*, and Compound Rhubarb powder, *Pulvis Rhei Compositus*, are examples. If there be much flatulence, or if you desire to give a little stimulus to the secretion of the gastric juice, you may add to the pill or pills half a grain or a grain of Capsicum, *Capsici Fructus*, or ordinary Cayenne Pepper, with advantage.

Pills may be coated with silver leaf or covered with gelatine, sugar, or other material, in order that they may be swallowed more easily. Among the best are Wiley's coated pills made in Coventry.

You must recollect in administering pills not to order more than five, or at the most six grains in one pill, or you will astonish your patient by the size of the bolus you have ordered him to take. Five grains form a moderate-sized pill, but if blue pill or calomel should be one of the ingredients, the pill will be small, because a grain of these mercurial preparations occupies very little space. This matter of the size of pills must be borne in mind, for some people think it an insult to receive a large pill, and many will tell you they cannot swallow one of even moderate size. The professed inability to swallow a pill is often mere affectation or determination on the part of the patient not to attempt to do so; but some persons have a real difficulty. For them the

pill may be silvered or gilt, or covered with a tasteless gelatine or starch coating, and if neither of these plans will please, tell them to pack the pill up in a small piece of moistened "pastry-cooks' paper," when the whole will slip down whether the patient will swallow it or not. This pastry-cooks' paper can now be obtained at many of the large chemists, and is an excellent thing in which to give powders to children. Little capsules of this material have been prepared and made in separate halves. The powder or pill is placed in one and the cover applied, the edges, being slightly moistened, the two halves adhere, and the little parcel with the included medicine can be swallowed without any difficulty.

Nux Vomica may be given by itself or combined with a purgative, in cases of imperfect action of the bowels. It is useful by giving tone to the bowel and stimulating, probably through its action on the nerves, the muscular coat of the intestine. It is now frequently prescribed. It comes from the plant which yields Strychnine, *Strychnos Nux Vomica.* You may give of the Extract of Nux Vomica, *Extractum Nucis Vomicæ*, from a quarter of a grain to half a grain. If added to a mild purgative pill, it helps the action very decidedly. The Tincture of Nux Vomica, *Tinctura Nucis Vomicæ*, may be prescribed in doses of from five to twenty minims with some Compound Tincture of Bark or other tonic. Decoction of Aloes, *Decoctum Aloes Compositum*, Tincture of Senna, Tincture of Rhubarb, are simple remedies, which are often prescribed in doses of from a drachm to half an ounce.

Scammony, *Scammonium*, a gum resin from the root of Convolvulus Scammonia, is a component of many purgative pills, and is a very active purgative. For children suffering from intestinal worms Scammony is one of the best remedies. It may be given in doses of one or two grains, or from three to five grains of the Compound Scammony Powder, *Pulvis Scammoniæ Compositus*, which consists of Scammony, 4, Jalap, 3, and Ginger, 1, may be ordered instead of the pure drug. It may be taken in a little milk. Probably many patent purgative medicines contain Scammony. It is a rather searching purgative, which clears out the bowel well, expelling any hardened fæces and wind that may have collected. Of Scammony there are several kinds in the market, some worthless. The uncertainty of getting a good specimen has caused many not to prescribe the remedy, but when good, Scammony is one of the most useful purgatives.

Purgatives suitable for children, delicate and aged persons.—Compound Liquorice Powder is now in the Pharmacopœia. This preparation is much used in Germany and Russia, and is certainly one of the best and safest of ordinary purgative medicines. The *Pulvis Glycyrrhizæ Compositus* of the British Pharmacopœia contains two ounces of finely powdered Senna and the same quantity of Powdered Liquorice

root, with six ounces of powdered sugar; but the German preparation is made as follows :—"Powdered Senna, powdered Liquorice, of each 2; powdered Fennel, Sulphur, of each 1; white sugar, 6: mix."—Squire's Companion to the British Pharmacopœia. The dose of the powder is a teaspoonful, carefully mixed in a little water.

Conserve of Currants, Senna, and Glycerine.—My friend, Mr. G. Farr-White, of Surbiton, has found the following confection of the greatest service in the constipation of old people. He tells me that it does not lose its active properties by repetition :—

Currants well beaten into a soft pulp in a mortar ...	4 oz.
Powdered Sugar	4 oz.
Powdered Senna	2 oz.
Powdered Ginger	¼ oz.
Glycerine	1 oz.

The whole is to be well incorporated and rubbed together to form a smooth confection.—*Dose*, half a teaspoonful daily when required.

Sulphur.—Sir Alfred Garrod has lately been advocating a very old remedy, sulphur, which he recommends to be taken in the form of lozenges, but unfortunately for many persons the dose is too small. Brimstone and treacle used to be commonly prescribed more than fifty years ago. At that time sulphur was a remedy commonly in use among the poor, and considerable quantities were used medicinally. Like many other old fashioned things it has long been almost discarded. Whether it really deserves to be held in very high repute as a purgative I doubt. It is, however, probable, like many medicines belonging to the laxative class, it will act advantageously on some weak persons and particularly on children. It may be noticed that it is an ingredient of *The German Liquorice Powder* which has been in high favour of late years. Sulphur may now be obtained in lozenges, of which one or more may be taken when required.

Aloes is a purgative which has the property of acting upon the large bowel. It probably irritates the mucous membrane, and excites its glands to secrete; but also, by reflex nervous action, it stimulates the action of the muscular coat of the intestine, and excites vigorous contraction both of the circular and longitudinal muscular fibres. It is a very good purgative to give in cases of torpid bowels, but it is important for you to bear in mind that aloes has the effect in some cases of encouraging the formation or increase of hæmorrhoids or piles, *see* p. 182. It seems to irritate the mucous membrane of the lower bowel, and those who suffer from an irritable state of this part sometimes find their sufferings much increased if they take any of the ordinary preparations of Aloes. There is the Socotrine Aloes, *Aloe Socotrina*, and Barbadoes Aloes, *Aloe Barbadensis*. The Compound Decoction of Aloes, *Decoctum*

Aloes Compositum, is ordered to be made of Socotrine Aloes, and contains besides, Myrrh, Saffron, Carbonate of Potash, Liquorice, Compound Tincture of Cardamoms, and Distilled Water. This is a very valuable preparation, and enters into the composition of many favourite draughts which used to be prescribed in former days, and which brought gain to the apothecaries of old. That once very fashionable but rather nasty dose called a *Black Draught* was composed of Decoction of Aloes, with Sulphate of Magnesia, Senna, and Liquorice. Its composition was modified by different authorities, and some improvements, more nasty still, were made by ingenious physicmongers; but the reputation of the black draught is gone, and though an excellent purgative, it is seldom prescribed in these days. Fifty years ago Dr. Chambers, who was then the fashionable physician in London, and other physicians only a little less fashionable, prescribed blue pills and black draughts for most ailments. Now it would not be easy to persuade people to swallow a black draught. However, with a little ingenuity you may suggest something less nauseous and equally efficacious. The Decoction itself may be taken in doses of from two drachms to an ounce and a half or more.

Probably the best preparation of Aloes, to prescribe in the form of pills, is the Watery Extract of Aloes (*Extractum Aloes Socotrina*). This watery extract does not irritate the bowels, and acts very effectually. It may be given in doses varying from the one-sixth of a grain up to a grain or more, but it is better not to order a larger dose than is absolutely requisite, and in prescribing, it is well to bear in mind that Aloes, as well as many other drugs, have their purgative action much improved by being reduced to a state of very minute division, and mixed with other things. If small pieces of Aloes should stick in the mucous membrane of the large bowel, that particular part might be severely irritated, and in consequence the patient would experience great pain and discomfort; while, if the medicine was very minutely divided and mixed with a quantity of inactive or less active material, there would be no danger of any such deleterious action. When you prescribe Aloes, you should always order it to be intimately mixed with other and less active substances. Let the pill contain, say, a quarter of a grain of the *Extractum Aloes Aquosum* with two or three grains of common Extract of Colocynth (*Extractum Colocynthidis Compositum*), and a grain of extract of Henbane (*Extractum Hyoscyami*). Although in these days it is the fashion to prescribe one remedy only, and I believe some distinguished physicians consider it improper to order more than two drugs in one pill or mixture, there is not the least doubt that, as far as regards the action of the medicine upon the organism, considerable advantage is gained by mixing several remedies together. Medicines, like foods, affect different people in a different

way. If you prescribe several different things together, you may influence different idiosyncrasies, while it would be almost impossible to determine the particular purgative suitable for each individual patient. I much prefer a pill consisting of a little Compound Colocynth, a little Nux Vomica, a little Henbane, a small quantity of Podophyllin, and perhaps a little of the Watery Extract of Aloes, to a full purgative dose of any one of these preparations by itself. By mixing these things together, there is no doubt that you get a less painful and more efficient action than you do from a large dose of either of them separately. If you desire to test the truth of this observation, you may carry out a very instructive experiment on your own organisms. Take, for example, one grain of Podophyllin and see how it affects you, and the next time you require a purgative take three grains of the Watery Extract of Aloes alone. On another occasion try a very small dose (a quarter or the third of a grain) of Podophyllin or Aloes, mixed with three grains of compound Colocynth pill, and notice whether, upon the whole, you do not get a better result with less griping pain than when you took the larger doses of the simple drugs.

Podophyllin has been much used during the last ten years, and was first employed in America. But it is a purgative of somewhat uncertain action, and those who order it should take care how they prescribe it. I remember the case of a child who was almost killed by half a grain of Podophyllin, incautiously ordered by the practitioner, who perhaps up to that time had been employing some weak and inferior preparation; but this last prescription, being made up by a chemist who used good medicines, a much too powerful dose was administered. The drug varies much in quality, and it is, moreover, one of those things which acts very differently upon different people. I have patients who have been taking a small quantity of Podophyllin for many years, and who say they have never taken anything that acts more satisfactorily. On the other hand, I every now and then get into disgrace for ordering the same thing to other persons. The drug sometimes gripes the patient so much that he does not wish to try the remedy again. You should always order Podophyllin first in small doses, mixed with compound Rhubarb or compound Colocynth pill, and if it causes no discomfort, you can easily increase the dose. Do not give more than one-quarter or one-third of a grain, unless you know by experience the patient can take larger doses with advantage. A solution of Podophyllin, Liquor Podophyllin, has been prepared by Hocken, and is strongly recommended by Dr. Quinlan. One drachm of the *Liquor* is equal to gr. $\frac{1}{4}$ of pure Podophyllin.

Drastic and Hydragogue Purgatives can hardly be included among the remedies for slight ailments, but a few of them may be prescribed in small doses for ordinary maladies. Thus Jalap, *Jalapa*, is a very old and

useful purgative, which may be taken in doses varying from five to fifteen grains. It excites the flow of fluid from the blood into the intestine, and when prescribed should be mixed with an equal quantity of Bitartrate, *Potassæ Tartras Acida*, or Sulphate of Potash, *Potassæ Sulphas.*

Jalapine is obtained from ordinary jalap by rectified spirit. It is the resin, in fact, *Resina Jalapæ*, deprived of its colouring matter by animal charcoal. A small dose of from one to three grains will be found to act freely. It may be prescribed in a pill or as a powder, mixed with a few grains of sugar.

Elaterium, *Croton Oil*, *Gamboge*, are all violent purgatives: the two first, although useful in the treatment of some diseases, are not required in the management of slight ailments; the last is prone to give great pain, and is now seldom given. Such purgatives as these should be prescribed in very small doses to begin with. In fact the practitioner who uses these drugs should ascertain whether the patient will bear them, by ordering in the first instance a very small dose. Drastic cathartics all excite the pouring out of a large quantity of fluid from the blood through the walls of the capillaries into the bowel.

Saline Purgatives are valuable in many cases of imperfect action of the bowels. Many of the salts used as purgatives act not only by promoting osmose of fluid from the blood by reason of the higher specific gravity of the saline solution in the intestine than that of the liquor sanguinis, but also by direct influence on the nerves of the mucous membrane. The beneficial action of some salines also depends upon their being first of all absorbed into the blood, and then excreted by the glands and follicles of the mucous membrane of the colon; at the same time, many other substances are removed from the blood with the salt, and in this way the circulating fluid may be freed from certain deleterious constituents which have accumulated in it, and which if they had remained might seriously have interfered with the action and nutrition of various tissues and organs. Most salines act partly as purgatives and partly as diuretics, and not a few of them have the effect of increasing the secretion of many, if not of all, the glands of the digestive system.

There are many salts in the Pharmacopœia which you will find useful. Of these some are very ancient remedies and well known in all countries. First of all, there is Epsom Salts, Sulphate of Magnesia, *Magnesiæ Sulphas*, and a capital remedy it is. It probably forms the basis of a great many fashionable medicines, and many people frequently take it without knowing from what a common drug they derive relief. It is one of the cheapest of medicines, for a pound of it only costs a few pence. It may be given in doses varying from half a drachm to half an ounce or more, in solution in water. The small dose, especially if dissolved in warm or lukewarm water, will sometimes

purge freely and quickly. As a medical author has metaphorically remarked concerning a much advertised water, it is "speedy, sure, and gentle"!

Sulphate of Magnesia is not an unpleasant thing to take, especially if you mix it with about one-fourth of its weight of common salt and twenty drops of Aromatic Sulphuric Acid (*Acidum Sulphuricum Aromaticum*), the whole being dissolved in an ounce and a half of lukewarm water. I often order ten minims of dilute Hydrochloric Acid, *Acidum Hydrochloricum dilutum*, and two drachms of Sulphate of Magnesia, to be dissolved in an ounce and a half of Cinnamon Water, Orange Flower Water, *Aqua Aurantii Floris*, common Water, or Infusion of Roses, *Infusum Rosæ Acidum*. The last gives a rather pleasant taste and agreeable colour to the draught, which should be taken in the morning before breakfast, or about two hours after that meal. If you consider it desirable to act upon the kidneys at the same time as the bowels, and often it is very important so to do, you may add a few grains of Nitre, *Pulvis Potassæ Nitratis*, and in this way you make a saline draught which many of your patients will find useful. It may be taken day after day for three or four days, or twice or three times a week; but its daily use should not be continued for longer than a fortnight at a time.

Sulphate of Soda or Glauber's Salt, *Sodæ Sulphas* of the Pharmacopœia, is not so strong in its purgative action as the Sulphate of Magnesia, but it is not nearly so disagreeable in taste. You may give two or more drachms of Sulphate of Soda dissolved in an ounce and a half of water. Or you may prescribe two or three drachms of the Sulphate of Soda with a somewhat less quantity of the Sulphate of Magnesia with five or ten grains of Nitre and a drachm or more of common salt. The addition of common salt you will find advantageous, as it certainly much diminishes the nauseous taste of the Sulphate of Magnesia. Sulphate of Soda, one of the constituents of Carlsbad water, acts powerfully on the liver, especially if dissolved in a considerable quantity of tepid water. By its use uric acid and other excrementitious matters are washed out of the tissues. In this way is no doubt to be explained the beneficial action of Carlsbad water in the gouty condition, and in states of system in which there is a marked gouty tendency.

The real and lasting benefit which frequently results from even a short course of washing out, with judicious attention to diet, and the importance of free exposure to good air and properly regulated gentle exercise, suggests the general plan to be followed in the case of those who are precluded from enjoying the advantages of a course of treatment at Carlsbad or other place where suitable waters may be taken at their source. If, on the one hand, we study the *rationale* of the health course, and on the other observe the results attending the same plan of treatment at home, we need not despair of

being of some use to patients who are compelled to remain in this country, and are unable to give up their work even for a week. The use of Glauber and many other salts was perhaps better understood by a former generation of practitioners than it is by us. In such cases, the old fashion of prescribing two or more teaspoonfuls of Glauber's salts in tepid water once or twice a day was without doubt of great use, and I think that remedies of this class are in these days too seldom prescribed. It is not only persons who are actually suffering from diseases who are benefited, but I have no doubt that many who are as it were preparing themselves by injudicious living for chronic liver disease, would escape if, before actual morbid change had resulted, they had been enjoined to take frequent doses of saline medicines. Carlsbad water, natural and artificial Carlsbad salts, may now be obtained without difficulty in London. Many salts which have a diuretic and slightly purgative action are very valuable in the treatment of enlarged liver, at least, during the early periods of the disease, and a mixture of three or four salts will often be found more useful than Sulphate of Soda or Sulphate of Magnesia alone.

In treating those who prefer to remain at home or are too poor to profit by a visit to Carlsbad, the following mixture may be prescribed with advantage :—

Sulphate of Soda, well dried	4 oz.
Sulphate of Magnesia	1 oz.
Chloride of Ammonium	¼ of an oz.
Nitrate of Potash	¼ of an oz.
Chloride of Sodium (Common Salt) ...	1 oz.

To be powdered and well mixed together, and kept in a wide-mouthed, well corked or stoppered bottle.

Dose—a teaspoonful or more in half a tumbler of tepid water, twice or three times daily (an hour after breakfast, about 4 o'clock, and an hour before going to bed) for a week or ten days at a time. Salines generally, like many other medicines, act more powerfully if they are combined than if taken separately, and, as I have already said, their action is expedited and increased if they are taken in a diluted state dissolved in warm or luke-warm water.

Phosphate of Soda, *Sodæ Phosphas*, is another salt which acts well as a mild purgative in doses of from one drachm to an ounce dissolved in water. It is not disagreeable, and has long been known as "Tasteless Saline Aperient." It is a good saline for children, and may be given dissolved in weak beef tea or other form of broth or soup.

Soda Tartarata, a Tartrate of Soda and Potash, commonly called Rochelle Salt, used to be a very favourite saline purgative. It also acts on the kidneys. The acid of this salt, like Citric and many other

vegetable acids, becomes changed in the system, alkaline carbonates being formed, which render the urine alkaline. The dose is from one drachm to half an ounce or more dissolved in water. You may order a mixture containing half a dozen doses, and direct the patient to take an ounce, that is, two tablespoonfuls, with one tablespoonful of hot water. If the dose is taken before breakfast it will generally act in the course of two or three hours, and many a patient will have good reason to thank you for the good advice you have given him.

Seidlitz powders are another popular saline remedy. An improved form of Seidlitz powder has been prepared by Hockin, Wilson, & Co., of Duke Street, Manchester Square. Many saline mixtures may be used instead of purgative mineral waters. Their action is much the same, but you will find that not a few of the most prosperous of your patients will decline to take such salines as you can prescribe. They require a more fashionable form of saline in the shape of a purgative mineral water from some wonderful spring warranted to cure all diseases and patronised by the nobility of Europe. In these days there are indeed a number of potent natural mineral waters having purgative properties from which to choose. A few years since, almost every person was advised to take Pullna water. This after a time, like the once famous Epsom and Cheltenham waters, gave place to others. For years *Friedrichshall* has been credited with virtues of surpassing excellence, but now I suppose opinion is divided between this and the unpronounceable Hunyadi Janos bitter water. The latter contains much more of the purgative sulphates than Pullna, Seidlitz, Kissengen, or Friedrichshall, and therefore acts more freely.

Friedrichshall water is a mild purgative saline. Its composition is shown in the following analysis, for which I am indebted to Mr. C. H. Piesse, Public Analyst for the Strand District:—

ANALYSIS OF FRIEDRICHSHALL BITTER WATER.

	Grains per gallon.
Sodium	657·5
Potassium	6·1
Magnesium	200·8
Calcium	18·7
Silica	1·7
Chlorine	1003·1
Bromine	0·13
Sulphuric acid (SO_4)	739·2

Carbonic acid not estimated.

It seems to contain Sulphate of Magnesia and Chloride of Sodium. Mr. Piesse remarks that if the "Chlorine" be calculated into "Chloride of Sodium," and the "Magnesium" into "Sulphate of Magnesia," and the amounts of the salts thus indicated be dissolved in one gallon of

ordinary drinking water, we shall have a solution very like the natural Friedrichshall water, especially if the mixture be well charged with carbonic acid.

You may tell the patient to take a wine-glass of Friedrichshall or Hunyadi Janos water with as much warm water every morning before breakfast, and in many cases it may with advantage be prescribed with twice as much Carlsbad water made warm, or hot water added. For patients who object to the expense of mineral waters you may easily prescribe a substitute according to the principles already mentioned, page 208. Whether the Sulphate of Magnesia and Sulphate of Soda in the water obtained from a spring are in a state in any way molecularly different from the salts as sold by chemists has not been determined, but certainly the less wealthy seem to derive as much benefit from solutions of ordinary Sulphates of Magnesia and Soda as the rich do from purgative mineral waters.

Sulphate of Potash, Potassæ Sulphas, is a very old saline aperient. It may be taken in doses of from ten grains to three scruples, dissolved in water. It enters into the composition of many of our remedies in the Pharmacopœia.

Effervescing Saline Purgative.—But perhaps the pleasantest saline purgative is an effervescing draught. We have an excellent mild purgative in what is now called *Granular Citrate of Magnesia.* I believe that much of what is sold under this name is really Citrate of Potash or Soda. The ingredients are mixed, and the water of crystallisation in part driven off by heat; but the preparation is a difficult one to make well. The dose is from one to two teaspoonfuls thrown into a tumbler two-thirds full of water, and the mixture is to be taken during effervescence. The granulated salts must be carefully excluded from damp, but if this be done they keep for a long period of time. Such effervescing draughts are very agreeable in hot climates. It is of course only a very mild form of purgative, but useful in a great many cases when a cooling saline is required. The urine may be rendered alkaline by the salts. To those subject to deposits of uric acid and urates, to those who suffer from "biliousness" and "sick headache," the citrates, tartrates, and other salts of vegetable acids are useful. Many different forms of granulated effervescing salts are now largely used which contain Quinine, Iron, Bismuth, Strychnine, Pepsine, Bismuth, Lithia, Caffeine, Salicine, and many other substances. These and many more are made by Bishop and Co. Granulated Effervescing Salts constitute a very agreeable vehicle for many different kinds of medicine.

Generally, in giving purgatives, do not forget that it is a great point to hit the exact time, for a very moderate dose will often produce a full and sufficient effect, although at another time, in the case of the very

same person, a larger dose will have little or no effect, save causing severe pain. If the right time can be selected, a mild purgative will be of the greatest use, and may possibly have the effect of preventing an attack of illness. This variability in the action of the same medicine is very remarkable in the case of mercury, an extremely small quantity of which has sometimes the most beneficial effect in dissipating symptoms which for several days may have indicated serious general disturbance and the derangement of more than one important organ of the body.

DIARRHŒA.

I pass now to the consideration of a condition the very opposite of constipation. Diarrhœa (διά, through, ῥέω, I flow), though a common ailment, is less frequent than constipation, and is seldom habitual and persistent, lasting perhaps for the greater part of a lifetime, like the tendency to constipation. Now and then, however, you do meet with people who seem to suffer very frequently from a condition to which the term diarrhœa would be generally applied. To your inquiry if the bowels are open, the patient will perhaps reply "Too much so." On further questioning, you find that the bowels act three or four times every day. I have known highly nervous persons who habitually during a long life have had two or three liquid or almost liquid actions daily, not only without suffering any derangement of the health, but really enjoying good health. If we knew precisely how to bring about a moderate degree of this condition, we should much increase the comfort and add to the health of many, for it is surprising how very many suffer through life from the very opposite condition, almost constant constipation. With not a few, east wind means troublesome, imperfect action of the bowels or actual constipation, for which medicine must from time to time be taken. In some of these cases the patients do not appear to suffer pain, nor do they necessarily get thin and weak, or appear to be out of health. Whether the looseness depends upon a highly irritable state of the nerves of the mucous membrane, or is due to weak vascular walls, or to an altered state of the blood, or to a highly nervous disposition, it is often difficult to decide. In some cases the condition results from a peculiar habit of body, and undoubtedly there are types of constitution which are remarkable for the great activity of various secreting glands, just as there are others as remarkable for slow and imperfect action. In neither case is there any structural alteration; but one class is characterised by rapid, the other by sluggish, change.

That diarrhœa may be produced through nerve influence only, is proved by a number of circumstances. Many nervous people are very subject to it. Fright, anxiety, and sudden joy may be immediately followed by diarrhœa. Many students who have been exceedingly

anxious concerning examinations have experienced the influence of the mind acting through nerve-fibres and nerve ganglia upon the secreting glands which discharge their contents into the intestinal canal. The action is due mainly to a relaxation of the muscular fibres of the small vessels, permitting dilatation and a free discharge of fluid from the blood directly into the bowels, as well as indirectly into the secreting glands.

To those who suffer from constipation, an occasional attack of diarrhœa is very advantageous, and is not to be regretted. Probably diarrhœa carries off many noxious materials that have accumulated in the blood, and provided it only occurs now and then, and does not last for too long a time, and is not allowed to become very severe at a time when there happens to be an epidemic, may be beneficial. But you must not forget that an attack of typhoid fever is often ushered in by slight and sometimes by severe diarrhœa. There is usually a very decided rise in temperature, which in many cases will enable you to form an opinion as to the nature of the malady.

There are times when diarrhœa must be guarded against, and, if it occurs, must not be allowed to persist. During an epidemic of cholera, a person suffering from diarrhœa must be carefully watched, for if the condition continue unchecked for even a short time, the diarrhœa may become choleraic. Indeed in cholera times what appears to be ordinary diarrhœa may be succeeded in the course of a few hours by the collapse stage of cholera. The disease often begins with slight purgation, and you cannot tell whether a person is about to have a mild attack of ordinary diarrhœa or actual cholera. It therefore behoves us to be on our guard, and during the prevalence of a cholera epidemic, it is important to at once check all cases of diarrhœa.

The commonest form of diarrhœa is that which we meet with in hot summers, and often prevails to a great extent in autumn. This is often called summer diarrhœa, and it is hard to say exactly what occasions it. Certain it is that it is more prevalent in hot, dry summers than it is in cold, wet ones. Some would explain the fact by the superabundance and cheapness of fruit in the former, and its scarcity and high price in the latter. Plums usually get the credit of exciting diarrhœa, but the condition frequently shows itself before plums are obtainable. No doubt bad, unripe fruit and decaying fruit are very liable to irritate the bowels, and may excite diarrhœa. Neither is there any doubt that decomposing vegetable and animal matter will bring on an attack of diarrhœa ; but what the particular organic material may be which exerts the deleterious influence I do not know. In all decomposition of animal and vegetable matter toxic substances are generated. On the other hand, it is quite certain that many of us can eat very considerable quantities of any ordinary fruit without suffering in any way, and even

without the ordinary half-constipated habit being relieved. In summer the intestinal canal of many persons seems to be in an unusually sensitive or irritable state, so that very slight errors in diet are apt to derange its action for a time. Even a little beer that is out of order, or sour milk, will sometimes set up a troublesome attack of diarrhœa, which may last for days, and require careful treatment to check it.

There are certain forms of diarrhœa which occur in persons who have been in tropical climates, which appear to be due to inaction or imperfect action of the liver. The condition may continue for months without being very severe—preventing the patient from gaining in nutrition, but not producing actual emaciation. In cases of the kind the motions are pale, not excessive in amount, and do not perhaps number more than two or three daily—never of the proper colour—and perhaps for a period extending over many months the digestion has been deranged, and the stools have always been of a pale, dirty, light-brown colour, and sometimes even whitish. It will be found that relief is often afforded by very small daily doses of a mercurial—from half to the sixth of a grain of grey powder or blue pill, or a smaller dose of calomel, continued for a few days at a time. During treatment no meat should be allowed, but the diet should consist principally of farinaceous food—bread, milk, and a small quantity of strong, freshly made beef-tea.

Concerning the precise changes which occur in severe diarrhœa, little is positively known. It is generally supposed, as I have already remarked, that much of the fluid escapes from the capillary vessels; but at least, in some cases, it is more probable that the condition depends upon increased activity of many of the glands which discharge their contents into the intestinal canal. In sudden diarrhœa, depending upon the presence of some irritating material, I suppose transudation of fluid takes place from the vessels, as well as increased secretion from the glands. In many cases, for some time before the attack, it is probable that the blood has been in an unhealthy state, in which case the free discharge of watery matter will be of advantage to the patient, inasmuch as various noxious materials (ptomaïnes) will be eliminated, which would do harm if they were retained in it in a state of solution. Thus by the attack of diarrhœa is the blood at once depurated, and, in this way, may be soon restored to its normal healthy state. Unquestionably, therefore, in such a case, diarrhœa may be regarded as conservative and advantageous.

Suppose a child has been eating a quantity of unripe fruit—and it is nothing very unusual for an English boy to eat half a dozen unripe and very uninviting looking apples: this will very soon produce an effect, the stomach and bowels will be irritated, and a sudden, and, it may be, violent derangement will follow, often accompanied by feverish-

ness, the temperature in such cases not unfrequently rising to 103° or 104°, with perhaps violent abdominal pain; and these symptoms may be sufficiently severe to excite alarm. If vomiting occurs, relief is at once experienced; but more commonly purgation is excited, and may perhaps have existed for a few days before you are called in to see the patient. You must not expect the diarrhœa to cease until the whole of the irritating matter which excited it has been removed, and the sooner this result can be effected, the sooner will relief be afforded. All the particles of half-masticated apples, containing immature acids and other irritating organic compounds, must be removed from the alimentary canal before the diarrhœa will cease. In such cases, therefore, it is bad practice to attempt to check the diarrhœa unless you feel sure that the irritating substances have been entirely got rid of. It is even desirable to encourage for a time the flow of fluid from the intestinal canal, so that the noxious matters may be thoroughly washed away. For this reason you will often have to administer a mild purgative to expedite the removal of the matter which excited the purgation. You purge to stop purgative action, and you will often find this the best and shortest method of checking the diarrhœa of children. Of all the purgatives that are known to remove irritating matters from the intestinal canal, oily purgatives are the most suitable. Common olive oil, *Oleum Olivæ*, the best Lucca oil, will act in this way, and for very young children is quite sufficient, but as a general rule you will find it expedient to give Castor-oil, *Oleum Ricini*, the purgative action of which is more decided. There is an active principle in the Castor-oil, which affects the action of the stomach as well as the intestinal glands and vessels of the greater part of the alimentary canal. In this way, Castor-oil in its action contrasts with Aloes, Colocynth, and Sulphate of Magnesia, which act mainly upon the lower part of the small intestines and the colon. I suppose Castor-oil excites increased secretion in the stomach, the duodenum, the jejunum, and ileum, causing a quantity of fluid to be quickly poured out from the vessels and glands of the mucous membrane. Thus the alimentary canal is thoroughly flushed in every part; and the action takes place from above downwards. Any irritating matters that may be present are thus swept away. For this reason, and for the further reason that Castor-oil is a substance which does not irritate the mucous membrane in any undue or uncomfortable way, it is the best purgative to give in any cases in which you have reason to attribute the diarrhœa to injudicious eating. Particularly in the diarrhœa of infants and young children is Olive-oil or Castor-oil a safe remedy. As a general rule, you will find a much smaller dose of Castor-oil will act than is usually administered. To a child of ten years old you may give half a teaspoonful or a teaspoonful; to an adult, two teaspoonfuls but a single teaspoonful of Castor-oil will be sufficient for many people.

The objection to Castor-oil is its nauseating, disagreeable flavour. I have already referred to the best way of taking it, and have offered some suggestions for disguising the taste.

After diarrhœa has continued for some time, there may be a good deal of severe griping pain all over the stomach, or at least in its upper part. At the same time the patient feels chilly or very cold, and may actually shiver; very generally there is more or less flatulence, with acid eructations, loss of appetite, and occasionally distressing nausea. The tongue is usually furred, and there may be a nasty taste in the mouth, or the mouth may feel clammy and disagreeable. After diarrhœa has lasted for several days, there may be considerable depression of the heart's action; and not unfrequently severe cramp in various muscles increases the distress.

In all cases of diarrhœa, particularly in the young, we must bear in mind the possibility of the symptom being due to an attack of *Typhoid fever*, in which case no purgative must be thought of. If the patient has been ailing for a time and looks weak and ill, and especially if the temperature for some days has been above the normal, care must be taken not to mistake the malady for a slight passing ailment. Purgatives may do great harm if given, especially to weak persons suffering from Typhoid. Always, therefore, bear in mind the possibility of the presence of Typhoid, and do not omit to notice any other signs or symptoms of the disease that may be present.

Acid eructations and the rising of acid fluid into the mouth will be relieved by the administration of alkalies and other so-called antacid remedies. You may give alkalies, such as *Potash*, *Liquor Potassæ*, twenty drops in a wine-glass full of water once in three or four hours, or the *Bicarbonate of Potash or Soda*, *Ammonia*, *Carbonate of Ammonia*, *or Carbonate of Lithia*. Preparations of Bismuth are also useful, as the *Carbonate of Bismuth* (*Bismuthi Carbonas*), or the *Nitrate*, the old *Trisnitrate of Bismuth* (*Bismuthi Nitras*), from ten to twenty grains to a dose, suspended in water with the help of a little mucilage, or prepared chalk (*Creta præparata*), or precipitated chalk (*Calcis Carbonas precipitata*). But one of the best as well as simplest remedies to give in these cases, and particularly in gastric and intestinal derangements occurring in infants and very young children, is Lime Water (*Liquor Calcis*). This is an extremely valuable remedy, which is not used as much as it deserves to be. Infants are very subject to diarrhœa, and I fear many a child has been lost simply from allowing diarrhœa to continue, which would have been easily checked, if sufficiently early in the attack a few teaspoonful doses of Lime Water in milk, or sweetened Lime Water (*Liquor Calcis Saccharatus*), had been given. Anything of an irritating character will very soon disorder the delicate mucous membrane of the intestinal canal of an infant, and a very simple remedy

administered at the proper time will stop it, but if the purging be severe, and it be allowed to continue for a few hours, extreme exhaustion may ensue, and be soon followed by death. In these cases, mothers often make the unfortunate mistake of feeding the child too much. Fearing lest it should be starved, they keep pouring in milk. The secretions, already out of order, get worse, and the milk, instead of being properly digested and assimilated, is either rejected in the form of curd, or the curd formed is passed onwards into the small intestine, where it excites irritation without being taken up and absorbed. Coagulation of the caseine, without subsequent solution, may persist perhaps for many days, sometimes for a week or more, each new portion of milk that is swallowed undergoing the same change. Thus, the intestinal canal, in every part of its course, becomes filled with firm white coagula, which, it will be noticed, constitute the greater part of every evacuation. After death from violent diarrhœa it is not uncommon to find the intestines even distended with coagulated and undigested curd.

Cases of diarrhœa in infants may often be relieved at the outset by small doses of Lime Water. A little may be mixed with the milk, in the proportion of a tablespoonful or less of lime water to half a pint of milk. Sometimes Potash Water answers better, and I have used Liquor Potassæ, in the proportion of twenty drops to half a pint of milk. You must not allow the child to take as much milk as it likes. For a day or two, half a pint of milk in the twenty-four hours will be sufficient. It must be obvious that, as long as the disturbed state of the bowels continues, it will be worse than useless to push food. Time must be allowed for the alimentary canal to become partially emptied of its irritating contents before fresh nourishment is introduced. If the child is at all low, it must be supported with small doses of brandy—from ten to twenty drops in a teaspoonful of water or milk and a little sugar, once in two hours. You cannot be too careful in watching cases of infantile diarrhœa, especially in weak children, for it sometimes happens that serious exhaustion comes on quite unexpectedly, and if you do not visit the patient every few hours, a sudden change may occur and the case be hopeless before you come to its assistance.

I have already drawn your attention to the fact that in these cases of diarrhœa bacteria often grow and multiply to an enormous extent in the casein clots. In many cases every part of the intestinal canal is pervaded by millions of these organisms, which grow and multiply in the altered secretions and food which are continually being poured into the stomach. The changes which ought to take place in the food prior to its absorption and conversion into healthy blood are consequently prevented. Children may, under these circumstances, die of inanition, although they have been but too liberally fed during the whole period of the illness. The food they are plied with merely serves to encourage

the growth of bacteria, and it actually undergoes changes which interfere with its digestion and absorption. If just at the right time you withhold food perhaps for a few hours only, everything may right itself; the irritating matters may themselves act a little on the bowels, and thus get pushed onwards by the contraction of the muscular coat of the intestine. Diarrhœa may come on and last for a few hours, or even for a day or two, and then the secretions return to their natural state. The child will be out of danger and soon be well again. In treating diarrhœa in children, particularly infants, you must take care that the child is kept warm. One of the principal causes of diarrhœa is cold: bathing in cold water, and exposure to cold and wet, will sometimes bring on diarrhœa even in adults.

You should be aware of the different characters of the stools in different forms of diarrhœa. If they are of the natural colour and odour, you may let the diarrhœa go on for a while, for it will probably do no harm, and will most likely stop without medicinal treatment. But if the stools should become much altered—if they should emit a sour smell, and the secretion should have the appearance of rice water, it will probably be necessary to check the discharge. For such evacuations, as well as those which are colourless or almost colourless, consist wholly or in great part of secretions poured out from the glands and from the vessels of the mucous membrane of the lower part of the small and of the large intestine. You will find in such evacuations much altered mucus, with numerous small cells (bioplasts) from the follicles as well as from the surface of the mucous membrane, chiefly of the colon. Not unfrequently you will find a little blood, but there may be more albumen than the quantity of blood will account for. If the increased formation of mucus continue for a considerable period of time, it is often associated with a serious change in the tissues of the mucous membrane itself. After such excessive action has gone on for several days or weeks, there may ensue an excoriated and almost lacerated state of a small portion of the surface of the mucous membrane. A sort of superficial ulcer results, from the surface of which perhaps blood will from time to time escape. By the continual drain of nutrient matter and general disturbance of the action of the bowel, a low state of health may soon be induced, which, with the local affection, may lead to the development of a very serious disease, not uncommon in many tropical climates, but happily rarely contracted here. The malady in question is Dysentery, but it is not included among "slight ailments."

Not unfrequently, however, in this climate the colon is the seat of great uneasiness, often amounting to actual pain. In many of these cases it is unquestionably the mucous membrane which is affected. The capillaries of a limited area become congested. The congestion

not unfrequently passes into ulceration, and we have an approach to that state of things which may under certain circumstances be soon followed by dysenteric symptoms. More commonly, if proper precautions be taken, the patient gets better before actual ulceration occurs. If we could see the mucous membrane in some of these cases, I have no doubt we should find it in the immediate situation of the painful spot, swollen, red, and exceedingly sensitive. Every time the muscular coat contracts, the dull pain changes in character and becomes severe. The affection may occur in any part of the colon, but I think the sigmoid flexure, the cæcum, and one or other end of the transverse colon are the situations to which the pain is usually referred; and, as regards frequency,—in the order in which I have named them. If small pieces of hardened fæces or the *débris* of food happen to be forced into contact with the spot, sudden attacks of exquisite pain, of a cutting or tearing character, may be experienced.

Not unusually the state of mucous membrane I have described persists for a considerable period of time. This condition may last for weeks, or even months, just as a portion of skin may be deranged by congested vessels, and chronic changes induced in the epithelium, and continue for a long period. Such morbid changes may be stopped by judicious interference, but they may not yield to remedial measures for some time. In the case of the colon, it is of the first importance not to allow anything of an irritating nature to pass along it—to restrain its action as far as possible—and to prevent the formation of wind, and the consequent irregular contraction of the muscular coat.

In some forms of diarrhœa, which are often spoken of as "bilious," you will notice a very peculiar alteration in the character of the stools, which are very dark coloured and not unfrequently may be fairly spoken of as black. Sometimes the colour is such as to suggest the idea that bile has passed down the intestine without undergoing the usual changes, and forms the chief constituent of the fæces. In some of these cases it is probable that bile accumulates for a considerable period in the gall bladder, until at last this viscus, having become considerably distended, suddenly expels its contents, which are discharged in such quantity that much passes almost unchanged.

You must be careful not to mistake the colour of the motions which is produced by many preparations of iron for that caused by blood. If a person takes iron, his motions will become almost black, owing to the action of the sulphuretted hydrogen of the alimentary canal producing a dark black compound with iron. Salts of bismuth and lead also impart to discharges from the bowel a peculiar dark colour. It is important to distinguish all these changes from those caused by the presence of blood, which is itself much changed in colour by the action of the intestinal gases and fluids which act upon it.

The *diet* is of the greatest importance in the management of all forms of diarrhœa. Little liquid should be swallowed while the purgation continues, and everything taken should for the time be tepid or cold, for hot things, and particularly hot liquids, seem to keep up the diarrhœa. Ordinary diet must be withheld for a time. The patient may live upon milk, thickened or not with flour, Indian corn, or lentil flour, arrowroot, sago, tapioca, or other bland, non-irritating starchy matter. Cream, pudding made with eggs, such as boiled batter, may be allowed, but anything containing hard particles that might get embedded in the mucous membrane or irritate any tender spot that may exist, must be avoided.

Treatment of Diarrhœa.—In all forms of diarrhœa, particularly where there is much abdominal pain, it will greatly contribute to the comfort and relief of the patient if you at once apply warmth to the external surface and recommend that he be kept in a warm room. He should lie down and rest, and if the attack be severe he should remain in bed. Cold unquestionably tends to keep up diarrhœa, and may in fact cause it. Cold also increases the sufferings of the patient. Hot fomentations to the stomach have been strongly recommended, and certainly afford relief. Various plans may be adopted. One of the simplest is to wring out flannels in very hot water, and have them quickly applied; or two or three thicknesses of dry flannel, held before a good fire until quite hot, may be preferred. The wet or dry flannels should be covered with a piece of oiled silk or mackintosh, which will prevent rapid cooling; or a large piece of spongio-piline, made moist with hot water, may be applied. A better plan is to procure at one of the shops where india-rubber things are sold a hot water bottle, made of good strong vulcanised india-rubber. It should be eight or nine inches by fifteen and covered with woollen material. In cases even of very severe griping pains, great relief will be afforded if the bottle containing hot water be placed close to the skin of the abdomen while the patient is lying on his side, and kept there for an hour or more. Those who are subject to troublesome attacks of diarrhœa should wear during winter and summer a good thick flannel belt made for the purpose.

There are many potent remedies for checking diarrhœa. We have alkalies, the action of which I have already referred to; then there are many astringents, certain metallic salts, acids, and sedatives. Astringents (*astringo*, I bind) are often given in diarrhœa, and unquestionably check it. Amongst these may be mentioned "*Krameria*," "*Kino*," "*Catechu*," "*Logwood*;" and several more are in general use. The value of many astringent remedies used in diarrhœa is perhaps, in great measure, due to the Tannin they contain, and this substance itself may be prescribed. It is a powerful astringent, and lessens transudation of

fluid through the walls of the vessels. The precise action of the Tannin is not fully understood. It may act directly upon the tissues themselves, and perhaps also alter the permeable or diffusible property of the fluids. At the same time no doubt it acts upon the afferent nerves distributed to the capillaries, and through these causes contraction of the muscular fibres of the small arteries. Thus their calibre is reduced, and the quantity of blood flowing to the capillaries lessened. Logwood, *Hæmatoxylon*, is much used in the treatment of ordinary diarrhœa. You may order the Infusion of Logwood, *Infusum Hæmatoxyli*, in doses varying according to the severity of the illness. You may begin with small doses, say from two drachms to half an ounce of the infusion once in three hours, and if the diarrhœa continues the dose should be increased to an ounce, and the remedy given more frequently. Of astringent tinctures like the Tincture of Catechu, *Tinctura Catechu*, the Tincture of Kino, *Tinctura Kino*, and the Tincture of Rhatany, *Tinctura Krameriæ*, you may prescribe from half a drachm or a drachm to three drachms in a mixture, and you may give this once in three hours, or if the diarrhœa is severe, once in two hours. Many practitioners order one of these astringent tinctures with chalk. Chalk Mixture, *Mistura Cretæ*, and the Aromatic Powder of Chalk, *Pulvis Cretæ Aromaticus*, are valuable remedies in ordinary cases of slight diarrhœa. If there is anything irritating the bowels, it must be removed, or the diarrhœa will continue. As I have already explained, p. 214, a purgative is necessary to expel the irritating matters before the diarrhœa will cease.

Next, with regard to the use of Opium.—If the diarrhœa has lasted for a considerable period of time, and the patient is becoming weak and exhausted, and you have reason to believe that instead of the bowels being filled with irritating matter, they are empty or nearly empty, the mucous membrane irritable and sore, with constant and irregular contractions of the muscular coat, giving rise to severe griping and excruciating pain, you will find Opium a most valuable remedy. In such cases small doses frequently repeated answer best. You may give five or ten drops of Laudanum in each dose of a mixture for an adult, half as much in the case of young people, but bear in mind that Opium must not be given in any form to young children. I prefer to give Opium in severe cases of diarrhœa in the solid form. A quarter of a grain of solid Opium, or half as much of the extract, *Extractum Opii*, for a dose. The composition of Dover's powder is known to most of you. Two grains will contain one-fifth of a grain of Opium. This quantity or more of Dover's powder, the compound Ipecacuanha powder, *Pulvis Ipecacuanhæ Compositus*, may be given in the form of a pill once in three or four hours if the diarrhœa persists. Or you may give the patent medicine Chlorodyne, which is so well known—perhaps too well known—to non-professional persons. Chlorodyne is a mixture

of many things, but it undoubtedly acts beneficially, and agrees with some persons who cannot take ordinary preparations of Opium. Many other remedies are frequently ordered, but I cannot refer to them in this place.

COMMON INTESTINAL WORMS.

I will here make a few remarks upon the important subject of intestinal worms, for some of these parasites are often the cause of slight ailments, and at many different periods of life. It is, however, during childhood that illnesses depending upon the irritation of intestinal worms are most commonly met with. The ailment may vary from a slight but almost constant uneasiness or pain in the stomach, occasioning or accompanied by irritability of temper, to a very serious disturbance of the nervous system characterised by attacks of convulsions and even unconsciousness—in fact, by the epileptic condition, a form of illness which cannot be regarded as slight, and classed under the head of slight ailments, although the affection almost always terminates in recovery.

The intestinal worms most commonly observed in children are called *Thread Worms* from their resemblance to small pieces of thread.

Oxyuris vermicularis.—The little *Thread Worms* are sometimes found in immense number in the fæces of children, and occasionally they trouble adults. The worms are male and female, the former being the smaller of the two. The female is seldom more than half-an-inch in length. They inhabit the lower part of the large bowel, and breed in immense numbers in the rectum. The eggs are oval, and are not more than the one five-hundredth of an inch in length in their longest dimensions. They are produced in countless multitudes, and can generally be demonstrated easily enough by microscopical examination of the matter passed by the bowel in cases in which thread worms have been observed.

Children suffering from thread worms are often fidgety, fractious, and excitable. They generally complain of itching about the anus, and not unfrequently the mucous membrane of the nose and of the lips is in an irritable condition. Sometimes there is diarrhœa and discomfort referred to the lower part of the abdomen.

In order to get rid of these minute pests you may begin with purgatives. A few doses of Castor-oil will often bring away hundreds of worms. Compound Jalap Powder, *Pulvis Jalapæ Compositus*, in doses of from five to twenty grains, according to age. Compound Scammony Powder, *Pulvis Scammonii Compositus*, is still more efficacious, but must be given with caution in the case of weak children in doses of from two to ten grains. But of all the remedies for the destruction of thread worms, bitter infusions are the most potent, and Quassia is, I

think, the best. An infusion of Quassia may be made by placing a tablespoonful of *Quassia* wood chips or shavings in a jug and pouring upon them about a pint of *Cold Water*. In an hour it may be strained. A child may take an ounce or more of the clear bitter infusion twice or three times a-day. But it is more efficacious to inject the infusion of Quassia into the rectum, and if common salt be added in the proportion of about a tablespoonful to a pint of the infusion it will act more efficiently. In bad cases about a quarter of a pint or more may be injected daily into the bowel with the aid of a little india-rubber ball syringe. If the worms are not very numerous, once or twice will be sufficient. Some cases will resist for a long time all the remedies that you may try, but if you continue to use the injections steadily the case will at length yield to treatment, though the patient may long have to exercise great care as regards diet if he would continue free from the troublesome parasites. The tendency manifested by the large bowel of some persons to favour the growth and multiplication of these little Ascarids is very remarkable and cannot be easily explained. I feel sure that in some cases which have been completely cured by treatment, a fresh importation of parasites into the intestines has taken place months afterwards. Other persons, and even members of the same family, eating the same food and living under similar conditions, pass through life without being once troubled by worms.

The large round worm, *Ascaris Lumbricoides*, is occasionally met with. The female is much larger than the male, and sometimes attains the length of twelve inches. It is of a pale brownish colour, round, about a quarter of an inch or more in thickness, and tapering off at each end to a thin rounded extremity. The male is only five inches long. These worms are seldom numerous, and usually not more than from two to four exist in one individual. They live in the small intestine, but often pass downwards and escape when the bowels act. Occasionally they make their way into the stomach, and are vomited or pass into the mouth or nose to the annoyance and perhaps terror of the patient.

Hundreds of thousands of eggs are formed and discharged by a single parasite. The eggs are oval, and about one three hundred and fiftieth of an inch in the longest diameter, and multitudes are sometimes found in the matter passed from the bowel by the patient, when subjected to microscopical examination. They may be seen by an inch or a half-inch object-glass.

One of the most potent remedies for the round worm (Ascaris Lumbricoides) is Santonin, the active principle of Santonica, which consists of the unexpanded flowers of some species of *Artemisia* or Wormwood. The dose of Santonin is two or three grains for a child, and double the quantity may be taken by an adult. *Santonica* is the

unexpanded flower heads as imported from Russia, from which the active principle Santonin, *Santoninum*, is obtained. The dose of the flower heads is from ten to fifty grains.

Tape worm.—Three kinds of tape worm are met with in England, the commonest of which is the Tænia Solium. Years ago many patients suffering from the presence of this worm used to come to the Hospital, but now we see very few cases.

Of all the remedies I used to try, the ethereal Oil of Male Fern was the most efficacious in expelling the whole of the worm, including the head. Out of about thirty cases which I carefully watched in 1851, when I was house physician to King's College Hospital, the head was expelled in six or seven. Some of the patients had been treated with kousso, and others with the oil of male fern. All the successful cases had been treated with the latter; indeed, although I have seen many treated with kousso, I never was successful in finding the head; the greater part of the worm, however, was invariably expelled. The oil of male fern is to be administered as follows:—two drachms to half an ounce, according to the age and strength of the patient, are suspended in eight ounces of water, with the aid of mucilage. After fasting for twenty-four hours (only a little water, or, at most, milk being allowed), the patient is made to take the draught early in the morning, and an hour or an hour and a half afterwards, a dose of castor oil is to be given. The worm is usually expelled in the course of the day. The fasting appears to be a very important part of the treatment, and it seems essential that the oil should be suspended in a large quantity of water. I have obtained many entire worms in this manner.

VERTIGO, GIDDINESS.

Vertigo, swimming in the head or giddiness, is an indication sometimes of disturbed action of the stomach and liver, and sometimes of deranged circulation and disturbed heart's action. But this symptom may also be due to affections of parts of the nerve structure of the brain or the small arteries which supply it. The exact seat of the lesion may vary, but in animals injury to the crus cerebri, as well as certain injuries to the cerebellum, are followed by vertigo, and at least in man the condition may be due to disease of the ear. For one case, however, of vertigo which is due to disease of the brain or its vessels, or of the ear, we shall meet with ten or more which depend upon temporary derangement of the digestive organs.

The giddy feeling after waltzing for too long a time, or turning round many times on one leg, is within the experience of most of us, and is a form of vertigo. You will find in some works on brain affections that vertigo is said to be one of the indications of serious cerebral disease.

If, however, a patient comes to you complaining of vertigo, do not at once shake your head and look grave, even if you have read records of cases in which it undoubtedly preceded some terrible organic disease of the brain or cerebellum, or was discovered to be due to some tumour or other incurable morbid growth ; for if you do give a dismal opinion you may afterwards discover that you have given a foolish one. You ought to know that this, like many other symptoms, may be due to a mere transient disturbance in connection with the circulation or of the nerves presiding over the calibre of vessels distributed to a very limited area of brain tissue. You must not forget that giddiness may be brought about by distal derangement, as well as by temporary or permanent local change. Temporary derangement of the stomach or liver, and probably very slight changes affecting both, will, as I have said, account for vertigo as it occurs in many cases which will come under your notice. There is a form of vertigo which is due to mere fancy or imagination. Having experienced the feeling of giddiness on one or two occasions, patients often fancy it is continually coming on. Violent attacks of coughing, especially in the case of weak persons, may occasion severe attacks of vertigo. Patients who have been ailing for some time, though not suffering from any definite malady, and those who have long been troubled with loss of appetite or impaired digestion, are frequently subjects of vertigo, and may often be cured by judicious management as regards diet and allowing a small quantity of wine or other stimulant, without any medicine. A little good soup at intervals of a few hours, and two or three glasses of Burgundy or port wine daily for a short time, may be ordered in such cases, and will often cure the giddiness and restore the general health in a week or two.

There are some persons who are very frequently troubled with a curious form of vertigo or giddiness, not arising from any organic lesion, or leading to any change which shortens life, or which may even seriously derange the health. In not a few instances vertigo is due to excessive nervousness. I have known highly nervous people of both sexes suffer from the most severe vertigo, preventing them from walking for many days, and for a time liable to come on if the head was only slightly raised from the pillow. Sometimes disturbed co-ordinating power of the muscles of the eyeball is accompanied by giddiness. Vertigo occurs in many cases of blood-poisoning and in some forms of fever. It may be brought on by sudden loss of a considerable quantity of blood, as from hæmorrhage, and it often occurs in anæmia. In some forms of epilepsy vertigo is a prominent symptom.

The whole subject of vertigo has been discussed by Dr. T. Grainger Stewart in three clinical lectures, which have been published in a separate form (Bell and Bradfute, 21, Bank Street, Edinburgh, 1884). In these lectures (p. 43) giddiness is considered as arising from :—

a. External conditions.
b. Changes in sensory structures.
c. Changes in conducting fibres.
d. Changes in central nervous system.
e. Dyspepsia.
f. Toxic causes.
g. Causes of uncertain seat.
h. Peripheral irritation.
i. Mental causes.

The word *vertigo* comes from *vertex* or *vortex*, a whirlwind, which is derived from *verto*, I turn. The sensation is sometimes described as a swimming in the head. Objects seem to be moving in a strange and irregular manner. Many cannot look from a great height downwards without feeling giddy. Vertigo may be brought on by taking certain substances. Opium will cause it, also Belladonna; alcohol causes it very commonly. Anyone who has seen a person a little tipsy knows how his power of co-ordinating the muscular movements of his body is impaired, and how he rolls about from one side to the other; and in consequence of feeling giddy is unable to walk in a straight line. Tobacco will also give rise to a form of vertigo, especially when it is brought into contact with nerves and nerve-centres which have not gradually become accustomed to its influence. A slight temporary failure in the force of the heart's action may cause marked giddiness, and the attacks may recur from time to time, causing much anxiety to the patient and his friends. A few doses of Sal Volatile or brandy will frequently relieve this form of vertigo. Only a teaspoonful or less of the stimulant is required, diluted with not more than double the quantity of water.

Peculiar disturbances in vision occur in many cases of vertigo. Things look crooked. Some see only a portion of an object. They can see the upper half without being able to see the lower half of a person, and so on. These disturbances of vision do not necessarily imply anything more severe than temporary functional disturbance, perhaps due to some irregular distribution of blood in the capillary vessels of parts of the central ganglia, consequent upon sudden alterations in calibre of the small arteries, caused by disturbed action of the nerve ganglia which regulate and preside over the action of the circular muscular fibres of these particular vessels. Such symptoms may mean, it is true, something far more serious, but in many cases they certainly depend upon no more grave or important changes than may be determined by taking a little more wine than is good. "Swimming in the head" is by many considered a form of vertigo. Persons who have been for some time over-anxious, or who have been overtaxing the mind or body, may suffer in this way. In the last case the unpleasant symptoms will

sometimes disappear ten minutes after taking a dose of Sal Volatile or an alcoholic stimulant. If, however, they do not do so, they will probably be relieved by a little attention to diet, and by a dose or two of Calomel or Blue Pill. The general health may afterwards be improved by taking a tonic containing acid and bark for a week or two.

Aural Vertigo.—Disease and injury to the semicircular canals of the ear may cause a feeling of giddiness and a tendency to fall, as well as vertiginous movements, the direction of which, forwards, backwards, or from side to side, is determined by the particular semicircular canal which is affected. Ménière, as long ago as 1861, directed attention to a class of cases in which noise in one ear—humming, buzzing, whistling, puffing—often associated with pallor, headache, faintness, giddiness, nausea and vomiting, occurred in connection with disease of the semicircular canals, or of other parts of the ear. The attacks at first are slight and occasional, but gradually the noises in the head increase in intensity and are almost constant. At last absolute deafness of the affected ear ensues, and in consequence of the nerve-structures being destroyed, the giddiness and other symptoms cease.

You will, however, meet with the symptoms above enumerated in cases in which there is no reason to suppose that organic disease of the ear or any other organ exists. The attacks, after recurring several times at intervals during many years, will at last cease, leaving the patient perfectly well. Some of these cases seem to belong to the category of sick headache, and the attacks will be relieved by a small dose of Calomel, Blue Pill, or Grey Powder, *Hydrargyrum cum Cretâ*. In such instances it is very probable that there is temporary disturbance of the circulation in the internal ear, as well as in other parts. Moreover, very nervous fanciful people will sometimes complain of the symptoms of Ménière's disease, but as they quite recover under the influence of tonics, good living, and change of air, it is more likely that the symptoms were due to slight and temporary nerve disturbance, rather than to definite morbid change affecting nerve or other tissue.

BILIOUSNESS.

It is difficult to adequately explain the various phenomena which constitute what is known as biliousness, although very many persons are well acquainted with the symptoms of the bilious condition, and have frequently experienced them. Whether there is congestion of the liver in all cases, I cannot tell, for I am glad to say that I never saw a *post-mortem* of anyone who had died during an attack of biliousness. Whatever may be the essential nature of the malady, it is not fatal. Nay, bilious people are for the most part long-lived. Some physicians who have experience in connection with life insurance business, so far from

objecting to take bilious people, are desirous of insuring them. In this opinion I fully concur. There is no doubt that a tendency to biliousness makes people very careful as to their mode of living. They know that if they exceed they will suffer. Bilious persons are often very fidgety about their diet, for if they eat too much a bilious attack usually comes on, and for a time they are completely unfit for ordinary work. Although biliousness is anything but an agreeable malady, nevertheless you may generally recommend bilious patients with confidence for various occupations in which endurance is required. The capacity for steadily going on for a long period of time is in truth often associated with a bilious habit of body. I fancy a very large share of the best work of the world is performed by the bilious. Such a tendency is frequently characterised by much energy and determination to work in spite of the derangement, and although there may be also some irritability of temper or despondency, there is frequently a very remarkable degree of patience, persistence, and resisting power.

Although I cannot give an accurate description of the pathological phenomena of biliousness, I may help you to form an idea of the sort of unpleasant sensations experienced by bilious people, if I describe in his own words the sufferings of a gentleman who had been bilious all his life, but who nevertheless managed to live to a very advanced age. My friend was a man who might have done great things and left his mark ; but I fear he lost much, and perhaps the world more, in consequence of his not being obliged to work. As in some other cases a fortune is after all a misfortune. He was, moreover, unwise enough to allow himself to get into that habit of thinking too much about slight physiological derangements which occurred in his own organism, and he gradually got into the bad habit of frequently talking to his friends about his aches and pains. Being rich, he was listened to, and further was spoilt by the sympathy and pity foolishly lavished upon him. As age advanced, the interest of his environment seemed to him to diminish, while the growls and grumblings, excited by sensations within himself, became so loud that at length he determined to seek professional consolation. He consulted the most celebrated physicians, but no one succeeded in curing his biliousness, or in teaching him to bear it patiently. He grievously troubled his family by his reiterated complaints, and by his persistent anxiety about himself. Though on occasions he felt pretty well for a day or two, during many years he failed to make himself contented or happy. Every kind of treatment was tried, but nothing cured the derangement, or averted the attacks. Blue Pill afforded some relief, and was the only remedy persisted in from first to last. All his tissues were probably sound, and I doubt whether there was any serious morbid change in any organs after more than ninety years of work. This gentleman was seen by me many times, and wrote

down for me a description of his sufferings. Here it is:—"Flatulence, distension of the bowels, and painful sensations between the shoulders, coldness of the feet, twinging pains occasionally under the right shoulder blade, nausea after eating. Muscular pain about the head and neck,—particularly the muscles at the back of the neck." The last is a very common symptom, and a very painful one in many cases of biliousness, and recurs in almost every attack. This old gentleman ate too much, and no wonder he was disturbed at night, and had to complain of "harassing and long distressing dreams." He also suffered, as very many old people do, from "irritation of the skin of the body generally, but of his legs principally, and from soreness and eruptions about the mouth, affecting chiefly the upper lip." Such was the long catalogue of recorded symptoms,—and the list by no means exhausts all this old gentleman's complaints. In nine cases out of ten many of the discomforts comprised in the phrase "bilious" are due to more food being taken than the organism requires in the time. One is often astonished at the very small quantity of food necessary to keep many persons of middle age or older in good health, and this small quantity of food is not incompatible with the discharge of a considerable amount of muscular work. Many such economical organisms, though they eat little, require an exceptional amount of sleep. Indeed there seems to be some connection between the proportion of food taken and the sleep required. And certainly many who have been noted for requiring little sleep have strong stomachs, and amongst such there have been some enormous eaters. In many "bilious" people the liver acts sluggishly, and more time is required for the blood to traverse the hepatic capillaries and to become properly depurated than they are inclined to allow. The consequence is slight derangement of hepatic action with the development of those disagreeable sensations they call "bilious." If too free living is persisted in, the condition gets worse and the chronic functional disturbance may gradually lead to the development of organic disease, which may, however, not become manifest in the shape of well-marked tissue degeneration for many years.

Some who suffer from biliousness differ from my old friend to whose case I have just adverted, and seem to alternate between a state of misery and despair and a state of comparative ease and comfort and even sanguine hopefulness. You will sometimes find a patient bilious and irritable and out of temper, and very indisposed to do what you may wish, unless indeed he may have sufficient self-command to overcome his natural bent. Another time you will find the same person in excellent spirits, ready to do anything for you, and as agreeable as possible. We often have very contradictory accounts of the same individual; one person tells us that he is a most disagreeable, cantankerous person, while another affirms him to be a most pleasant and excellent man.

The conflict of testimony is explained by the circumstance that one informant happened to see him when he was bilious, while the other came in contact with him just after he had recovered from an attack.

It seems curious that we should not be able to adequately explain such very prominent and persistent functional derangements as affect important organs in cases of biliousness, more especially as the condition is a common one, and has been often experienced by well-trained scientific and thoughtful members of our profession. But I have never been able to get, from any physicians with whom I have conversed or from any books I have read, what seems to me to be a clear and satisfactory account of the disturbance which occurs in an attack of biliousness, or of the actual changes which affect the action of the peccant organs during the prevalence of the attack. There is, however, no doubt that before and during the attack there is actual disturbance in the liver, and that whenever biliousness is experienced, the changes taking place in this organ, as well as in the stomach, differ in important particulars from those which occur under ordinary circumstances.

The liver is not concerned merely in the secretion of that fluid which we know as the bile, but it has to do with many other changes in the system. Among the most remarkable phenomena are its sugar- and fat-producing powers. It also effects great changes in albuminous matters and peptones, which have just been taken up by the vessels of the intestines and carried to it dissolved in the portal blood.

Concerning any slight derangements which the sugar-forming functions of the liver undergo from time to time we know comparatively little, but we do know that these functions may be so disturbed as to result in the establishment of a most serious change in the action of the organ, which, when once started, usually persists, and at length, at least in the case of the young, ends in death. In Diabetes, particularly as it occurs in the young, many ounces of sugar, or perhaps, more accurately speaking, of a substance easily convertible into sugar, are formed during each period of twenty-four hours. The kidneys are chiefly concerned in the removal of this sugar from the blood, although the tears and other secretions contain sugar when the diabetic state has been established. This formation of sugar, although varying in activity from time to time, and under the influence of remedies, cannot certainly be stopped. It continues in the great majority of well-marked cases occurring in the young, and gradually exhausts the patient, until, after a period varying from a few months to two or three years, death results. On the other hand, it may be confidently stated that, under certain conditions, the liver may be seriously deranged as regards its sugar-forming functions, not only without causing death, but even without apparently deranging the general health or nutrition of the patient. In old age it is not an uncommon thing to find a certain amount, and, occasionally, a

considerable quantity, of sugar in the urine. It would seem that, in old age, the sugar-forming action of the liver may be greatly in excess of what it is in the normal state, and although the sugar pervades the blood and is carried by it to the various tissues and organs of the body, it scarcely seems to disturb their action. At any rate, it may continue uninterruptedly for more than twenty years, and the patient may die at an advanced age of some other malady. Not only so, but any healthy person may for a time form considerable quantities of diabetic sugar, if he takes more than a moderate quantity of cane-sugar. A man who took a dose of a quarter of a pound of ordinary sugar passed diabetic sugar in his water for two or three days afterwards, but this temporary diabetic state is not to be induced so easily in every person. The liver is the organ by which the change is effected, and if you think over these facts you will, I think, agree with me in the conclusion that, in many slight derangements of the health, some other functions of the liver, instead of or as well as its bile-forming office, are at fault. The action of the liver-cells, in connection with their influence on the formation and transformation of fatty, albuminous, and amyloid matters must, therefore, not be lost sight of in our efforts to determine the causation of many slight derangements of the health which seem referable to the liver.

But as regards "biliousness," it seems to me that the yellow tinge of the conjunctiva so commonly observed, the alteration in the colour of the skin and its dryness, the disturbed action of the sebaceous glands, the sense of weight in the right side, the derangement of digestion—all point to the fat- and bile-forming operations of the liver-cells as being mainly at fault. This view is confirmed by the fact that medicines which correct the changes just referred to are those which unquestionably act upon the bile-forming process, and as soon as the action begins the patient who suffers from what is known as a bilious attack experiences relief. Some cases of severe biliousness approach so nearly to those cases of temporary jaundice which I shall presently speak of, that I am almost inclined to regard them as related to that condition. Possibly, it may be correct to consider biliousness a condition which initiates certain forms of jaundice. Biliousness may possibly depend upon an inactive state of the liver-cells, in consequence of which substances remain in the blood which ought to be separated from that fluid and converted into bile. The sluggish state of the circulation, the tendency to the accumulation of the blood in the capillaries and veins, as shown by the distension of the capillaries of the papillæ of the skin and the bleeding which takes place if they are divided, the formation or increase of hæmorrhoids, the turgid state of capillaries near slight scratches or wounds, and the indisposition of the latter to heal, indicate such disturbance of the capillary circulation generally as would result from the

accumulation in the blood of substances which ought to be thoroughly eliminated from the circulating fluid.

The Treatment of Biliousness.—The only medicine that relieves many bilious people is a small dose of some mercurial preparation. The old gentleman to whose case I have already referred, discovered that blue pill alone gave him ease, and dissipated for a time the unpleasant sensations from which he suffered, and which made him at times perfectly wretched. He took blue pill of his own accord, whether the doctors allowed it or not. For forty years he seldom went four days without the remedy. He tried over and over again to get out of the habit, and many advisers strongly recommended him to give up taking mercurials. He made many attempts, but in a short time his sufferings became so great, that at last he was obliged to return to his favourite remedy. He seldom, however, took more than a grain once in four or five days.

I do not mean to imply that you will cure every case of biliousness if you give mercurials, but certainly the great majority that come under your notice will be benefited. Many cases resist every effort to cure them, but it is the exception to meet with a sufferer who cannot be in some degree relieved by treatment. The bilious habit seems to be due to an unusually sensitive, irritable stomach and liver, which fairly discharge their functions in a moderate degree, but which cannot be made to perform more than this moderate amount of work, without getting much out of order; so that where you have to treat patients suffering from biliousness, you must be careful to give directions concerning diet, which should be very moderate, and lay stress upon the importance of great moderation.

Most of the organs taking part in the digestion and assimilation of the food seem to strike work when a decided bilious attack comes on. If food be taken, the suffering becomes greater. Moderate starvation is what is required in many cases. Bilious people often find advantage from giving their digestive organs partial rest for several days. In this way time is allowed for the return of the organs deranged to their normal state. The fact seems to be that the digestive organs require rest for a time, and if when an attack comes on this rest is given, the bilious state passes off, and then the patient feels extremely well, perhaps for a considerable time.

In general, you will find that those who are liable to bilious attacks require very little meat. Free meat eating will often bring on an attack. Generally, rich foods do not agree. Fatty matters in certain forms and in moderate proportion must be taken, but cooked and half-cooked fatty materials, as in many sauces, soups, fried fish and meats, are not suitable. Cream or much milk sometimes precipitates an attack. Most forms of alcohol, and any form in quantity, will generally disagree with

the patient. Vegetables and many fruits, particularly bananas, on the other hand, agree well. Vegetable acids seem to help the action of the liver and stomach. From half an ounce to an ounce of lemon juice with water or in linseed tea daily for a time is undoubtedly useful in many instances Cider and perry in moderation, that is, one or at most two tumblers daily, can be taken by some bilious persons. Citrates, Tartrates, Acetates may also be given. Light puddings composed of starchy matters of various kinds, such as rice, Indian corn, Sago, or Tapioca, made with milk and eggs in small quantity, and plenty of bread, may be enumerated among the articles of diet for the bilious. Generally, such persons are of necessity small eaters. Their organs rebel before it is possible to damage them by overwork, and so they seldom die of those diseases which cut short the life of so many who enjoy good living, and who possess strong digestive organs. Hence, as I have already remarked, the bilious often live to be old. When an attack comes on, benefit often results from the the use of mild purgatives. Effervescing Citrates of Potash, Lithia, Ammonio-citrate of Bismuth (Bishop's), and Tartrates also do good. Liquor Ammoniæ Acetatis and Muriate of Ammonia have been also prescribed with advantage in many cases. I have often recommended grapes, in quantities of half a pound a day, when they can be obtained. Many persons have been relieved by taking from six to ten tumblers of fluid in the course of twenty-four hours, for two or three days at a time. Ordinary soda water, or Brighton seltzer, or Apollinaris water, or distilled water with free carbonic acid in it, or Salutaris water may be ordered. The kidneys are in this way made to act very freely, and relief soon follows.

Of the deleterious action of the *east wind* upon the functional action of the liver there can be no doubt, but it is not easy to explain precisely how this results. That the dryness of the air and the constant wind are potent in interfering with the due action of the skin there can be no question, but these effects do not afford an adequate explanation of the facts, since persons shut up in rooms artificially heated and with the air supplied with watery vapour, nay people who have kept their beds, are often aware when the wind blows from the east. Northerly and westerly winds may be as cold and I think as dry as the east winds, without giving rise to those very unpleasant sensations experienced by the majority of the population who have passed their fourth decade, whenever the wind is in the east. As long as the wind blows from this quarter people suffer, but a few hours after a change has taken place they feel perfectly well both in body and mind, for, as is well known, the temper is often terribly ruffled by a dry east wind.

The *seaside* has the reputation of seriously impeding the action of the liver, and deservedly so, for we are assured by many persons that whenever they go to the sea for a week or more, the motions are in-

variably scanty and of a very pale yellow or of a gray colour. But what is very remarkable is this :—that for some time after their return from the sea the hepatic action of the same persons is unusually free. Although they may consume much less food than when they were away, the motions are more abundant and the fæcal matter properly formed. In these cases there is no doubt that there is increased formation of fæcal matter—that materials which had been accumulating for perhaps a fortnight previously are at length separated from the blood, and the patient in consequence feels greatly relieved and appears to be much improved in health.

Where the bilious state is very severe,—and in some cases it is so severe as to incapacitate people from performing any kind of work for the time,—you will often afford relief, and in a very short time, if you give a grain or two of blue pill or Calomel. Some who suffer from biliousness also experience violent headache at the time, and this symptom is also relieved by the blue pill or Calomel, and frequently in the course of a very few hours after the medicine has been taken. Indeed, some who suffer much, and who are generally speaking in anything but a good state of health, may yet be able to get through their work with the help of an occasional dose of a mercurial—from one to three grains of gray powder once in five or six days. I am not aware that any deleterious effects are produced by this practice in persons who suffer much from biliousness. Of course, it is not desirable for anyone to be continually taking mercurials, or any other drugs for that matter, but it is better to take mercurials now and then, than to be utterly incapacitated for one or two days out of every ten or twelve, as is the case with many who suffer from this most unpleasant ailment.

From some experiments performed by Dr. William Rutherford on the dog, it appears that several vegetable substances act as stimulants to the secretion of bile, and it has been inferred that they act upon man as well as upon the dog. Among the most important of these cholagogues, are Iridin, Baptistin, Juglandin, of each of which from two to four grains may be prescribed for a dose, Euonymin in doses of from one grain to two grains, and Phytolaccin, of which the dose is from one-eighth of a grain to a grain. These remedies are made by John Richardson and Co., of Leicester, who prepare them in the form of pills, "pearl-coated," and of several different strengths. Dr. Rutherford's observations will be found in the "British Medical Journal," Feb. 8th, 1879.

Jaundice is rather a common affection, particularly in summer. It may be due to many different causes, some of which are unimportant and transient, while others are serious and irremediable. The particular form of jaundice to which I am about to refer may with propriety be included under the head of "slight ailments." It is known as *ordinary* jaundice, and I dare say that perhaps thirty or more per cent.

of you have suffered from an attack of jaundice, or will do so before the age of twenty-five is passed.

The physiological changes in the system must needs be very much modified if the bile which is formed in such considerable quantity, instead of being poured into the intestines, is retained in the gall-bladder. It is probable that in every form of Jaundice the bile is formed by the liver but does not escape by its usual channel. Most commonly the Common Gall-Duct, *Ductus Communis Choledochus*, is plugged up; and the bile, which has been formed by the cells of the liver, and has passed into the gall-ducts, is obstructed in its further course towards the intestine. After accumulating to some extent in the ducts and in the gall-bladder, it would appear that it gradually makes its way through their coats and gains entrance to the lymphatics and veins which lie outside them, passing into and circulating with the blood. Tissues in all parts of the body become stained, and in some cases take a deep yellow colour. Textures both at the surface and in the interior of the body are thus tinted more or less intensely in cases of jaundice.

Not only so, but the excretion of the yellow colouring matter originally formed in the liver, and absorbed into the blood, is effected to some extent by the kidneys. Mucus, epithelial cells, casts, and even some crystals passed in the urine are tinged of a bright yellow colour, while the urine itself contains a good deal of yellow matter. Sometimes it appears of a dark green colour, owing to the quantity of bile it contains. So quickly in many instances is the bile removed from the blood by the kidneys that the urine is often stained with the characteristic yellow colour for some days before the skin acquires the slightest yellow tint. On the other hand, the secretions from the bowels will be found to lose the ordinary colour, and after the jaundice has lasted a short time they will be clay-coloured or colourless.

Whether the impediment which interferes with the passage of the bile into the intestine in these cases of temporary jaundice is due to firm spasmodic contraction of the muscular fibres which surround the lower part of the common gall-duct near its opening in the duodenum, or to the accumulation of mucus and epithelium in the same situation, thus plugging the duct, is not quite certain; but there can be no doubt that there is in all these cases an impediment to the onward flow of the bile, consequent upon some temporary obstruction, which after a period varying from a week to three months or even longer, gives way without any permanent change or derangement being induced. Patients suffering from temporary jaundice completely recover.

Now I desire to ask your careful attention to the fact that in these cases the jaundice is due not to the accumulation in the blood of substances out of which bile might be formed by the action of the liver-

cells, but to the passage into the blood of bile which has been already formed by the action of these hepatic elements, and has passed into the ducts.

As I have already said, the stools appear more or less like clay, or of very light brown colour, in consequence of the biliary matter not having passed into the intestines, where ordinarily it undergoes those complicated changes which take place in its resinous acids and colouring matter, and which end at last in the development of the peculiar chemical compounds which are constantly found in normal fæcal matter. Even in slight cases of jaundice the bowels are usually somewhat confined. The patient perhaps experiences slight nausea, with indisposition to take food. He gets thin. The nutrient matters he does take do not nourish him properly, and he feels weak and out of health. Some people suffering from jaundice are, however, able to do their work; and students have passed through a difficult examination although they were deeply jaundiced, but the proceeding was not a wise one.

You see, therefore, that a very large and important organ like the liver may be seriously deranged without the ordinary functions of the other organs of the body being very seriously disturbed. For a time at least we can get on not only without bile flowing into the intestine, but in spite of its distribution to all parts of the body. The patient may, notwithstanding this great change, be able to perform a certain considerable amount of work, and may be able to use his mind efficiently, although the whole of the blood distributed to his brain is contaminated with a considerable amount of biliary matter.

But, as I have remarked, you must bear in mind that from time to time cases of jaundice are met with which end, and very quickly too, most disastrously. It is a fact which must not be forgotten that some of these cases which may run on to a fatal termination in the course of two or three weeks cannot at their commencement be distinguished from that almost trivial form of jaundice of which I have spoken. Ordinary jaundice may last for a period varying from one week to three months. Probably the average time will be from two to three weeks. When it persists for more than a month, even though there be no grave symptoms, we feel some degree of anxiety lest the case should be due to more than a temporary obstruction of the duct. The longest case of ordinary temporary jaundice which has come under my own notice lasted for upwards of twelve weeks. For the whole of this time the patient, a young man of eighteen, was deeply jaundiced, and no decided improvement began to take place until three months had passed. In cases where the malady is so considerably prolonged beyond the average time, we may suppose that the plug of mucus or modified epithelium in the common duct is firmer than usual. At last, however, the mass,

having become softened, slowly escapes bit by bit from the orifice of the duct, and the organ gradually returns to its normal state.

That form of jaundice which is very fatal, and which may end quickly in death, is dependent upon serious damage to the secreting and other structures of the liver; indeed the liver-cells are often completely disintegrated and destroyed. As I said before, I do not know how we can distinguish the terribly serious from the slight ailment when the patient first becomes jaundiced. In the fatal form of jaundice, however, very grave symptoms are developed after the lapse of a few days, and we then become aware of the terrible disease with which we have to deal. But during the first few days of the attack it is, I believe, not possible in many instances to distinguish a case which will end fatally from a case which will terminate in recovery. I allude to this matter because it is really most important not to be over confident and offhand in forming a prognosis in this, and indeed in many other forms of disease. You may perhaps be called to see one of these fatal forms of jaundice, due to what has been called *acute yellow atrophy of the liver*, and if not aware of the existence of such cases, you might make a very sad mistake in informing the friends confidently that a necessarily fatal disease was only a slight ailment. We ought never to allow ourselves to make light of a malady which may turn out to be very serious indeed. Under such circumstances, we might be deservedly accused of want of care, experience, and knowledge, and regarded as advisers lacking discretion and wisdom, and wanting in power of discerning a most serious disorder, which destroys life in a short time. On the other hand, you must be careful not to needlessly frighten people by detailing all the possibilities of disaster in any given case. Happily these serious forms of jaundice are not common. In the course of a year we seldom see in the hospital more than one or two of them, and several years may pass without a single case being admitted.

Ordinary temporary jaundice may occur at any period of life, but it is most common between the ages of fifteen and twenty-four; and it is more frequently met with in males than in females. Whether it is that we are apt to exceed in diet more than the other sex at this period of life, or whether the way we live has anything to do with it, I cannot tell; possibly we may be more anxious and nervous about our work and examinations than female students; but it is certain that about adolescence jaundice in men is not at all uncommon.

Jaundice occurring in middle life and old age is not very likely to be of the kind referred to. More probably it will depend upon some more serious change than catarrh of the gall-ducts and the obstruction of the common duct by a plug of mucus. A very common cause of jaundice in middle life is a gall-stone impacted in the duct. Jaundice of this kind is usually associated with great, and not uncommonly sudden

excruciating pain, and its nature can often be at once detected. This form of disease can, however, hardly be included under the head of "slight ailments;" neither can the jaundice which depends upon hydatids, or that due to cancerous or other tumours pressing on the duct. You should be aware that jaundice may occur in very young children, and I have known cases in which it existed in intra-uterine life. It is not an uncommon thing for the child at birth to be completely jaundiced, but this usually is due to temporary change and soon passes off. I have seen one case in which life was destroyed at or about the eighth month of intra-uterine life by jaundice, caused by the impaction of a gall-stone in the common gall-duct. What is the earliest period of development at which the embryo may become affected I cannot say, but it is certain that some months before birth biliary calculi may be formed. Urinary calculi also may be produced even before the development of the kidney in which they are formed is perfected.

Treatment of temporary Jaundice.—With regard to the treatment of ordinary jaundice, there is little to be said. The main point to be borne in mind is that the patient should live on a light diet. Do not let him feed heavily, or he will get worse, and may suffer much. Keep the bowels gently acting by giving small doses of blue pill or gray powder at intervals of a few days. You may also, or instead, occasionally give a dose of some saline purgative. A drachm or two of Sulphate of Magnesia, *Magnesiæ Sulphas*, with a little Hydrochloric or Sulphuric Acid (p. 207), before breakfast, is of service in this condition, just to promote the action of the bowels. Do not, however, give violent purgatives or attempt to cure the disease offhand by any course of special treatment. A mustard poultice may be placed over the region of the liver every day, or every other day, for twenty minutes. Another local application which seems to be of use, and which I learnt from Dr. Blakiston, is Hydrochloric Acid applied on rags. The strong acid is diluted with twice its bulk of water. A rag is carefully wetted with the lotion, placed over the liver, and then covered with some useless rags or an old towel. This application may be used each alternate day, care being taken that the acid is not allowed to spoil any linen or the clothes of the patient. It produces only a little tingling. The skin should be wiped with a soft wet sponge when the rag is removed.

I come now to another malady, reference to which may perhaps raise a smile. It is, however, an extremely disagreeable ailment to endure, and it may entirely prevent, or seriously mar, the execution of mental and bodily work.

SICK HEADACHE.

This is, perhaps, one of the most severe of the maladies I have included under the head of slight ailments. The affection is common, and used to be known as Migraine. Some, who in other respects are

perfectly healthy persons, with apparently sound constitutions, and whose tissues generally would seem to be not only healthy but of an enduring character, suffer from very frequent attacks, and may be for many years hardly ever free from the malady. Nevertheless, sick headache is to be regarded as a very troublesome and inconvenient rather than as a dangerous derangement.

This curious disorder may affect people at every period of life. Some authorities assert with confidence that, as we grow older, we overcome the tendency to sick headache, but I am sorry to say I know some who have grown old, and many who are growing old, who still suffer. One sees cases of sick headache occasionally in very young children, frequently in young people and adults, and not uncommonly in old age. I know persons of seventy-five and upwards who continue to suffer from well-marked forms of this intractable malady. However, there is no doubt that the tendency of sick headache is to diminish in severity as age advances, so that many who are martyrs to frequent and severe attacks up to the age of twenty-five or thirty begin to improve after that period, and towards forty become troubled less frequently, or recover altogether. In others, the attacks become rare, but occur now and then, as long as life lasts.

Sick headache is a disease not dependent upon any actual pathological change, as far as can be at present ascertained. It seems to be due to some temporary but widely extended derangement, influencing a number of different tissues and organs situated at a distance from one another, through the influence of nerve-distribution and connections.

I shall endeavour to lay before you the several phenomena of which this malady is composed, and shall try to point out in what respects there is a departure from the normal and healthy action of the several organs and tissues involved. In the first place, as to the headache. This is peculiar, for it is usually confined to one-half or less of the head, *Hemicrania* (ἥμισυς, half, κρανίον, the head). A part of one lateral half of the upper part of the head is the seat of very severe pain, which is occasionally described as of a boring or penetrating character, and may be so circumscribed that the painful spot could be covered by the top of the thumb. Sometimes the pain is situated immediately over one brow, the sensation experienced being like that which would be produced if a sharp and strong instrument was being forced into the head at that particular spot. The pain, varying much in intensity and somewhat in character from time to time, may last for a period of from twelve to twenty-four hours, or even longer. It may then shift to the opposite side, and after lasting there for about twelve hours more, may gradually subside, until the patient becomes perfectly free from pain. In a short time he feels well and in good spirits, and perhaps for some days after the attack has subsided is exceptionally vigorous. From the

frequency of the occurrence of cases in which the pain is confined to the region above one or other brow, the condition has been called *Brow Ague*. The term ague is, however, unfortunate, for the affection is far removed from maladies belonging to that class.

Next, as regards nausea and vomiting, which frequently accompany this headache. The stomach derangement in sick headache is often very marked and very distressing; but these symptoms are often preceded by an almost irrepressible tendency to yawn at frequent intervals. There is a sensation apparently situated in the soft palate which almost makes the person yield, but as soon as he has yawned once, the desire returns, and this often lasts for some hours, or until vomiting occurs or sleep is induced. There is, as I have said, almost always more or less nausea, and not unfrequently absolute vomiting, the depression accompanying the sickness being sometimes of the most distressing character. It is often as bad as severe sea-sickness. I have known people to vomit fifteen or twenty times in the course of the day, although they were merely suffering from what is called sick headache. In this condition, then, we have temporary, but very decided and sometimes violent, disturbance of the digestive organs, inability to take food, nausea, and severe vomiting, associated with pain, more or less acute, on one side of, or it may be all over, the head. The vomiting is remarkable, for there is not merely straining and contraction of the stomach, followed by the rejection of its contents, but a great deal of secretion is poured into the stomach from the blood or from the glands, and after this has accumulated so as to distend the organ, it is suddenly expelled. It is in this way that many of those who suffer from sick headache get relief. After the removal of the contents of the stomach, which are often of an intensely acid reaction, the distressing nausea and sense of oppression and exhaustion become relieved for a time, but recur if more acid fluid is poured out. What is very remarkable in many of these cases is this: that food may be digested shortly before the vomiting is excited, when an enormous quantity of acid fluid from the stomach is brought up. There can be no doubt that in these cases much acid is formed in the stomach, or secreted by the glands. Indeed, at the very time food is being digested and passed onwards to the duodenum, there is evidence of the formation and accumulation in the stomach of other acids besides the ordinary acid of the gastric juice. Oxalic, butyric, acetic, valerianic, are among the organic acids which are developed, owing to some unusual chemical changes taking place in the contents of the stomach. It is the accumulation of this acid mixture which causes the nausea and painful sinking experienced at the pit of the stomach. The nausea remains until the contents of the stomach have been expelled. Vomiting may, of course, be encouraged by the administration of a medicinal emetic, by drinking several tumblers of warm water, or by

tickling the back of the fauces. The act of vomiting may be attended with instant relief. I have known cases in which the moment after the stomach had rejected its contents the pains ceased, and for a time at least the patient will be in comparative ease, or feels perfectly well.

In slight sick headache, as well as in more serious head affections, there is evidence of remarkable sympathy and association between the action of the brain and the stomach. The pain that we suffer in sick headache is not due merely to some affection of the cutaneous nerves of the skin of the head and face, as has been held by some, but there is clearly a temporary disturbance in the brain itself, probably in connection with the vessels at least of the surface of the gray matter of the convolutions, for not only does the pain seem to be situated in the brain, but the action of the cerebral elements is unmistakably disturbed. The memory is for the time impaired. Attention cannot be given without conscious and even painful effort. Sustained thought is impossible for the time, and there is a decided longing for mental rest, which, being yielded to, soon results in dozing, or in actual sleep. It might be thought that cerebral disturbance generally, at least when ushered in by functional or organic disease of the digestive organs, would be due to deranged action of the upper part of the alimentary canal only. The most remarkable phenomena undoubtedly point to stomach and duodenal disturbance, and we know that in many diseases of the brain the action of the stomach especially is disturbed—frequent and sudden vomiting being often present. The action of the stomach as every one has experienced is much influenced by the brain, and the latter by the stomach. Digestion may seriously derange cerebral action, and may in its turn be modified or completely interfered with by mental or emotional disturbance. This indeed is admitted, but in many forms of sick headache, the derangement is certainly more general than the consideration of the subject thus far would have perhaps led you to suppose, and it is doubtful whether the lower as well as the upper part, and in some cases exclusively the lower part, of the alimentary canal is not implicated in the attack. I shall presently refer to this point more particularly.

The disturbance of the nervous system in sick headache is so striking and widespread that some pathologists have been induced to place sick headache among nervous diseases, and to support the conclusion that the derangement not only begins in the nervous system, but that the affection is exclusively nervous. To me, however, it seems more probable, and the conclusion is partly grounded upon personal experience, that the nerve phenomena are second in the order of their occurrence, and that the starting point of the malady is abnormal functional disturbance of the liver, stomach, and large bowel, or of one of them, and through them of the blood itself.

That the blood is deranged in cases of sick headache is shown by several circumstances. It has been noticed that any slight wound or scratch on the surface of the skin looks angry, in consequence of the adjacent capillaries being distended with blood. The processes of healing and repair and the nourishment of tissues do not proceed as in perfect health. Another reason for concluding that the blood is more or less out of order, is that when the sick headache disappears very free action of excretory glands sets in. A considerable quantity of urine, often rich in urea and urates, and of high specific gravity, is voided, and this is succeeded by the free secretion of large quantities of pale urine containing a small proportion of solid matter. Gradually the ordinary actions in the several tissues and organs are resumed. Any patches of congestion on the surface disappear, and the capillary vessels are no longer distended. Could we see the viscera we should find that the veins which had been highly congested were no longer distended with blood.

The composition of the blood is also much altered during the attack by the free discharge of certain substances from it into the stomach. The gastric glands, instead of pouring out ordinary gastric juice to digest the food, secrete, and in considerable quantity, a fluid which instead of quietly acting upon the food, irritates the nerves distributed to the mucous membrane, and this results in vomiting. The fluid in the stomach is frequently highly acid, but as I have remarked, the acidity is due not to the normal acid but to a number of organic acids which are not to be found in health. Under these circumstances it is of course quite useless to introduce food into the stomach, for little or no digestion will take place. The stomach must be allowed to rest for a while until its contents are rejected, or have been by degrees driven downwards into the small intestine. It seems, then, probable that certain substances which yield these unusual chemical compounds after their discharge into the stomach have been accumulating in the blood for some time before the attack of sick headache results. Possibly the malady may be due to this accumulation of various matters in the blood, the "attack" being occasioned by their discharge into the stomach.

The salivary glands, the little labial and buccal glands, are also affected at the time of sick headache. Saliva is very sparingly secreted, and the mouth is often in a dry or clammy and uncomfortable state; the mucous membrane dries very quickly; there is often a very unpleasant taste, and instead of the mucous surface being soft and moist it seems to be besmeared with viscid mucus, and the patient will tell you his mouth is quite out of order. In many cases the action of the salivary glands is certainly suspended for a time, and when the attack is passing off, one of the first points noticed is the pouring out from the glands of a quantity of saliva into the mouth. With the return of

salivary secretion, the unpleasant sensations about the mouth, the dryness, the disagreeable taste, and the clamminess disappear.

The liver is always out of order in "sick headache." Its action in many cases seems indeed to be almost suspended for a time. The excrements are sometimes, but not invariably, pale and altered in consistence, and are sometimes very offensive. The intestine is not stimulated to perform its ordinary contractions, and in many cases flatus collects. Moreover the surface of the liver is sometimes tender to the touch. Not unfrequently there is a feeling of fulness or actual pain in the right side; and often there is a distinct yellowness of the skin and the conjunctiva. The liver is one of those glands which act irregularly: at least as regards the passage of its secretion into the intestinal canal, the greatest differences are observed. In some animals probably days pass without a flow of bile, and after a large meal the gall bladder and ducts may be completely and suddenly emptied. In man this variation in the secretion and discharge of bile exists, but as compared with carnivora to a moderate extent only. In some persons, however, it entails much, almost constant, discomfort, and even suffering, affecting not only the spirits, but being constantly associated with, if not actually causing, a particular, and to its possessor most undesirable, temperament. This was well known to the ancients.

Those who suffer from exceptional irregularity of hepatic action may, however, mitigate their misery by regulating their diet so as to suit their unfortunate condition. They must eat irregularly to be in accordance with their hepatic requirements, and they will find that to keep themselves in health, and out of that mental morbid state which renders life a burden and contentment an impossibility, they must acquire the habit of taking little meat, and that little not every day, while the amount of fluid (water) introduced in proportion to the solids taken must be considerable. Many of these unfortunates do not require more than two or three ounces of meat three times a week, while they may drink two quarts or more of fluid daily. After trying this diet experiment for a month such persons will be astonished at its success. They will be surprised to find they have gained in weight, although they may have reduced by one-half or more the quantity of food they have taken; and they will find this economy of no less advantage to their working powers and feelings than to their pocket. Such people are among the most economical of "machines," and unlike any other form of machine (of course within certain limits), the less they consume the more work is to be got out of them.

In sick headache the action of the alimentary canal is partially suspended, or the intestine may scarcely act at all. Its contents, in many instances, seem to remain almost still for a time during the attack, or are but very slowly urged towards the lower bowel. The action of the colon

is suspended. No accumulation of fæcal matter goes on during the attack, for at the time fæces are not being formed. In some cases of sick headache, I think, the derangement actually begins in the large intestine. Sometimes there is evidence of moderate, but not excessive, fæcal accumulation, with a passive state of the mucous membrane and its glands, and sluggishness of its muscular coat. The cæcum and ascending colon are very commonly at fault, and I have often succeeded in feeling the accumulation at this part of the bowel. The patient himself is frequently aware of some discomfort or unpleasant sensation in the right iliac fossa. By palpation you may detect the fulness, and by the tympanitic percussion over this part of the bowel you demonstrate the presence of gas, much of which probably arises from decomposition of materials which ought to have been expelled long before. It does not follow that actual constipation has prevailed, but the bowel has not completely emptied itself. For some time, perhaps for weeks and months, it has not driven down the fæcal matter towards the rectum as fast as it was formed. The lower part of the ileum, as well as the cæcum, is at fault in many instances. Probably Peyer's patches and the solitary glands do not act freely, and oftentimes their action is further disturbed by the constant presence of faulty secretion, and possibly of the products of fermentation and unusual chemical action, in the slowly moving and sometimes almost putrefying mass. The action of the glands themselves is then interfered with, and the uneasiness and pain which are sometimes experienced may be due to this cause. You must not forget these points, for they are of interest in connection with the causation of many derangements of the health, some of which are by no means slight. I believe that a prolonged, and perhaps almost constantly disturbed, action of this part of the alimentary canal leads to important changes in the blood, and may establish a state of system favourable to the development of important diseases of different kinds. Neither must it be forgotten that when materials remain for some time in contact with the mucous membrane of the large bowel, reabsorption occurs, and thus many noxious matters which ought to be discharged from the system find their way in an objectionable form into the blood.

You see, then, in sick headache there is evidence of very widespread but, at the same time, slight derangement in many organs and tissues of the body. There is general disturbance of the intestinal canal, alterations in the composition of the blood, and disturbed action of many parts of the nervous system. There are derangements of touch, perverted taste and smell, often disturbance connected with vision, and not unfrequently singing in the ears, giddiness, tremors, and other departures from the normal state as regards the action of the organ of hearing. The action of the heart is depressed. The capillary circulation is de-

ranged, there being too little blood in some parts—congestion in others. Digestion is much deranged, and the action of the liver and other secreting organs is seriously impaired for the time. The muscles do not work as they should do. Delicate movements cannot be executed with the usual precision, and sustained muscular effort is difficult or impossible. The body is fatigued. The memory is more or less affected for a time, and in many instances the temper becomes "bilious." To attempt brain work when you suffer from sick headache would be useless, for the mind will not work to any advantage. Sometimes there is a very distressing faintness and a feeling of terrible exhaustion; the heart's action being often very feeble for a time, and sometimes so very weak as to cause alarm. Rest in the recumbent posture for a few hours may be necessary, but generally the heart soon regains its usual power if let alone. Stimulants sometimes increase the stomach disturbance, and prolong the attack; but if the heart's action is very depressed, it may be desirable to administer ammonia or brandy in very small quantities at short intervals until the organ regains its natural strength, as indicated by the character and intensity of the heart's sounds.

When the attack of sick headache begins to pass off, urine, often loaded with deposits of Urates of Soda, Ammonia, and Lime, and of high specific gravity, is excreted. Then the kidneys begin to act freely, and the urine is of low density and pale, the bowels also act slowly, and in a few hours more the patient will feel well. It is remarkable that after all this disturbance in the system, the individual who has suffered should be for a time in better health than usual, and he may feel exceptionally well and vigorous. Indeed, you will find that many of the victims of this derangement have considerable powers of endurance, enabling them in a great many instances to work on energetically far into old age. Many who suffer severely, though not fit to work, by great effort may get through their duties, and perhaps during a long lifetime may not have been forced to absent themselves for a single day. As far as I know, no harm results from working on through a sick headache in cases in which this can be done, but, of course, certain kinds of work cannot possibly be executed under the circumstances. Attacks of sick headache may occur once a week and oftener, or the affection may recur not oftener than once in a fortnight, or once a month, or still less frequently. You will sometimes find that the suffering returns almost to the day, after a week or a fortnight, or other interval.

In spite of this almost continual disorder, the general phenomena of the system, essential to the continuance of life, proceed as usual. I think that some of those who suffer, and who take moderate care of themselves, really enjoy certain advantages as regards the prospect of longevity. Their tissues do not seem to grow old as fast as those of many of their more vigorous contemporaries. Periodical sick headaches

may after all be conservative in their action, and may protect the organism from more serious pathological derangements, thus perhaps enabling persons to live long who might under other circumstances die early. Although the digestive organs may be seriously wrong for a certain time, they get the advantage of resting from time to time for periods varying from twelve to twenty-four hours. If in the affected organism anything happens to be wrong in connection with the alimentary canal, the illness ensures time being allowed for the derangement to right itself, instead of actual morbid change being induced by the repetition and persistence of the disturbance. There appears to be hypersensitiveness in connection with the nerves of the digestive organs in many who suffer from sick headache, which, by favouring severe temporary disturbance of a functional character, may prevent damage and permanent structural changes in important tissues. Possibly this may be the reason why many people who suffer from sick headache not only live to be old, but retain their vigour in old age.

Some physicians have thought that an intimate relationship existed between sick headache and the epileptic state, but we meet with so many instances of each condition without the slightest indication of tendency to the other, that I cannot, without some further evidence, accept this opinion as correct. Undoubtedly you will now and then meet with a case which might seem to justify such an inference, but you will also come across cases which, considered alone, might suggest a relationship between epilepsy and many other forms of disease usually considered quite distinct. Indeed, there are few morbid conditions in which nerve derangement exists which might not be adduced as supporting the view of their affinity to the epileptic state. Hysteria, nightmare, waking up suddenly in the night and calling out, nocturnal expulsion of urine, twitchings occurring in the muscles, may all be regarded as belonging to the category of epileptic affections. But if I admitted this view to be probably correct, I should still be disposed to doubt whether any connection between sick headache and any form of the epileptic state had been proved to exist. Some cases that come under our notice would seem to justify the notion that, in certain instances attacks of sick headache take the place of attacks of gout, and that the two affections are related. But it must be admitted that there are many persons who suffer from sick headache who have no tendency to gout, while many who have gout hardly know what it is to suffer from headache of any kind. Nevertheless, there is reason to think that in both affections the blood is deranged, and possibly by the accumulation in it of nitrogenous materials which ought to be eliminated. Both affections come on at intervals, and often suddenly. Both are relieved by the same general treatment. Both are aggravated by a full meat diet, and mitigated by a diet largely composed of vegetables and fruit. In both

there is derangement of the liver, and Calomel and other remedies which act upon that and other excreting organs relieve those who suffer from gout as well as those who suffer from sick headache.

We cannot, I think, accept the generalization that sick headache belongs to the class of neuralgic affections;* for those who suffer from severe forms of neuralgia do not seem to be more susceptible of sick headache than other persons; nor, on the other hand, are the victims of sick headache unusually prone to neuralgic pains. I do not see what we gain by calling this, and many diseases in which nerves are affected, "neurosis," or by referring them to "nerve storms," for no one knows what he means by the phrase "nerve storm." Nor has the supposed connection between sick headache and ague, and maladies of that class been proved. There seems to be an alliance between many different diseases, but it is most difficult to do more than point out the connection in general terms. As time goes on I have no doubt that many affections which have received different names, and are now regarded as distinct diseases, will be shown to be much more closely related to one another than we should be led to suppose from the accounts given in our systematic works on medicine. For reasons to which I have already adverted, I should rather place ordinary sick headache under the head of derangements of the digestive organs than include it in the disorders of the nervous system. This question of the nature of the malady has an important practical bearing, for it must influence our views upon treatment. Now I think I may go so far as to commit myself to the opinion, that if the digestive system and the most important organs of excretion could be made to work properly, and could be kept working properly, the subjects of sick headache would be cured, and from the time when these results had been obtained would be free from attacks.

It appears to me probable, for reasons which I have set forth, that some material gradually accumulates in the blood, and by its deleterious action on the nerve-cells of the brain gives rise to the headache, and causes the inability to think, or at any rate renders it impossible to sustain connected thought for many minutes at a time. This inability to think is probably caused by an indirect action leading to dilatation of the capillaries of the pia mater and those in the superficial part of the gray matter of the convolutions. At the same time it is probable that the fluid effused from these vessels laden with noxious matters which ought to have been eliminated bathes the nerve-cells, and exerts a deleterious influence upon them. A small dose of Calomel within two hours, or even less time, completely alters the state of things—for the nausea, the headache, the misty confusion of intellect, all disappear. The kidneys soon begin to secrete actively, and in this way the blood is depurated. The stomach and the intestinal canal participate, and then the peccant

matter which has accumulated is removed and the healthy function restored.

Treatment of Sick Headache.—I believe we may often succeed by judicious management in reducing the number and severity of the attacks of this disorder. You must, in the first place, enquire very minutely into the general habits of the patient, and of course advise him to correct any irregularities he may have committed as regards quantity and quality of food and the times of taking it. To lay down a strict dietary is, however, useless—nay, it might be mischievous, and more harm than good result. Many doctors make themselves conspicuous and their patients miserable by the absurd importance they attach to severe restrictions as regards particular articles of diet. The victim of sick headache will not gain anything by feeding as if he were in prison, and exercising as if he were under sentence of penal servitude, or undergoing the "cure" at some strict German bathing establishment. You may cut off his beer, wine, and all things containing sugar; you may order him to take so many pieces of dry toast at breakfast without a particle of butter, and only allow him skimmed milk and lime-water to drink. You may limit him to a biscuit for lunch, and allow a small chop with bread pudding, made without any sugar, for dinner, and a cup of water arrowroot for supper, or no supper at all. You may make him walk so many measured miles, rise at a certain hour, and retire at a time when most people consider the hour for a little quiet reading or other harmless enjoyment has arrived—and all to no purpose. Nay, instead of getting better, he may have to tell you that he is worse, and feels less happy and contented than before, and less able to bear his suffering. Your advice as regards living should be considerate, but not too strict, for, in the first place, we do not know enough about the real nature of the malady to justify us in accurately and arbitrarily laying down the law as to exact diet systems: and secondly, experience has incontestably proved that persons who suffer from sick headache get on better upon the whole if they live fairly well, in the intervals, and starve for the short period during which they have to suffer. As regards wine it will be generally found that light wines, such as hock, suit the sufferers if they require stimulants at all; but many who suffer from the malady do not need any form of alcohol whatever.

There are many cases of sick headache that have resisted every attempt to cure them; indeed, it must be confessed that, up to this time, no certain method of "cure" has been discovered. While the headache lasts, and the action of the stomach and liver, and indeed of the secreting organs generally is suspended, even the most easily digestible substances do harm, and I know of no medicine that invariably affords relief to the patient.

Some of those who suffer from this unpleasant affection can tell

some days before the derangement begins that they are about to have an attack. There is an unpleasant taste in the mouth with a degree of dryness, particularly at the tip of the tongue, a feeling of distension or fulness over the stomach, sluggishness or inaction of the bowels, lassitude, and an indisposition to take active exercise, slight or considerable depression of spirits, and an inclination to sleep. The appetite may still be good, but there is often some degree of discomfort after taking food, an act frequently succeeded by a feeling of regret. Now if the patient, by whom the import of these premonitory symptoms is understood, takes two or three grains, or even a grain or less of Gray Powder, with a little Colocynth, and perhaps a saline draught the following morning, he may completely escape the impending attack. He may feel more or less out of sorts for a day or two, but he does not get the severe headache, and perhaps, also, escapes the sickness, though very likely he experiences a slight degree of nausea. This surely indicates that matters which had accumulated in the blood have been removed by the purgative, and have thus been prevented from exerting a deleterious influence on the nervous system culminating in headache, and causing other symptoms.

But what should be done in these cases? What methods of treatment afford the best chance of relieving the patient who actually suffers? If you cannot always cure him, you may do something to prolong the interval between the attacks, and to mitigate the severity of the symptoms when they occur. If the sick headache is not severe, persuade the patient to think as little about it as possible. Recommend him to go about his ordinary work, and tell him to try by his manner to prevent people from discovering that he is ill, for too much sympathy and kind inquiry may concentrate his attention upon the malady, and make him feel worse. If anything happens to annoy him he should keep quiet, and restrain himself from expressing any decided opinion until he is well, otherwise he may get the character of being a very ill-tempered or cantankerous person, when, in truth, he is nothing of the sort. It is his headache, not himself, that does the wrong.

1. *Treatment during an attack of Sick Headache.*

Rest.—During a severe attack of sick headache the patient, if this be possible, must have complete rest, so that the organs which are deranged may be allowed to gradually right themselves, and it must be borne in mind that the mind and the nervous system need repose as well as the stomach, liver, and other organs. When the suffering is very great, and particularly in cases in which there is that distressing feeling of nausea, and frequent or occasional attacks of actual vomiting, the patient must lie down. But one meets with many instances in

which if tolerably courageous he may continue his usual avocation in spite of the headache, and I am not aware that any one has discovered that by this plan the suffering was actually greater or lasted longer than when another is followed and the patient is advised to give way as soon as the headache comes on, and to lie down in a darkened room until the attack passes off. In bad cases, however, and especially if the patients are weak and in other respects out of health, absolute rest in the recumbent posture must be recommended from the commencement of each attack. There are not a few sufferers who are so very ill that they are obliged to lie quietly in bed for two or three days.

Starving in Sick Headache.—The patient who is suffering from an attack ought to starve for the time and thus rest the stomach until the attack passes off. It is very remarkable, as already observed, that many who suffer from this troublesome disorder are able to discharge even active duties without taking any food at all for perhaps twenty-four hours or longer, although if in ordinary health the same person fasted he would soon get faint if he attempted to do a very moderate amount of work. A person may rise with a sick headache and be quite unable to eat any breakfast, and yet may perform the ordinary duties of the day, and perhaps continue working up to nine or ten o'clock at night without having taken a particle of food, and yet without suffering, while the same man in his ordinary health might not be able to postpone breakfast for an hour without becoming faint and exhausted. This peculiar state in which abstinence from food does not occasion exhaustion may last for forty-eight hours, during which period not an ounce of solid matter may be taken, and yet it does not follow that the nutrition of the body will be in any way impaired, or the health damaged for any length of time. The patient will not lose in weight, because the organs soon resume their natural functions. When the appetite returns and the victim is able to eat again, plenty of nutrient material will be poured into the system and be rapidly appropriated. Abstention from food for twenty-four hours is usually long enough to allow the organs which are deranged to right themselves. But in any case during an attack of sick headache, it is not of the slightest use to attempt to force the patient to eat. Even bread and butter is apt to disagree. The starchy matter of the bread instead of being digested is apt to undergo other changes, and butter as well as other fats suffer decomposition, various organic acids being formed, which after a time irritate the stomach and cause it to reject its contents. Even meat is not digested, but if the patient feel exhausted a little cold beef tea may be absorbed, or beef tea which has been artificially half digested with the aid of pepsine, p. 170. If patients object to starve from the fear that they will get very weak, you may tell them to try a little mutton broth or beef tea, which should be entirely free from fat, and should be sipped. Of course, as far as any real

advantage is concerned they might just as well take nothing, for the little that is introduced under these circumstances cannot in any way help nutrition, although it may, on the other hand, somewhat interfere with the return of the stomach to its normal state. The fact is, that temporary abstinence from food, as above suggested, can do no harm whatever, and this course is necessary if the patient desires to gain his normal state of health in the shortest time possible, and with the least degree of suffering.

In considering the cogency of the ordinary scientific physiological objections that may be offered to starving for a day or two and to living on very little food (bread and butter, with perhaps a little cheese, or anchovy paste with water or tea for drink) one must carefully bear in mind the condition of system which follows a long illness. Perhaps for weeks a patient, always thin, has been living on beef tea or milk and stimulants, and during his convalescence his stomach is so sensitive that it will only bear liquid food. In many of such cases no doubt the heart's action is endangered from living too low for a considerable time, but the ordinary precautions against fainting and failure are usually effective, for in practice one very seldom meets with cases illustrating the failure in question, and though the patient is weak he steadily if slowly regains his former strength. It is not therefore likely that the degree of abstinence recommended will be productive of anything but good to those for whom it is recommended.

Warmth.—Exposure to cold often precipitates an attack of sick headache if one is about to come on. Indeed, many sufferers attribute the illness to the direct influence of cold. I have thought on some occasions that instead of catching an ordinary cold from undue exposure, I had contracted the greater, if less lasting suffering,—sick headache. Sick headache is certainly relieved by warmth. A warm bath sometimes removes the headache and almost always gives relief for the time. In slight attacks of sick headache complete relief may be obtained by putting the feet into hot water, or even by simply well warming them before a good fire. An ordinary hot-water bottle, or better a vulcanised india-rubber bottle filled with hot water and applied to the stomach, sometimes appear to be of use, and is at any rate very pleasant under the circumstances.

Counter-Irritation.—There is no doubt whatever that considerable temporary relief is afforded during an attack of sick headache by the employment of counter-irritants. A mustard plaster (half mustard and half linseed) to the back of the neck or to the pit of the stomach will relieve the pain, or half of one of Rigollot's mustard leaves, a piece of writing paper intervening between the mustard and the skin, may be applied in one or both situations; but one of the best applications to be used in these cases is described on p. 237. In recommending the

external application of strong Hydrochloric Acid, you must, however, always be very careful to give explicit directions, or you will get into disgrace in consequence of the destruction of bed clothes and the serious damage to wearing apparel.

Acids.—It is curious that in many cases in which acids are produced in undue proportion by decomposition of various materials in the stomach, there should be a natural desire for things having an acid taste. Many persons certainly experience a distinct longing for acid drinks, which undoubtedly afford relief in some cases. Lemon or Lime juice and water is very grateful to some, and seems to allay the distressing nausea often present.

Tea Drinking in Sick Headache.—Some persons sustain themselves during an attack of sick headache by drinking several cups of tolerably strong tea in the course of the day. The tea, which, however, should not be infused for more than three minutes, seems to keep them up, to mitigate the severity of the headache, and to relieve the nausea. Tea is condemned in the most emphatic manner by many members of the profession, but I cannot help thinking that the public forms a more correct estimate concerning the value of this celebrated infusion. I doubt whether it would be possible to persuade old women or old men, or even young men, as a class, to give up tea. The majority of people do not believe that tea does half the harm attributed to it, and with this opinion I am inclined to agree. If, however, you were ailing and were to consult many of the most distinguished members of the profession on the matter, you would almost certainly be enjoined to give up tea, whether the malady was dyspepsia, constipation, or sick headache, and, indeed, for many slight ailments the most important curative measure would seem to be to abstain from tea. Some practitioners express this opinion with amazing confidence and absolutism. Milk and water, or wine and water, are suggested as substitutes—substitutes for tea ! Your medical adviser fairly argues that something or other must be wrong, and infers that you take something that you ought not to take, that this something must be at the root of the evil, and then concludes, but not in my opinion with good reason, that the particular peccant matter is nothing less than *tea.* Now, it is almost hopeless to attempt to alter the views of those whose minds are "made up" upon such a matter as this, and, as regards the deleterious effects of tea, not a few medical minds will be found in this happy state. No one is to be allowed to say a good word for tea. Tea is held to be the almost universal cause of dyspepsia, and there is an end of the matter. But in spite of its condemnation, tea is at this time more largely drunk than ever. Probably more than two hundred million pounds of tea per annum are consumed in the United Kingdom alone, and if its influence is as bad as some assert it to be, it is wonderful how few people discover its

deleterious qualities. Seldom, I believe, does tea do the harm that has been attributed to it. In many cases of sick headache, four or five cups of good tea, at intervals during the day, will unquestionably mitigate the severity of a bad attack, and, perhaps, enable the sufferer to pursue his ordinary avocations in a way that he could not otherwise carry out. Strong coffee seems to suit some persons who cannot take tea.

Vomiting sometimes goes on for four and twenty hours, and sometimes for a longer period. The patient may be much exhausted, and the stomach become weak and very tender. Three or four days often pass before the patient regains his normal state of health and is again able to digest food.

My old friend Dr. Spender, of Bath, who for many years was himself a sufferer from this malady, makes the following remarks in the *British Medical Journal* for June 14th, 1844 :—

"I always felt particularly well on the day before an attack, and this generally warned me for an approach of the enemy. At bed-time, I took a very mild aperient of aloes and myrrh. It was most fatal to have a good night, *i.e.*, a long and deep slumber; and so my first preparation was to put off going to bed as long as possible, and if that ghostly thing rang, called the night-bell, I welcomed the peal as my truest friend. My invariable rule was to keep sleep at bay as much as possible, however tired I might be; an almost sleepless night would dash aside the coming headache. Only milk and porridge should be taken for supper; soup or meat is simply poison."

"When the sufferer awakes and feels that his misery is upon him, Dr. Beale's advice to starve should be absolutely obeyed. It is of no use to attempt to eat, for there is no appetite, and nothing would be digested. But that neurotic food named tea may be taken hot and strong, and at frequent intervals; strong coffee is sometimes better still, but it never did me so much good as tea. An amelioration of the headache and a return of the appetite were generally simultaneous. Another remedy, usually of great service, is the fomentation of the head with the hottest water that can be borne, and continued for at least ten minutes. I do not think that Dr. Latham's suggestion of cold applications to the head can be safe or useful. Rest and darkness are grand therapeutic means; but how can either be enjoyed by a professional man who has to work whether his head aches or not?"

"A few words about medicines. Dr. Latham esteems guarana more highly than Dr. Beale. On the morning of a headache, I prescribe half a drachm of powdered guarana to be taken with hot water every two hours for three doses; but if these do not afford almost immediate relief, it is useless to give more. Citrate of caffeine may do good when guarana fails. But I wish to lay special stress on the prophylactic

treatment of migraine. Before the days of chloral and the bromine salts, Indian hemp was much more in fashion than it is now; and I often recommended a dose of Indian hemp and of quinine to be taken every night during the intervals of the neuralgic attacks. It is doubtful whether any combination of more modern drugs promises better success; and we must remember that our aim is gradual alleviation rather than sudden cure. In several cases I have thought that hypophosphite of soda contributed to a patient's benefit."

Recovery after one of these headaches is almost like beginning a new life. From having been plunged into the depths of misery and despair, without the slightest alterations in any external conditions, the whole outlook is changed. Not only hope but ambition rises in the mind, which is more active than usual. New ideas and new schemes take possession of it. There is not only a feeling of content, but a longing to enter upon more work than usual, and often the patient will find that he can work with more effect than usual after a sick headache. Indeed, were it not for the conviction that more attacks of headache were in store, all sorts of ambitious projects would be started soon after recovery. How differently would the same suggestions be received, and the same circumstances be viewed, by the individual during an attack! Surely there can be no doubt that here we must look for the cause of the change in the individual himself, and not in the environment.

The most opposite methods of treatment have been recommended for "bilious attacks," for although the symptoms may not be very dissimilar, one class of cases is relieved by purgatives and remedies which increase excretion, another by wine, iron, and tonic remedies; and although authorities have given us very positive advice as to distinguishing the different classes of cases, in practice this will sometimes be found difficult, and now and then a mistake will be made. In most cases of sick headache no doubt a poison is generated in the system which causes the disturbance, while its oxidation and elimination by certain organs are followed by a return to the normal state of health.

2. *Treatment in the Intervals between the Attacks.*

Now, as to the treatment in the intervals between the attacks. After having tried many different systems of diet with the view of preventing attacks of sick headache, as I have already mentioned, I have come to the conclusion that, upon the whole, the best plan is to live pretty well, and not to be too fidgety as regards food. In one or two days after the attack has passed off, the stomach begins to digest, and in most cases it will readily digest the ordinary things taken in health. I do not think that a restrictive diet, of any kind, is of much advantage, and if the plan adopted lowers the general health, there is no doubt that the attacks of

sick headache will not only come on more frequently, but they will be more severe. I should say to those who suffer from this troublesome ailment :—"Live fairly well while you can, and when the sick headache comes on, entirely abstain from food for a time. As soon as the attack has passed off, live as usual, and think as little as possible of the malady." A great many persons are certainly *too* careful as regards diet, in sick headache as well as in many other slight ailments. I fear, too, it must be confessed that many doctors encourage this, and give minute directions as to food which are as unpractical as they are meaningless and useless. A parcel of very absolute rules are laid down for patients' guidance, many of which rest upon no principles whatever, and are but needless arbitrary enactments. If they were called upon to give their reasons for the rules they have made, arbitrary practitioners would find themselves in a very serious difficulty. Many of the very precise directions that have been given to people suffering from slight and not only slight ailments are really ridiculous. Even if some patients are a little silly, it is certainly not our duty to treat them as if they were utterly devoid of sense. Give reasonable and necessary directions as to diet by all means, and see that patients do not exceed in any way, but to write minute directions concerning the precise thickness of the bread and the exact quantity of butter, and to give written orders as to whether the toast is to be taken hot or cold, buttered or without butter, is nonsensical. Such trumpery fussiness will be condemned by all sensible patients. If people, who are merely dyspeptic or bilious or inclined to headache, are allowed to be too particular as to what they may or may not eat, they get very fidgety, and perhaps at last loathe almost all food. They soon lose considerably in weight, simply because they do not get food enough to sustain them. Such persons often get into a low hypochondriacal state, during which some real, and perhaps serious, illness may come on.

Many who suffer from sick headache discover, if they will only try the experiment, that they can eat pretty much as other people do, in the intervals between the attacks ; and if they can manage to eat fairly well, they will find that, instead of having a greater number of attacks, they escape with fewer. Most who suffer from sick headache require and can take but very little stimulant. Many are better without any stimulants whatever. Beer will often precipitate an attack, and wine generally disagrees. A teaspoonful of sherry, taken between meals, is sufficient to bring on an attack in one predisposed to the ailment. There are, however, exceptions to this, for I know some who find that a little sherry or beer, but at meals only, helps them in the intervals, and does not bring on an attack unless one happens to be imminent.

Sufferers from sick headache should do all they can to avoid worry. Peace of mind and freedom from anxiety are of course to be desired

for every one, but those prone to the malady we are considering should be doubly careful, and should avoid undertaking responsibilities likely to make them anxious. So also they should exercise as much self-control as possible, and endeavour not to give way to a feeling of restlessness and fussiness, which only increases the severity of the attacks which they have to suffer.

Many saline medicines, which increase secretion, seem to be useful to those who suffer from sick headache. Small doses of Nitrate of Potash, *Potassæ Nitras*, Bicarbonate of Potash, *Potassæ Bicarbonas*, the so-called effervescing Citrate of Magnesia, or *Liquor Ammoniæ Acetatis*, or *Liquor Potassæ Citratis*, may be ordered to be taken in a largely diluted state early in the morning before the breakfast, and the last thing at night for a week or two at a time. Or you may give half a tumbler of *Vichy Water*, or *Lithia Water*, or *German Seltzer Water* at the same times of the day, now and then, in the intervals between the attacks of sick headache.

Some bitter preparations also seem to be of use. You may give Infusion of Orange, *Infusum Aurantii*, or Infusion of Quassia, *Infusum Quassiæ*, or Quinine; or, as I have suggested before, you may try the effect of tea or coffee in somewhat larger quantities than they are usually taken.

A good deal has been said lately about Guarana. It is prescribed in powder, in doses of from ten to thirty grains twice or three times a day. Its active principle has also been extracted, and may be prescribed in doses of from one to three or four grains. I am indebted to Messrs. Savory and Moore for a specimen of Guaranine. It looks something like quinine, but is more flocculent. The taste, though bitter, is very unlike the taste of that substance. Messrs. Corbyn and Messrs. Probyn have prepared a Liquid Extract of Guarana, *Extractum Guaranæ liquidum*, the dose of which is from twenty to thirty minims. I am sorry to say that although benefit seems to have been derived by some, many have tried this remedy without gaining the hoped-for advantage from its use.

General treatment in the intervals of comparative good health must not be forgotten. Tonics of various kinds are often useful. You may give Quinine in one- or two-grain doses twice daily, about eleven and four o'clock, or Quinine Wine, or Tincture of Quinine. Various other bitter tonics and the mineral acids may be prescribed in many cases with advantage. The above remedies must, however, be withheld as soon as the headache begins and while it lasts.

When you desire to give powders, such as quinine or guaiacum, you should recommend your patients to procure *cachets*, which are little gelatine boxes made in two pieces, in which the powder may be enclosed and easily swallowed. These may be obtained in four sizes of most

chemists, and by using them the most nauseous powders may be taken as easily as pills.

If the patient suffers from constipated bowels, you must give mild purgatives, and if the various excreting glands do not sufficiently freely perform their work, you must prescribe those remedies which act upon the liver, kidneys, or other organs at fault. Whether Calomel should be given now and then is a point upon which there is much difference of opinion. Some patients undoubtedly derive the greatest benefit from small doses of this drug. From the sixth of a grain to two or three grains, taken at intervals of three or four days, is, as I have before remarked, treatment which really deserves in certain cases to be called curative. There are, however, a few persons who cannot take Calomel. If you give half a grain or even less, the salivary glands will begin to act within three or four hours, and will soon secrete violently. The saliva flows from the mouth, the tongue and cheeks swell, the teeth become loose, and the patient is in too much pain to take food, and is too ill to digest it properly if he could take it. You must be aware of this extraordinary susceptibility to the action of Mercury, and do not order it if the patient or friends assure you that invariably it has this effect. Sometimes Calomel seems to weaken patients terribly. Even small doses may purge too much, and harm, instead of good, may result from the drug. On the other hand, I can assure you that the confident unqualified condemnation of mercurials that has lately been so fashionable rests on no foundation of fact. It is one of those fads or fancies which, being acted upon, are ever interfering with our usefulness to the sick. Here and there you find a person who cannot take Calomel, but it is easy to bring forward instances where persons having found out for themselves the value of mercury, have taken it almost daily for thirty or forty years, not only without suffering, but, from their own account, with great benefit. Indeed, some will tell you that they cannot get on without an occasional small dose. Many Mercury-takers have lived to be very old. I could give instances of life being prolonged beyond eighty-four years, although one or two grains of Blue Pill had been taken every fourth or fifth day for forty years. I have been told by people that they had been distinctly warned by their medical adviser upon no account to take Calomel, on the ground that if they did take the drug, it would almost kill them, or would at least provoke some serious and lasting injury to tissues and organs, and damage the constitution. Such assertions belong to the class of arbitrary utterances which so many patients love. It is a fact, as I have told you before, that Calomel enters into the composition of many powders which have a great reputation for exerting a soothing effect upon irritable children, and which are given even to young infants for the sake of improving the temper. It is wrong for practitioners to lay down the law against the

use of such a remedy as Mercury. The public are sufficiently capricious to make it difficult to advise them for the best, and it is very injudicious on the part of a skilled practitioner to encourage fancies and prejudices. Calomel, by helping the action of the stomach and liver, restores digestion, and even an infant will soon regain its good humour after a small dose. Adults experience a pleasant sensation if digestion goes on quietly and effectually; while, on the other hand, if the digestive process is interfered with, the most amiable persons will sometimes find it difficult to keep themselves in that desirable state. If they do not feel out of temper, they probably experience despondency and feel melancholy and utterly out of heart, a mental state which may last for a considerable time if nothing is done, but which may in many cases be cured by half a grain of Gray Powder.

So far the reputed substitutes for mercurials which I have tried have not succeeded as I could wish, but I have perhaps not tried them in a sufficient number of cases of sick headache and other maladies in which the liver is at fault to form a definite conclusion.

3. *Of the Management of Sick Headache when the Patient continues to work.*

The following plan has been found to answer in several instances in mitigating the severity of the attack while the patient continued his usual avocation. The victim may become conscious of the attack as soon as he wakes in the morning, and instead of attempting to eat any breakfast, he should take only a cup of rather strong tea. In the commencement there is a feeling of weakness and lassitude, often accompanied by giddiness, but the patient can nevertheless walk about, and so far from feeling exhausted, as he certainly would do if under ordinary circumstances he was deprived of the first and, with some, most important meal in the day, he will very probably not feel the slightest demand for food. In an hour or two he may take another cup of tea, and the dose may be repeated at intervals through the day. A little milk and sugar may be allowed, but probably the simple infusion of a good tea, taken warm, would be best.

In this way the patient may get through his work, with difficulty no doubt, and perhaps he may feel somewhat miserable; but the time passes more quickly than if he were lying down and contemplating his pain. Towards evening in many cases the discomfort becomes less, a sensation of emptiness, not difficult to bear, is experienced, and this is gradually followed by an actual desire for food. But the most striking change which sets in about this time, and which is an invariable indication of a favourable turn in the progress of the malady, is the free secretion of urine, after the action of the kidneys has been nearly

suspended for four-and-twenty or forty-eight hours or more. At first a small quantity of very acid urine, of high specific gravity, makes its appearance in the bladder, but this is soon followed by a very free secretion of pale urine of low density, and great relief of all the distressing symptoms is at once experienced. The stomach will now bear a little light food. The large bowel begins to resume its function, and next morning the patient will probably wake up, feeling nearly well. If, however, the headache still troubles him when he rises, it usually passes quite away during the day.

It is true that in many cases the attack is often more severe and its duration longer than I have indicated, but the general plan of treatment suggested should be the same—complete abstinence from solid food, the administration of tea, coffee, or even plain water, at intervals of two or three hours, until the headache nearly ceases and the nausea disappears. Some people like warm water flavoured with lemon-juice, and you may add with advantage Supertartrate, or Nitrate, or Citrate of Potash, or some other salt known to act as a diuretic. Bishop's granular effervescing Citrate of Caffeine is useful in some cases of sick headache.

It would appear that during the attack of headache most of the secreting organs of the body, and notably the liver, strike work. It is useless to try to violently and immediately excite them to action, for you would do harm by such attempts. You must wait for a few hours, and as soon as you see the slightest tendency of a return to activity, I believe you may be of use in hastening the return to convalescence and thus save time. A free flow of urine I am sure is advantageous, and lemon-juice, nitre, with plenty of water, will often effect this object. Purgatives do harm if given too soon, and I have not been satisfied as to the advantage derived from many other remedies that have been warmly recommended during the attack. Neither warm baths nor cold baths seem to be of use; and with the exception of tea or water flavoured with lemon-juice, with perhaps some simple saline diuretic, the less introduced into the stomach during the twenty-four or thirty hours of suffering the better. Let me press upon your notice the inference that sick headache is not an unmixed evil. The condition has its advantageous side, for he who is subject to the malady generally finds no difficulty in keeping temperate, and the delicacies of the table are to him scarcely a temptation. Thus he is less likely to suffer from early failure and degeneration of important organs than many apparently healthy persons who may overwork them and subject them to undue strain.

Lastly, we must bear in mind that in certain cases, although the symptoms generally may lead the practitioner to conclude that he has to treat a case of sick headache due to functional disturbance only, the condition may be much more serious, and be caused by organic disease.

Moreover, the sickness so common in sick headache is a prominent symptom in very grave cases of cerebral disease, but I must not attempt to treat of the diagnosis of different forms of headache, and must now content myself with pressing upon your attention the necessity for great care in diagnosis, so as to reduce as far as possible the chance of mistaking for a slight ailment a case of very serious disease of the brain or its membranes.

DROWSINESS.

Patients sometimes come to consult us in consequence of a persistent sleepy state. They will tell you that they feel as if they could sleep all day as well as all night. If they sit on a chair for a few minutes, they begin to nod and soon drop off to sleep; if they take up a book or a paper, it soon falls from their hands in consequence of an irresistible drowsiness. If they go out for a walk, they soon begin to experience a strong inclination to lie down and yield themselves up to sleep. Patients who suffer in this way sometimes come for help to their medical adviser. They may feel pretty well, and in good health, with the exception of this irrepressible drowsy feeling, and they ask you what they can do to get rid of a tendency so very troublesome and inconvenient.

In many cases the drowsy state seems to depend upon some imperfect action of the digestive organs. Sometimes it may be traced to overfeeding. Sometimes to taking too large a meal in the middle of the day. Sometimes beer or a too liberal allowance of wine seems to be the cause of it. If you give mild purgatives and mineral acids before meals, and saline medicines which act upon the intestinal canal, you will often succeed in curing the patient. When the liver is in fault, as is not unfrequently the case, you will find the advantage of giving a small dose of Calomel, Blue Pill, or Gray Powder (from one to two grains will be sufficient) every third or fourth night for three or four courses.

Cold bathing is often useful. As soon as the patient rises in the morning he may have a cold shower-bath. There is no need of a large quantity of water. A shower-bath of two or three pints will be sufficient. If the drowsiness is very troublesome, two moderate shower-baths a day may be tried—one at about eleven, the other at four o'clock—cold or tepid, according to the time of year. In some cases, in addition to the cold bathing, a mild purgative every night for a week will be found useful.

WAKEFULNESS AND RESTLESSNESS.

A condition the very opposite of drowsiness afflicts some patients. They come to you complaining that they cannot sit still or quietly rest for a time. They experience a strong desire to be continually walking

about. They cannot stay for long in one place, and do not feel satisfied unless they get constant change of scene. You inquire if there is any cause for this restlessness, and, as a rule, the invalid assures you that, although everything is going on in its usual way, he cannot feel satisfied, quiescent, or composed. Sometimes vague frights harass the patient. When he goes to bed at night, instead of dropping off to sleep in a natural way, he lies tossing about. The pillow seems uncomfortable, and soon gets too warm for the head. A very miserable night is passed, and the patient only gets a little sleep towards morning, and perhaps wakes up feeling tired, exhausted, and unrefreshed. The mental disturbance in these cases depends upon some temporary derangement which cannot be accurately defined. If upon inquiry you learn that the restless state has existed for a considerable period, you must induce the patient to thoroughly change his mode of life. If he is in business, recommend him to get away and take a holiday for a time. Send him to some place where he will get complete change of scene for a month or more. The diet must at the same time be carefully regulated, and in all probability the patient will return home well, and able to go on with his daily round of duty just as steadily as he did before the illness commenced.

Persons who suffer from wakefulness are often ordered to take Chloral, and after finding out the efficacy of the remedy, some very imprudently continue its use without consulting their medical adviser. In a short time they discover that they cannot sleep at all without the drug, and at last they become complete slaves to its use. It has happened that from want of due care an overdose has been taken and death has resulted. It is important to caution all persons for whom you prescribe Chloral, never to take this drug unless it is specially ordered for them. More dangerous even than Chloral-taking is the hypodermic injection of narcotics, and it seems to me that this method ought never to be employed in cases of occasional wakefulness, and I think that in all cases the rule should be observed of never leaving the syringe and morphia solution in the patient's custody, nor should anyone be allowed to perform the operation for you. In those cases only in which owing to chronic incurable disease, accompanied by constant severe pain, the unfortunate patient can get no sleep or peace without the aid of morphia, and only very exceptionally, should this rule be relaxed, and non-professional persons permitted to inject the narcotic.

Patients oftentimes complain of feeling tired and exhausted as well as restless, and sometimes they will tell you that they cannot walk half a mile in consequence of being muscularly weak. You must carefully inquire into the state of the various organs of the body, and suggest what you can to rectify the action of any which may not be working properly. Generally, you will do well to send such patients for

a moderate tour in a pleasant part of the country, where they can see a good deal without walking very far. You must particularly caution them against over-fatigue. Many persons suffering from this or other conditions requiring change, are advised to take a walking tour in Switzerland or the Tyrol. So they go with all despatch, and having arrived at their destination, begin their pedestrian cure. Not having been accustomed to much exertion for many years, they set to work and, perhaps, walk twenty miles or more a day. Instead of feeling better, and gaining strength, they soon feel terribly tired and exhausted, and return home in every respect worse than when they set out. Such an expedition, under the circumstances, is a mistake. You must strongly impress upon such patients that they are not to walk more than a mile at first, and if they are tired, they are to sit down; or better lie down on the sofa and read a novel, or otherwise amuse themselves. They should, as we say, moon about, or potter about in the open air several hours daily, without taking any active exercise. In this way, most sufferers will soon begin to improve, and when this is the case they may by degrees extend their daily walk until they are restored to health.

NERVOUSNESS.

There is another condition, which is usually called "nervousness." In this state there can be no doubt that the mind is in some degree temporarily affected. There may be undue emotional excitement. The least thing may arouse fear or dread, but instead of the nervous excited state impelling the patient to be more active in his work, he finds it almost impossible for him to discharge his ordinary duties. A large proportion of the population seems never to have experienced anything approaching to nervousness, but some people suffer from it in a terrible degree. I have been told by patients, that for some time they had been conscious of an indescribable anxiety, for which they could not account, and from which by no reasoning with themselves, could they get relief. They know and acknowledge that there is no reason for anxiety; but nevertheless a sort of ill-defined dread seems to hang over them. They fear that something or other is about to happen, and this most painful state of mental disturbance sometimes lasts for a considerable time, causing the patient great suffering. With this state is frequently associated considerable depression of spirits. The subject of it feels as if everything was going wrong with him. He may be getting on just as well and making quite as much or even more money than usual, but nevertheless feels discontented and depressed, as if something terrible had happened. Such patients often make themselves needlessly wretched by fancying they have received slights at the hands of friends. A quite unintentional oversight is magnified by them until it appears to them a

studied insult. People who suffer in this way sometimes tell you that they are certainly going to the workhouse, and all this sort of thing, although they know themselves to be prospering. If a patient in this state of health should happen to lose a few shillings, he will feel quite convinced that everything is going to the dogs, and nothing will persuade him to give up the despairing views of life which have somehow arisen in his mind.

Some who suffer from nervousness, and experience a restless, unsettled state of mind, occasionally do very curious things. A man may wake up suddenly in the middle of the night and with the conviction he smells fire. He jumps out of bed, strikes a light, goes over the house, finds nothing the matter, and goes to bed again. In another hour or two, perhaps, he wakes up a second time, and goes through the same proceedings as before. Many people whose nervous system is a little overwrought wake up at night, jump up, and perhaps light a candle before they are quite aware of what they are doing. A further development of the same tendency may lead to sleep-walking, of which condition again there are many different degrees. Children of highly nervous temperament are likely to suffer from attacks of chorea. These and many more severe functional disturbances of the nervous system seem to depend upon a highly sensitive or excitable state of certain parts of the central nerve organs—perhaps inherited, but at any rate not due to structural change. The nervous state is often associated with a special type of organism, and frequently it will be found that cardiac disease, affecting either the mitral or aortic orifice, or both, also exists, or if not is likely to be developed before the period of adolescence.

Sometimes an unusually restless and excitable state of the nervous system temporarily seizes upon people, and may come on at almost any period of life. But all the trouble experienced by the unfortunate patient may be due merely to disturbed action of the liver. The circulation becomes slow in the vessels of the gland, and many of the impurities which ought to have been separated from the blood remain and cause disturbance in the action of the brain. The patient who has suffered for long should be advised to visit friends, or take a holiday abroad. You should urge him to leave for a time his ordinary avocations, and very likely in a few weeks he will recover from his nervousness, and his digestive organs and liver will act better. Upon careful enquiry, you will find that many who suffer in this way have been long in the habit of taking too little sleep. There is hardly anything in which individuals more widely differ from one another than in the time required for sleep. Some can do with six or seven hours, but it is quite certain that many require nine hours. Nervous people, as a rule, are benefited by a long night's rest now and then, and ordinarily require an average of eight or nine hours.

Of late years, very much has been written on the subject of nervousness, and attempts have been made to show that we are much more "nervous" than our fathers were. It seems to me that the evidence adduced in favour of the statement is, to say the least, very far-fetched. The so-called brainworkers are supposed to be great sufferers. It is said that people are more sensitive to heat and cold, and require to live in rooms more highly heated than was the case even a few years ago. It must, however, be borne in mind, that a far greater number of the existing population are able to have the advantage of warm rooms in cold weather than formerly, and in consequence the majority enjoy better health, and live to be older. That large incomes engender a good deal of fussiness, and little aches and pains which are made too much of is, I dare say, true, and if this is "nervousness," an increase no doubt exists, and such "nervousness" will increase as prosperity increases. I cannot help thinking that if our fathers had been as prosperous as we are, as large a percentage would have suffered from "nervousness." However this may be, it is quite certain that if our modern habits and systems are productive of increased nervousness, they are at the same time upon the whole conducive to health and longevity. There is no doubt whatever that the general health of the population has improved, and is improving, that the average duration of life is on the increase, and, if the sum of human happiness is not much greater every succeeding decade, it ought to be so, and the fault lies in the circumstance that individual evil inclinations are capable of counteracting the natural influence of highly advantageous external conditions. Upon the whole, I doubt very much whether there is anything to justify many of the statements made about the increase of nervous disorders. Whenever money is made rapidly, luxury and folly will increase, but the silly rich constitute but a very small, and after all a comparatively unimportant part of the population—so that in the life of a country like England their existence is hardly noted, except by themselves and the few whose interest leads them to minister to their requirements, and to pander to their caprices.

Dr. G. M. Beard, of New York, has lately called attention to the increase of nervousness in the United States, but I think his remarks can only apply to a small fraction of the population of some of the large cities. This author seems to think very much of pork as a food, and to have formed a low estimate of those whose stomachs are not strong enough to digest it. The dethronement of pork, says Dr. Beard, is having a disastrous effect upon the American people—"Pork, like the Indian, flies before civilization." Really it seems very hard that people who cannot digest pork should be put down as unduly nervous, over-sensitive, and the like, and be accused of undergoing deterioration and decay. I have no doubt that the American nation will survive and

increase in numbers and in vigour, "the dethronement of pork" notwithstanding.

Dr. Beard also tells us that there is increased sensitiveness to cold and heat among the people in these days, but he forgets that many who indulge in very warm rooms bear extreme cold better than those who cannot enjoy well warmed houses.

As regards the effects of overworking the brain in the case of the young, while it may be admitted that, now and then, instances of mental strain are met with, such cases are rare, even in these days, as compared with the number of persons, young and old, who are suffering from the very opposite condition—from too little mental exertion. I should say that, as a fact, far more *disease is caused by too little brain work than by too much.*

NEURALGIA.

I will now offer a few remarks concerning a very important condition which is well worthy of attentive study, but of which I can now treat only very briefly and imperfectly. Every one of you must have heard something about *Neuralgia* and *Neuralgic pains*, though no one has yet been able to give an adequate explanation of their causation in many cases. Sometimes these pains are no doubt due to a temporary change induced in the nerve centre or in the nerve-trunk. Perhaps the capillaries distributed to the nerve-fibres constituting the trunk of a large nerve may be unusually distended with blood. Possibly the circular muscular fibres of the little arteries ramifying amongst the bundles of nerve-fibres may be temporarily relaxed through nerve influence; and thus the capillaries distributed to the particular nerve or particular part of the nerve may become much dilated, and by undue pressure upon the adjacent nerve tubules, very severe pain may be occasioned.

That the trunk of the nerve is the seat of attack in many forms of neuralgia is certain, and pain like that of neuralgia may indeed be produced by temporary pressing, stretching, or squeezing a nerve-fibre. If a sensitive nerve-fibre be pressed upon by a growth of any kind, or be stretched over a tumour, great pain often results, and it may continue perhaps for months if the circumstances causing the alteration in the nerve persist. In certain cases, on the other hand, the precise seat of the affection is undoubtedly in the peripheral distribution of the nerve where it breaks up into expansions, plexuses, or networks of extremely delicate fibres.

Neuralgic pains, then, are generally associated with branches known to consist principally of sensitive nerve-fibres. Perhaps the fifth nerve is the greatest offender in these cases. You may have neuralgic pain closely resembling that of toothache and affecting the very same nerve-

fibres, the tooth itself being free from disease. The pain may be so acute as to lead both the patient and his adviser to conclude that some morbid change is going on in the pulp of the tooth. The dentist is consulted, and unless he is thoroughly up to his work, the tooth may be injudiciously extracted, and upon examination found to be in perfect health. The patient, however, goes away with the conviction that, although he is minus a sound tooth, he has at any rate experienced the last twinge of pain. But, alas! before many hours have passed the suffering returns as bad as ever. Torture as severe in all respects as that from which he had previously suffered is again experienced, though perhaps to the sufferer the pain may seem to be situated in an adjacent tooth. The patient might have one tooth extracted after another without the neuralgic pain being cured. Extraction is not the proper expedient in these cases.

In some instances it is probable that the attack depends upon change taking place in the circulation, and that in consequence partly of the pressure exerted by the distended capillary vessels, and partly in consequence of changes produced by exudation of fluid among the ultimate ramifications of the nerve-fibres, or around their bioplasm, pain is caused, and may persist until the effused substances are absorbed. In some cases the lymph which is passed out after a time contracts, and phenomena resembling those occurring in cirrhosis of liver, kidney, and central organs of the nervous system follow, and may result not only in stretching or pressure upon the nerve-fibres, or both, but in their complete atrophy and peripheral paralysis, partial or complete, of motion in certain muscular fibres, or of sensation over certain limited areas of skin. In a few very intractable forms of neuralgic pain originating in the tooth-pulp, it is probable that the nerve-centre is the seat of disturbance, and that this is due to vascular congestion, brought about by reflex action.

In cases in which the pain depends merely upon some temporary disturbance in the branch of the fifth nerve which supplies the tooth, or in the tooth papilla itself, the probability is that it will yield to simple treatment.

Certain forms of skin disease, particularly Herpes, Urticaria, as well as congested areas, ulcerations, sloughing, painful spots, numbness or anæsthesia, hyperæsthesia, twitchings, pains in many organs, heart, lungs, liver, kidneys, intestines, uterus, ovaries, mammæ, as well as many parts of the brain, and ganglia may be due to nerve change.

Treatment of Neuralgia.

Sometimes a good sharp purgative will cure the patient at once, but more frequently it is necessary to follow up the purgative with tonics, and especially preparations of bark, or Quinine itself, a mild purgative

being also given every few days. In this way you very often cure obstinate neuralgic pains. You must bear in mind that if Quinine is given by itself it may, under some conditions of the system, increase the pain, even for some time; while if you give a purgative in the first instance, or combine purgative medicine, such as Sulphate of Soda or Sulphate of Magnesia, with it, the Quinine will often act perfectly well and cure the patient. When the pain is intense, and is decidedly a neuralgic pain, coming on at about the same time of the day, and lasting about the same length of time, you must order a considerable dose of Quinine at once—five or ten grains,—and then from three to five grains twice or three times a day, taking care that the bowels act pretty freely at the same time. Some people can take as much as ten grains of Quinine twice or three times daily for several days with great relief to various nerve ailments. Quinine may be given in the form of pills, or you may place the bitter powder on the tongue, or it may be diffused through water, or dissolved in water containing a few drops of free Hydrochloric, Sulphuric, Nitric, or Phosphoric acid. The usual way of giving Quinine is the last. We order a six-ounce mixture as follows :— Aromatic Sulphuric acid, three drachms; Quinine, thirty-six grains; Syrup of Lemon, half an ounce or more, and water to six ounces. The dose will be half an ounce, or one tablespoonful, with an equal quantity of water, three times a day, between meals, for a fortnight.

The old *Muriate of Ammonia*, *Chloride of Ammonium*, *Ammonii Chloridum*, is a very valuable remedy in certain cases of neuralgia which are not relieved by Quinine. Some consider it as a specific, and say that it seldom fails. The remedy should be given in good doses, and it is often useless to order less than twenty grains or half a drachm. It is not pleasant to take, as it has a peculiar salt taste which is disagreeable to most palates. However, those who have suffered much from neuralgia are usually ready to try anything that affords them prospect of relief.

Salicine is sometimes of use, and may be given in doses of from five to eight grains every three or four hours for one or two days. *Salicylate of Soda* has been largely prescribed in the treatment of both slight and severe forms of rheumatic pains, and has been given for neuralgia. It is not much used in slight forms of either disease, but occasionally it does good. In many cases of acute rheumatism it acts admirably in lowering the quick pulse and high temperature. It must be given with care, and the patient taking it must be well looked after, as in a few individuals it lowers the pulse and depresses the heart's action to a greater degree than is desirable.

Iron. Arsenic.—Many preparations of iron may be ordered in cases of neuralgia, particularly if there is reason to think that the state of the blood is at fault. *Arsenic* in small doses, and given with due care, will sometimes cure severe neuralgic pain. It is well not to continue arsenic

for more than a month at a time. You may order from three to five minims of Fowler's solution of arsenic, *Liquor Arsenicalis*, with a little syrup of ginger and an ounce of water, three times daily, soon after food has been taken.

Opium.—There are several forms in which opium may be given. A small dose of Dover's powder, *Pulvis Ipecacuhanæ Compositus* (from two to five grains), at bedtime, followed in the morning by a mild saline purgative, if persisted in for a few days or a week, will relieve and sometimes cure certain forms of neuralgic pain.

Hypodermic Injection.—You may, too, inject a solution of Morphia under the skin if the pains are very severe. The sixth of a grain, or less, of this drug is sufficient for subcutaneous injection. The operation is performed with the aid of a little injecting syringe made for the purpose, one of many forms of which I show you. In this way, for the time being, you may relieve the most exquisite nerve pain ; but too often it happens that, as soon as the effects of the Morphia have worn off, the pain returns. You must know that people are nowadays too apt to get into the way of prescribing sedatives for themselves after they have found relief, and thus they may do themselves great harm. You must, therefore, always exercise caution in prescribing and recommending this class of remedies, and be careful to tell patients they ought never to prescribe them for themselves. More particularly as regards hypodermic injection it is my duty to impress upon you the importance of not allowing the patient, under any circumstances, to get into the way of operating upon himself. There is really great danger in this, for the process is very simple and easily performed ; and as the relief is great, patients are very apt to assist themselves without waiting for the doctor. Of those who take this injudicious course, not a few get into the habit of narcotising themselves on the slightest excuse. Whenever they suffer slight pain they at once resort to hypodermic injection. As soon as the effects begin to wear off the pain recurs, and the dose is repeated. A vicious habit is soon acquired, and it is difficult indeed to prevent many of those foolish persons from going to extremes and making themselves slaves of the remedy. Very painful cases of the kind come under our notice from time to time, and every now and then death results from an overdose. Patients who have contracted this habit of self-injection not uncommonly lose all control over themselves and introduce narcotics hypodermically, just as other weak-minded individuals become a prey to drink or indulge in other vices. It is remarkable that some of the most active and highly trained intellects should have fallen victims to this most silly system ; and it is hardly credible that the most strong-minded persons are not unfrequently among those who lose all control of themselves. Some think that we ought to have societies for the entire suppression of hypodermic injection.

Dr. Sansom's Disks.—Of late years some excellent little disks of gelatine have been prepared, each of which contains a given quantity of the drug we may desire to inject. All that is necessary is to dissolve the gelatine disk in a few drops of warm water at the time when it is required. The solution may then be taken up by the syringe and injected into the subcutaneous areolar tissue of the patient. My friend, Dr. Sansom, was the first to suggest the employment of these disks, which are also used when it is required to apply atropine and other remedies to the conjunctiva. They are prepared by Messrs. Savory and Moore, of New Bond Street. Permanent *neutral* solutions for hypodermic injection are prepared by Messrs. Gerrard and Tanner, of Aldersgate Street, and little tabloids, which readily dissolve in a few drops of water, are now in general use.

Chloral-Hydrate and *Croton Chloral-Hydrate.*—Chloral is of great use in procuring sleep in many cases of severe neuralgia, especially when the patient has been kept awake night after night, but you must give it with the greatest caution, and only order one, or at most two, doses on the prescription. Take care also to write full directions how and when the draught is to be taken. The dose of Chloral is from ten to twenty grains, with a little syrup and Peppermint or other water. The most convenient form is the syrup of Chloral-Hydrate, one drachm of which contains ten grains of the drug. Peppermint or Ginger covers the taste of the Chloral better than anything else. In cases of old catarrh and emphysema it should not be given. I have seen it do harm in several instances in which the heart was weak and the right ventricle dilated, and you must remember that there are chloral victims as well as alcohol victims, and every year some deaths occur from an overdose of this drug. *Croton-Chloral* or *Butyl Chloral-Hydrate*, which was much used a few years ago, when it was first discovered, has not been heard of so much lately. It is prescribed in doses of one or two grains, to be taken every two or three hours. In the "Lancet" for Jan. 31, 1874, my colleague, Dr. Burney Yeo, reported some cases in which the remedy had been of service in relieving severe neuralgic pain; and in the same journal for Dec. 2, 1876, you will find some cases recorded by Dr. Skerritt, of Bristol, in which the remedy relieved bilious headache, facial neuralgia, and giddiness. Five grains were given twice a day. Messrs. Corbyn, Stacey, and Co., prepare a Syrup of Croton Chloral-Hydrate,—pills containing two, three, and four grains each,—and a *Liquor Croton-Chloral*, which contains one grain in ten minims.

In extreme cases, the external use of Aconite may be tried, and acupuncture and stretching and division of the nerve are justifiable in extreme cases, but some of the results are such as to render it desirable not to recommend surgical interference until every other means have been tried and have failed.

Massage.—Of late years, among many new plans of treatment of obstinate nervous affections, perhaps the most popular is massage. This process, which has been called by some the rubbing cure, is said to require great skill, and to be useless or worse than useless if not practised by skilled hands. Like many other popular plans of treating chronic ailments, massage is reputed to be a certain cure in most intractable diseases. Among the affections to be relieved or cured by massage are, congestion of the brain, constipation, enlarged liver, œdema, dyspepsia, pain in the heart, catarrh, neuralgia, scriveners' palsy, distortions, chronic arthritis, rheumatism. Labour pains may be excited, the position of the child altered, the detachment of the placenta effected, menorrhagia caused to cease. Even the ear and the eye may be massaged, cloudy swellings of the cornea and conjunctivitis cured! In short, there is hardly a disease in which treatment by massage has not been advocated. And many of its advocates entertain no doubt whatever as to its curative effects, even in conditions caused by changes of the most opposite and, perhaps, conflicting kind, such as morbid changes relieved by rest, and morbid changes to be relieved or cured by movement.

RHEUMATIC PAINS.

I must now say a few words about another kind of pain which is very common. It is, perhaps, not so severe as bad forms of neuralgia, but it nevertheless occasions much suffering, and in some cases is so severe and so constant us to prevent the patient from following his work. I allude to the so-called *Rheumatic Pains*, which affect various tissues and occur in many different parts of the body. The character of the pain differs somewhat in different cases, sometimes being sharp evanescent twinges, which either flit about, as it were, from place to place, or seem to be obstinately fixed in certain joints, the severity of the suffering altering only in degree. A good many old men and old women living in cold damp country places will tell you they have been martyrs to rheumatism for more than half their lives.

When the blood is in a state favourable to the development of those changes which result in rheumatic pains, you may be exposed to cold damp air for a short time towards sundown, and conscious of a slight chilly feeling, in two or three hours you feel very decided aching of the muscles of the forearm, or upper arm, or of the leg, back, or other part of the body. Perhaps some of the tendinous structures about the wrist or ankles are the seat of fixed continuous pain, which becomes worse on exertion, and makes it a matter of great difficulty to lift anything or to perform the ordinary movements. Very commonly the muscles at the back of the neck, from their insertion in the occipital bone downwards, are so painful that you cannot turn or bend the head. Partly from the pain and discomfort experienced, partly from the effect of the altered

blood on sensitive nerves of the body generally, you feel quite ill and must lie down. Now you soon find out that external warmth gives great relief. Sit before a good fire, wrap yourself up in a railway rug, take a warm bath or hot-air bath or a Turkish bath, and the pains will soon disappear. If you go to bed and freely perspire, you will feel better within an hour. But, perhaps, after a few hours more you have evidence that the pain temporarily allayed has not really gone, and that the changes which caused the pain are dependent upon phenomena which determine a more lasting departure from the normal state.

Rheumatic pains are often preceded by or are associated with flatulence, heart-burn, and other symptoms indicative of deranged digestion. Some suppose that the peccant matter which causes the pain is actually secreted by the stomach, while others consider that it results from the occurrence of unusual chemical changes taking place in the recently absorbed constituents of the food. In favour of this latter view may be adduced the fact that the subjects of rheumatism are almost invariably made worse by beer, while rheumatics who can be persuaded to give up this popular beverage, almost invariably improve. The rheumatism, however, returns whenever the beer is resumed.

Rheumatic pains differ from neuralgic pains, inasmuch as they commonly arise in muscles and in fibrous tissues, while neuralgic pain is generally seated in a nerve-trunk or its ramifications. The dental nerve and its branches, or the superior maxillary or frontal, or certain cutaneous branches in various parts of the body, are more frequently affected than other nerves. Rheumatic pains, on the other hand, seem to be situated deeper, and are more widely dispersed apparently in the substance of tissues, as if emanating from many ultimate ramifications of nerves distributed in the substance, tendons, or fasciæ, or in the muscles themselves.

Lumbago is a form, and a very unpleasant one, of muscular or fibro-muscular rheumatism. Sometimes it is very obstinate and very difficult to cure. The patient is obliged to rest in bed, and it may be a fortnight or more before he is able to bend his back without great suffering. Care must be taken not to mistake pain in the back arising from other and more serious conditions for rheumatic muscular pain or lumbago.

Rheumatic pain seems in many cases to arise very near the insertion of a muscle where there is much white fibrous tissue in connection with the periosteum. The point of attachment of the deltoid to the humerus is a favourite spot for the development of rheumatic pain, which may be so severe as to interfere with the raising of the arm, and to render the putting on of a coat without assistance a most difficult proceeding. Sometimes the pain persists in this situation for several weeks.

The intercostal muscles are not unfrequently the seat of very severe

rheumatic pain which is sometimes taken for pleurisy. The muscles of the side and of the hip are also frequently affected. Rheumatic pain in some of the fibres of the diaphragm and of the abdominal muscles has unfortunately led the practitioner to express the opinion that a patient was suffering from peritonitis, and some days perhaps will have elapsed before this terrible and erroneous diagnosis has been controverted.

The nerve-fibres distributed to the muscular fibre cells (organic muscle) may be the seat of rheumatic pains as well as those distributed to voluntary muscle. It is to be remarked with reference to the latter, that those parts of the muscle situated nearest to the tendon are most frequently the seat of the pain. Here, of course, the circulation through the vessels is slowest, and there would be the greater chance of any exudation poured out from the blood producing a deleterious influence upon the finer branches of any nerve-fibres with which they may come into contact.

In various forms of rheumatism then, we infer that it is certain of the fibrous tissues that are the seat of pathological change. Exudation is probably poured out from the blood as the circulating fluid slowly traverses the sparsely scattered capillaries of the tissues. The nerve-fibres close to the capillaries are those which (*see* page 314) are affected. The exudation poured out probably coagulates, and part of it is at length converted into fibrous tissue, so that the affected textures become thickened and the movements of the joints and of the tendons and muscles in their neighbourhood seriously impaired. In many old cases of chronic rheumatism the patient is seriously crippled, and the movements of some of his joints are greatly impeded or altogether stopped. It would almost seem as if in bad cases of rheumatism the fibrous tissues were the seat of a sort of slow inflammation; and that the exudation poured out in the interstices of the bundles of the fibrous tissue gradually increased in amount as the disease advanced, and that the resulting fibrous tissue underwent condensation and contraction, greatly interfering with the action of the tissues in question. The movements of the large joints at last cease altogether; this change being partly due to the pathological phenomena I have described, and in part to the circumstance that the pain accompanying every effort to move has gradually discouraged the patient from making any attempts. The limbs become quite stiff, and the unfortunate victim is entirely dependent upon others, even for every mouthful of food he swallows. We often see extreme cases of the kind in country workhouses. If you visit some of these institutions, you will almost certainly discover several persons who, for many years, have been complete cripples from rheumatism, and are bedridden and incapable of moving any one joint in the body.

The inquiry as to the actual state of things at the seat of pain during the early stages of the disease in ordinary rheumatic affection is an interesting one, but I am sorry to say I cannot tell you what are the essential differences between a slightly rheumatic and a perfectly healthy tissue. The facts of the case justify the conclusion that certain materials, probably soluble, are formed in undue quantity in the blood —that the solution transudes through the walls of the capillaries in situations where the vessels are few and the circulation is slow, that the contact of the fluid with the fine ramifications of the nerves close to the capillaries causes pain, that in consequence of the formation of more fluid of the same character in the blood, that which has been already poured out cannot be at once absorbed. The accumulation thus brought about accounts for the persistent character of the pain. Whether the pain is caused by the direct influence of the effused fluid on the fine nerve-fibres, or upon the bioplasm or living matter connected with them, is a question which is open to discussion. There can be no doubt that stretching of the terminal ramifications of nerve-fibres or pressure upon them will give rise to pain, and it is not unreasonable to infer that fluid differing in its composition from that which bathes them in health would also cause pain as well as disturbance of nerve action. The mere stretching and pressure to which the nerves are subjected are not, it may be fairly objected, an adequate explanation in many cases, as, for instance, in those where there is persistent rheumatic pain, not associated with any tension or swelling of the tissues. The views above suggested, however, receive support from the fact that in many cases after very free secretion has gone on for some time from skin, kidneys, and bowels, the re-absorption of any exuded fluid does take place and the rheumatic pain ceases.

With regard to the muscles there is almost invariably imperfect action, and some muscles during an attack pass into a state of complete inaction. The muscular tissue, which has been many times affected by the rheumatic state, gradually wastes, and the muscle itself after becoming very weak soon exhibits structural degeneration. Near the tendon the contractile tissue undergoes condensation and slowly degenerates into fibrous tissue, while in the adjacent fleshy parts fatty degeneration often occurs. Shrinking, wasting, thickening, and contraction proceed until fibre after fibre has deteriorated, when the limbs fail to execute their ordinary movements. I need hardly say more concerning the very serious results consequent upon the long continuance or frequent recurrence of the rheumatic state. Every one must see the importance of doing all he can to check the pathological changes, or failing this, to cause them to take place as slowly as possible, and to retard the development of that dreadful state of helplessness and in-

capacity which are too often the consequences of frequent attacks of rheumatism or the very chronic form of the malady.

Rheumatoid or Osteo-Arthritis.

A very common and very intractable form of morbid change, if not rheumatic in its origin or nearly related to the rheumatic condition, affects the joints and particularly the periosteum (the membranous structure attached to the surface of the bone, and beneath which the formation of bone proceeds) and the bone tissue itself. The condition in question is known as *Rheumatoid Arthritis*, and although the morbid change is local, it is associated with certain general changes in the system, and recent researches have shown that at least in many cases the joint affection succeeds to and is connected with certain changes in the spinal cord. The disease is a remarkable one, and a slight or moderate degree of some of the forms of the malady is common. As regards treatment, probably much may be gained if the condition is detected in the early stages. Conditions favourable to the general health, such as warmth, dryness, simple diet, with but a very moderate allowance of meat, and frequent warm baths of alkaline water should be recommended, and this general plan should be persisted in. Bath in the winter is a very suitable place, and great benefit is often derived from the treatment. ("The early symptoms and early treatment of Osteo-Arthritis," by J. Kent Spender, M.D.: London, H. K. Lewis.)

MEASURES TO BE ADOPTED FOR THE TREATMENT OF RHEUMATISM.

The very quick cessation of some forms of even severe rheumatic pain is very remarkable. A dose of Sal Volatile, a small glass of wine, a teaspoonful of spirits, twenty grains of Bicarbonate of Potash or Soda, a grain or two of Quinine, have severally in different cases had the effect of removing slight and even rather persistent pains of the rheumatic class within half an hour. Equally surprising is the effect of a warm bath or careful rubbing. It may be regarded as certain that pains of the rheumatic as well as of the neuralgic order may be quickly alleviated by effecting changes in the alimentary canal, or on the external surface of the skin—a fact of the utmost importance in considering the treatment necessary for severe forms of the malady. The change so desired is brought about through the influence of nerves, and is, at least in many cases, reflex. By the remedies and by external rubbing the capillary circulation is affected, and there can be little doubt that the particular nerve-fibres favourably influenced are those which run with the capillary vessels. No doubt the relief of the pain under the remedial influences referred to is but temporary, but by repetition of the same methods at certain intervals, the relief may be maintained, and after a time the con-

ditions associated with the occurrence of the pain being removed, a cure may be effected. The repetition day by day for two or three weeks of free perspiration may have a most beneficial effect, and if only the patient can be persuaded to continue in a milder form for a much longer time the method of treatment recommended, he may not only keep himself well, but may prevent the occurrence of morbid changes which otherwise would slowly progress, and at last result in the degeneration of muscular and nerve tissues of a very important and, it may be, irremediable kind.

General hints concerning the prevention and relief of chronic rheumatic affections.—All who suffer from rheumatic pains should, therefore, be made to understand that by acting in a certain way they may greatly diminish the tendency to rheumatism if they cannot completely check it; while by acting in a different manner they may greatly encourage and expedite the progress of the morbid change. All rheumatics should be instructed concerning the great importance of promoting the free action of the secreting organs generally. The medical adviser should particularly direct the patient's attention to the great importance of frequent and free action of the skin, kidneys, and bowels, in order that the materials which tend to accumulate in the blood and which are concerned in the causation of the rheumatic state shall be removed as fast as they are formed, and as soon as possible expelled from the system, so that there may be no danger of their accumulation. It is remarkable how inveterate is the tendency in many to the formation and accumulation in the system of compounds of the class in question, and if the patient is to remain free from their deleterious effects, he must compass their removal day by day.

In our climate a tendency to slight rheumatism is so common that I should say at least half the population suffer more or less. It is noticed, too, at every period of life. The so-called *nervous*, *neuralgic*, and *muscular pains* are very often of a rheumatic nature. These may get well of themselves or be relieved or removed by a purgative, by a few doses of Bicarbonate of Soda or Potash, or by one of those effervescing salines now so commonly sold, or by frequent ordinary warm baths, or, in the case of the young, by active exercise followed by free perspiration, the diet being, of course, carefully regulated at the same time. A somewhat more decidedly developed rheumatic condition often brings patients to us for advice, and here and there, I am sorry to say, we find this to be but the state precursory to a severe attack. In the great majority of cases, however, the morbid condition yields, in a few days or a week or two, to remedial measures based on the principles already referred to.

The first thing to bear in mind in the treatment, I might say of every form of rheumatism, is that free action of the skin should be encouraged.

Warm baths of various kinds, and in many parts of the world, have been held in great repute for their curative properties. The Turkish bath is often of great use to those who are troubled with severe rheumatic pains. It is, however, a rather long business, and the patient who adopts it must have two hours or more at his disposal. I know people who take a Turkish bath twice every week with advantage, and consider that they could not get on without it.

Those who cannot or will not adopt the advice given them to take Turkish baths may, perhaps, not object to an ordinary warm bath, twice or three times a week, staying in the water from twenty minutes to half an hour, or until they perspire freely. I think the action of the ordinary warm bath in rheumatism is improved if the water be made alkaline. This may be done by dissolving in it a quarter of a pound of washing soda. The vapour bath is also of great use, and so is the hot-air bath. Very simple arrangements for vapour or hot air may now be obtained. Among the most efficient is the portable apparatus sold by Hawksley, 357, Oxford Street, London.

By free perspiration the removal from the blood of a large quantity of water, holding various substances in solution, is effected. Then thirst is excited, and the patient, to allay his thirst, drinks freely of aërated or other water. In this way the noxious materials which would otherwise accumulate in the tissues are gradually removed from the system, and the patient in this way may escape much suffering.

Small doses of Mercury.—Cases of rheumatism which have lasted for weeks or months, in which there has been pain in many muscles and in the fibrous tissues about the joints, and even a moderate amount of effusion into more than one joint, but without febrile disturbance, have been cured by two or three small doses of Mercury. The bowels, you will be told, are regular and have acted daily—but even in small eaters the dose you give will be followed by such free action that you will feel surprised. In these cases excrementitious matters have gradually accumulated in the blood and tissues, and by proper treatment the accumulation may be got rid of—not often by one dose, but after several given at intervals of a few days at a time. You need only give less than a grain in each dose, and probably three or four doses will be sufficient to cure the patient. This is one of the very few instances in which the word "cure" is, I think, correctly used. Many old doctors adopted this plan and some carried the system too far, but few of the rising generation are aware of its great value, and if they were, perhaps they would not adopt it until they had taken courage to try the experiment in their own organisms, or in the case of medical friends who are able to form a judgment of the effects of a remedy.

Alkalies may be given in all forms of rheumatism. It is very important for the free action of the muscles that the fluid which bathes the

contractile tissue, and which undergoes alteration during the action of the muscle, should be frequently changed. If some portions of the fluid remain in contact with individual fibres, the materials resulting from the decomposition taking place during the action of those fibres will accumulate and necessarily interfere with their free action, probably also affecting the action of the nerves, and thus occasioning rheumatic pains. You will find that generally muscular pains may be relieved by exciting the action of the skin, the bowels, and the kidneys. Alkaline remedies have a very beneficial effect, and are invariably useful to those who suffer, possibly because in this condition there is an invariable tendency to the development in the system of organic acids, particularly lactic. You may order *Bicarbonate of Potash*, or *Liquor Potassæ*, or *Bicarbonate of Soda*. These are very old remedies, and concerning their influence in relieving rheumatic pains there cannot be the slightest doubt. In many slight cases of pain, twenty or thirty grains of Bicarbonate of Potash, dissolved in two ounces of water, will be found to relieve in three or four hours, and sometimes in half an hour. Sal Volatile helps the action, and also stimulates the heart a little. Thus the blood is driven more quickly through the capillary vessels, and in this way absorption is promoted. You may order the alkali to be taken about half an hour after meals, for a week or a fortnight at a time. But you must take care not to let a patient go on taking *Liquor Potassæ* or *Bicarbonate of Potash* from one year's end to another, or you will probably be consulted on account of the appearance of phosphates in the urine, with perhaps irritable bladder. Retention of urine may follow, and considerable quantities of pus may be formed. Sometimes the patient becomes very low and weak, and I am not sure that serious changes in the blood, and even purulent inflammation of joints, have not resulted from the too long continued use of alkalies. *Potash* and *Soda* are very valuable remedies, if given with judgment, and if people are not allowed to go on taking them as long as they like. You must not forget to explain to patients how long you wish them to continue taking any medicine you prescribe, or you will sometimes be astonished, if not alarmed, to find that an obedient patient, for whom you have prescribed a pill, has been daily taking it for years.

If a patient suffering from rheumatism finds that alkalies disagree with him, and disturb his digestion, you may try salts of vegetable acids, particularly the Citrates and Tartrates, for these become converted into alkalies in the system, and the urine may even be rendered alkaline by them as well as by the ordinary alkalies. Lemon and orange juice, and many fruits, also act beneficially in some cases.

Among diuretics, the ordinary Nitrate of Potash or Common Nitre —dose from five to ten grains, in water, three or four times a day; the Acetate of Potash, in doses of from ten to fifty grains, in two ounces

of water, three or four times daily; the Bitartrate of Potash (*Potassæ Tartras Acida*), in doses of twenty to sixty grains or more, in two or three ounces of water, three or four times in the twenty-four hours (sometimes also acts as a purgative); and the Citrate of Potash, in the same doses as the Acetate,—are the most generally useful.

Guaiacum.—In former days Guaiacum was much in favour in the treatment of chronic rheumatism, and I have found benefit result from its use. You may prescribe the resin, *Guaiaci Resina*, in doses of ten grains made into pills, or finely powdered and mixed with milk, three or four times a day, or the *Mistura Guaiaci*, an ounce of which may be ordered twice or three times daily. Perhaps the least unpleasant form in which to take Guaiacum is as the Ammoniated Tincture, *Tinctura Guaiaci Ammoniata*, in a mixture with some bitter tincture or infusion. Mucilage and a few drops of *Spiritus Chloroformi*, with water; or peppermint, mint, or other water, may be used to cover the taste.

Iodide of Potassium.—You will often find that severe lumbago pain, fixed pains in the muscles and fibrous tissues in many parts of the body, and severe chronic aching about various joints, which have troubled people for months, will be relieved by a few doses of Iodide of Potassium (*Potassii Iodidum*). You may begin with three grains, three or four times a day, and gradually increase the dose to five, six, eight, or ten grains. The Iodide should be dissolved in a considerable quantity of water, and should be taken about an hour or more after meals. You may also give with it half a drachm of *Liquor Cinchonæ* (De Vry's), and a few drops of *Tincture of Ginger*. Although I cannot justify the practice, on scientific grounds, I often give with the Iodide, Nitrate of Potash (five grains). The Iodide probably acts upon the painful textures, partly by promoting the absorption of exudation, but I think chiefly by taking the place of Chloride of Sodium, driving this out and thus, perhaps, promoting free circulation of fluids and saline matters through the interstices of the textures. Do not accept the conclusion, implicitly received by many, that the beneficial action of Iodide of Potassium is evidence of the syphilitic origin of the malady. This is one of the new delusions. Some authorities attribute half the ills we suffer from to syphilis, and even think that a syphilitic taint accounts for the majority of ailments they cannot otherwise explain or account for. If neither you nor your father nor your grandfather had syphilis, the origin of the disease is to be discovered further back in your ancestral line. Some authorities seem to think that no one exists who is entirely free from syphilitic taint. Both Iodide of Potassium and Bichloride of Mercury (from the $\frac{1}{32}$ to the $\frac{1}{16}$ of a grain for a dose) are extremely valuable remedies in very many affections which are not in any way due to syphilis.

Bromide of Potassium, *Potassii Bromidum*, is useful in cases in which

the rheumatic pain is in part neuralgic in character. It may be given alone, or with the Iodide, in doses of from ten to thirty grains. Salicine and Salicylic Acid, and Salicylate of Soda (*see* p. 266), are useful in some cases of chronic rheumatism, and quinine is frequently of advantage.

I have observed, and in many instances, that after the persistence of slight but evidently rheumatic pains for many days, perhaps for two or three weeks, the patient without resorting to any special treatment whatever, experiences unusually free action of the skin at night. Even in mid-winter, as soon as he gets warm in bed, he sweats profusely, and for the whole night—finding his nightshirt quite moist and his skin thoroughly soft and soddened in the morning—although no change had been made in his bedclothes nor in his diet, and he had not taken any medicine whatever. The free sweating had not only come on of itself, but perhaps persisted night after night for some time. So remarkable and unusual is the free action of the skin, that oftentimes a patient is alarmed, and seeks advice with the object of stopping the cure. On inquiry, it is found, not only that the rheumatic pains have been much less severe since the free sweating at night came on, but that the patient feels in much better health. He is in better spirits, lighter, as he says, and stronger and more active. His mind clearer. His bowels act unusually well, and urine is excreted freely, and is perfectly clear and destitute of the accustomed sediment. The tongue is clean and the appetite is good. But notwithstanding his conviction that he is in better health than usual, he fears the very free sweating may weaken him, or in some way do harm, and therefore seeks advice. Now, so far from interfering with the free perspiration, you may assure your patient that a natural cure is being effected, and that it is desirable not to stop it. After a week or two the perspiration will diminish, and the patient will feel well, and will not be troubled with rheumatic pains for some time to come. Such facts are of the greatest interest and are well deserving of your careful contemplation. We may learn from them even more than we can learn from many serious cases of disease. And though, if we act rightly, we may object to interfere, our attention is forcibly directed to certain phenomena from the consideration of which the principle of treatment to be pursued, in the case of those who are not so fortunate as to suffer a spontaneous cure, may be deduced.

Moderate, but habitual, natural action of the skin, liver, and other emunctories probably prevents altogether the development of the rheumatic state. Free action for a time cures the rheumatic condition, if present, and this free action may be brought about by changes within the body. In the absence of this action, however, we endeavour by artificial means to excite it. And if the rheumatism is really severe, we should resort to the best means we possess to bring about these curative influences as soon as possible.

Questions like the following will doubtless occur to some, but I regret to say that I cannot adequately answer them:—"Why in some organisms only this spontaneous cure is observed? Why some persons never suffer from rheumatism, and so need no cure? Why some suffer terribly in spite of all measures adopted for their relief, and why some die in consequence of the extreme degree and inveterate character of the rheumatic phenomena?" Some would refer the difference to nerve action only, and there can be no doubt concerning the amazing variation in rapidity and intensity of nerve action in different individuals. Some people seem to be "all nerve." Others appear to get on, and very well, with extremely slow and apparently blunted nerve action. Between these two extremes many degrees of difference are to be noticed. If the nerve mechanism presiding over the physiological changes in the system is well developed and highly active, derangement will be corrected ere there has been time for its existence to have been made evident to the consciousness of the individual; but when nerves and nerve centres are dull, and small and sparse in proportion to the extent of area they have to govern, response is slow, and physiological derangement may even pass into pathological change, and result in structural alteration of a most serious and irreparable character without the patient being aware that he is even out of health. Nay, we see the most grave morbid changes running a long course, damaging in the most decided manner, it may be, many important tissues and more than one organ, and at a comparatively early period of life, although the patient has not experienced even discomfort. On the other hand, sensitive, constantly ailing people often lead long, complaining lives, and die in old age, without a single organ having passed into a state of actual disease. In such instances as the last, the patient is endowed with highly active nerve organs. In the first, very decided pathological change fails to exert any influence upon slowly acting and blunted nerve organs. In the one, broad and obvious lesions progress until action is greatly deranged or death results; in the other, illness is prevented or is self-cured before it progresses to any extent. Very decided and well-timed interference at an early period, and the utmost care all through, would alone save patients of the first class from serious disease, and perhaps death; while no treatment, or only treatment of the simplest character, would be needed by the person having a more sensitive nervous system. Slight ailments in some organisms cause much ado, while in others grave pathological actions of great intensity may occur, and serious structural morbid changes run their course for a considerable time without being discovered, and without giving rise to any symptoms sufficiently distinct to attract the attention of the patient.

The Diet in Rheumatism must be nutritious, but care should be taken that the patient does not exceed. All rheumatics should be

careful not to partake too freely of meat. Farinaceous substances and fatty matters do no harm. While many ripe fruits agree well, and some —oranges, lemons, cooked apples, prunes, and some more—are useful, sugar in large quantity is not desirable. Lemon juice seems to be of real use in many cases of chronic rheumatism. Milk is excellent, and rheumatics may take it in quantity. Various puddings, such as batter, sago, tapioca, &c., made with milk and an egg, may be recommended. Acid wines, like the commoner forms of claret, usually do harm, and indeed sometimes occasion rheumatic pains. Beer is especially hurtful, and should invariably be withheld. In treating cases of rheumatism you must impress upon patients very strongly that beer, as well as claret and some acid wines, seriously interferes with the improvement, and may prevent the remedies you prescribe from having the advantageous effects you would expect. If stimulants are required at all, you may allow in the twenty-four hours two or three tablespoonfuls of brandy with seltzer or other mineral water, or the same quantity of whiskey with lemon juice and water.

Importance of Warmth and Warm Clothing.—Cold, damp, ill-ventilated rooms are especially hurtful, and exposure to sudden changes of temperature often gives rise to very severe and acute attacks of rheumatism. Those who are prone to rheumatism may feel annoyed if they perspire much, and are too often unwise enough to try to check the tendency to perspiration by wearing very light clothing, and thus not uncommonly they precipitate an attack. Not only should all persons who have even a slight tendency to rheumatism wear woollen next the skin during the day, but at night they should either have a flannel night dress or a flannel jacket over their cotton garment. If the shoulders and arms be exposed at night with insufficient covering, very obstinate rheumatic pain is sometimes the consequence.

ON THE FEVERISH AND INFLAMMATORY STATE.

A departure from the healthy state of the blood may originate in the blood itself, or may be determined by changes in the tissues and organs which it nourishes. The change in the blood may, in its turn, react upon and influence the action of some, and, indeed, almost all the tissues and organs in the body. When this is the case, the phenomena are said to be "general," to distinguish them from phenomena of the same kind, but which are restricted in area, and are therefore termed "local." We may therefore speak of *general tissue changes*, *general fever*, *general inflammation*, as contrasted with similar actions, but which are local, and affect only a very small portion of the body. Among the most important and most common general changes are those departures from healthy action known as *fevers* and *general inflammations*. So

common is febrile and inflammatory disturbance that it is doubtful whether a single example of a mammalian organism could be adduced which had reached maturity without having suffered more or less. Few of us pass a month without experiencing, in our own bodies, some slight degree of febrile or inflammatory disturbance, and many are seldom entirely free for many weeks at a time from phenomena of the kind.

Of Catching Cold.—Before bringing under your notice the actual phenomena which characterise all fevers and inflammations, I propose to direct attention to the consideration of that most common of all febrile disorders, and the best known of all slight ailments—*an ordinary cold*—in the course of which a certain degree of febrile and inflammatory action invariably occurs.

Most people have "caught cold" probably many times in the course of their lives, and though they may have suffered on some occasions severely, there is no reason to suppose that any tissue in the body has been damaged in the slightest degree. Whenever you are unfortunate enough to take cold, you should make the most of the opportunity and carefully study the changes as they go on in your own organism.

When the cold is coming on, you may perhaps shiver a little, or you may experience a creeping sensation, apparently in the skin of different parts of the body. Although you may feel quite chilly, if you place a clinical thermometer in your arm-pit, you will be surprised to discover that it indicates a rise of three or four degrees above the normal in the temperature of your body, and the very striking and important fact will be impressed upon you that, although you feel extremely chilly and inclined to shiver and desire warm clothing, or to sit by the fire, with a good blanket over you, the temperature of your body is decidedly higher than it ought to be, and in fact may have risen from a little under 98° Fahrenheit, the point at which it stands in health, to 100°, 101°, or 102°. You need not be very much disturbed or frightened if you should find that it marks 103°. You will also notice that, as soon as you get into a free perspiration, all the uncomfortable sensations which you have experienced during perhaps several hours, will disappear. As soon as you feel warm, and especially if you have perspired, you will find that the temperature has fallen a degree or two. After you have perspired very freely, it will fall lower still, and probably stand at the normal.

I shall endeavour to show not only that a cold is a form of fever, but that in many colds there is evidence of a certain, and, in some, a considerable degree of inflammatory action. The mucous membrane of the nasal passages, of the larynx, trachea, and bronchial tubes, of the pharynx, and many of the small glands connected with these surfaces, are red and "inflamed." The capillary circulation in them is impeded,

and if a minute examination be made we shall find evidence of undue growth of the bioplasm of the epithelium and adjacent structures.

Many of the symptoms which usher in an ordinary cold precisely resemble those which occur when some special form of fever or, it may be, general or extending inflammation is about to attack the patient. In the last case the shivering and other phenomena may be more severe, but the difference is one in degree; in fact, a cold must be included among the *Febrile Diseases*.

Let us now go further back in our inquiry as to the real nature of the malady, and try to discover the change which, so to say, constitutes the first departure from the normal state in the case of a common cold or other slight febrile attack. The change in question usually precedes by hours, and it may be days, the manifestation of any symptoms. The actual process of taking cold is never *immediately* followed by any phenomena which disturb the health or which indicate to the patient himself that he has passed, or is about to pass, from the healthy into an abnormal state. This fact alone—the existence of an interval between the commencement of the operation of the disturbing cause and the development of distinct derangement in the physiological actions of the body—is, I think, sufficient to show that the symptoms are not due to nervous disturbance alone, and conclusively points to the conclusion that the change excited is of such a nature that it does not result in immediate consequences.

The condition of the organism which is favourable to "taking cold" is not one of perfect health. The circulation at the time is feeble, and the blood itself not in a perfectly healthy state. Instead of passing quickly through the cutaneous capillaries, the circulation is retarded in the surface vessels, partly on account, as above suggested, of feeble heart's action, but mainly, I think, owing to the muscular fibres of the smallest arteries being relaxed, and the consequent dilatation of the tube of the vessel. The blood, very slowly traversing the cutaneous capillaries, being far too long a time exposed to the cooling influences perhaps of a draught of cold air, becomes the seat of chemical changes which differ from those ordinarily taking place in the blood constituents. The particular chemical compounds formed under these circumstances are not readily excreted. Remaining in the blood, they accumulate, and minute bioplasts grow and multiply. At length an influence upon the nerves is exerted, and then ensue the chilliness and other symptoms due to the derangement of the action of many tissues and organs of the body which mark the invasion of the illness. After a time the materials in question begin to be eliminated, and the patient gets well.

If we promote the action of the excreting organs, we follow the "suggestions of nature" and expedite recovery. Now some may think all this a rather fanciful explanation, but if we consider what happens in

slight rheumatism, we shall, I think, be convinced that the conclusions arrived at are supported by facts. When the rheumatic state comes on, the patient experiences pain in the muscles and fibrous tissues in many parts of the body distant from one another, which pains are relieved in a very short time if free action of the skin, kidneys, and bowels is established. There is no doubt whatever that certain alkaline, diuretic, and purgative medicines excite the desired action, and thus the morbid condition is relieved or cured. The increased flow of urine, caused by giving diuretics, is followed by thirst, to quench which the patient resorts to cooling drinks. Thus the tissues get well washed out, and the peccant materials which, by their action on the nerves, cause the pain, are by degrees highly diluted and dissolved away, or if in the blood after reaction are converted into materials readily removed from the body by different emunctories. We are thus able to account for the formation of morbid materials in the body, and to explain how these derange many physiological actions and occasion pathological phenomena. Further, it has been shown how these noxious substances are removed and by what means their removal, or, in other words, the recovery of the patient, may be assisted and hastened.

Preliminary Changes and Attendant Phenomena.—As regards the accession of a cold, or other febrile or inflammatory attack, the first indications of derangement in the ordinary physiological processes are much the same, but the intensity of the changes varies greatly in different fevers and inflammations. For some little time before you "catch cold" you are conscious of not being in the ordinary state of health. Without feeling very weak or low, there is an indisposition to move about, you are inclined to lie down, and perhaps if you followed your own inclination, you would go to bed, and in this way try to obtain relief from the discomfort and sense of oppression and general uneasiness. In a short time some degree of soreness about the nose is usually experienced, and this is often associated with dryness of the nasal cavity and of the throat. The tongue feels more or less dry and uncomfortable. Little or no saliva is secreted; the skin, too, often feels hot and dry. When the skin is perfectly healthy, it is smooth and supple, but when a cold or any general fever or inflammation is coming on, a change usually takes place. It becomes more or less harsh, and even rough, small particles of the outer layer of the cuticle being partially detached. The surface, in consequence, feels dry and rough, and when rubbed, bran-like particles, consisting of the scales of old cuticle, are removed.

Very frequently the patient experiences slight uneasiness about the head, perhaps not amounting to actual headache, but a little pain, it may be, over the brow, or heaviness there or at the back of the head, or in the back of the neck, or in all these situations. The pain in the neck

is probably caused by some derangement affecting the nerves distributed to those muscles by the action of which the head is raised and drawn backwards. This pain just below the occiput often lasts for several days and is very troublesome; the slightest movement of the head being difficult in consequence of the pain which is excited.

When a cold or fever is imminent, you usually feel weak and disinclined to take exercise. If it is necessary to walk, you have, as it were, to force yourself to do so. There is little appetite, and perhaps no desire to eat an ordinary meal. Rather than solid food, you feel inclined to take a cup of warm soup or strong beef tea, or ordinary tea or coffee, or gruel, or hot wine and water. There is very generally indeed a demand for fluid when a cold is coming on. You feel dry and thirsty, and almost instinctively seek for water, iced water, or lemonade. It is unquestionably advantageous to take fluids when these sensations, which usher in a cold in the head or other febrile attack, are experienced. For although, as Dr. J. C. B. Williams long ago showed, by resisting the longing for fluid and bearing with the thirst for two or three days, the catarrhal symptoms may be lessened, at least for a time,—the discomfort and distress are often so great that the patient prefers the inconvenience incidental to the cold to the suffering which results from carrying out this dry system of treatment for its relief or cure, and it is doubtful whether the duration of the illness is by that plan in any way shortened. I have thought that in some cases the cold has been cut short by taking plenty of fluid and thereby exciting free action of the skin and kidneys. The premonitory symptoms of a cold are unquestionably often much relieved by a basin of hot soup, or even warm tea or coffee. As you are probably aware, the treatment everywhere most popular is a glass of hot wine or spirits and water. You will hear in every part of the country of cases of various terrible forms of disease which have been at once stopped or cut short by a stiff glass of hot brandy, whiskey, or gin and water. Although the secretion from the mucous membrane may be diminished by withholding fluid for a time, it is also quite certain that general relief of the discomfort and unpleasant symptoms may be obtained from the very opposite system, that of drinking freely of fluids which excite the action of the skin and kidneys, and thus wash out of the system various deleterious matters which have accumulated in the blood.

The Body-heat of Man and Warm-blooded Animals, Fixed and Definite.—The temperature of man and the higher animals in a state of health is fixed within a very limited range, and as I mentioned, in one of my early lectures, it is worthy of note that this fixed and definite temperature of the blood in the case of warm-blooded animals is maintained at the uniform standard, although the temperature of the medium in which the animal lives may vary greatly from time to time. The

temperature of the body is the same in summer and winter, or at the most varies little more than a degree of Fahrenheit's scale. A man in the Polar regions will have the same internal temperature as one living at the Equator. In the cold climate there is very little sensible perspiration. In the hot one perspiration never ceases, and the cuticle is always wet and soddened. By constant changes in the rate at which heat is evolved in and carried off from the body, the internal temperature of the blood is kept very nearly uniform. It is remarkable that the limit of variation in health is so slight, for we may regard it as proved that the blood cannot vary to a greater extent than is represented by two degrees of Fahrenheit, without a departure from the normal state of health. Whether the air be cold or hot—whether a person take violent exercise or lie quietly in a warm bed—whether food be taken frequently or withheld for many hours, the temperature will not exhibit more than a very slight temporary disturbance, and whenever a change does occur the temperature will very soon return to the normal point.

Rise of the Body-heat in all Fevers and Inflammations.—In every form of fever, and in every kind of inflammation, the temperature of the body or of the affected part, and therefore of the blood, rises. You must not forget that although, as I have said, the patient may feel excessively chilly, nay, though he be seized with decided rigors, and is pallid, the face being pinched and almost destitute of colour, or actually livid, and cold to the touch, his limbs trembling and his teeth chattering,—the temperature of his blood will be higher than in the ordinary condition of health. So far from the blood being entirely or only affected, it is more probable that in many cases the rise in temperature begins in the tissues outside the vessels. The blood-corpuscles, as they pass through the capillaries, take heat from one place and distribute it to other parts, so that a considerable rise in one spot may be soon reduced and the heat diffused over a wide area, and thus cause a slight rise in the temperature of the body generally. Even in the flea-bite, if it were possible to place an instrument among the distended capillaries and tissues of the affected part, the temperature, I venture to say, would be found higher than in the tissues just beyond the affected area. In extensive inflammations, as was shown by Mr. Simon, the temperature of the blood which leaves the inflamed part is always decidedly higher than when it passes into it.

There is not a fever known to us in which the temperature does not rise above the normal; neither is there any inflammation which is not characterised by phenomena which occasion the development of an increased degree of heat in the inflamed part. This generalisation is to be extended to all the higher animals. Every creature capable of suffering inflammation or the feverish condition exhibits, during the attack, elevation of temperature. There is, in fact, a very intimate con-

nection between the increased development of heat and the states *Fever* and *Inflammation*, and we may go so far as to affirm that the existence of either of these pathological processes without a rise in the temperature is not possible. In both fever and inflammation it would seem that the circumstances which determine the maintenance of the equable body-heat of health are deranged, either generally, as in the fever, or locally, as in the inflammation. Heat is developed faster than it can be carried off, or the processes by which it is carried off are for the time interfered with, or both circumstances are concerned in determining the rapid rise of temperature which is often observed in various fevers and inflammations of marked intensity.

Is there increased Oxidation in Fever and Inflammation?—This question is one of much importance in reference to the consideration of the real nature of the febrile condition. It would be answered directly and most positively in the affirmative by most pathologists, but, as we shall see, the facts known by no means justify an offhand and confident answer. The secretion from the kidneys of a person suffering from feverishness is usually concentrated and of high specific gravity. You will frequently find it loaded with urates, and often there will be *Excess of Urea*. Deposits of uric acid are common. The *Excess of Urea* is shown in a very simple way. To about half a teaspoonful of the urine in a test-tube you add an equal bulk of strong nitric acid, and plunge the lower part of the tube at once into cold water, shaking it from time to time. In the course of a few minutes crystals of Nitrate of Urea will begin to form, and if the specific gravity of the urine is 1030 or higher, it may become almost solid from the quantity of crystals formed.

The circulation of the blood and the action of the various organs in the body are greatly disturbed, and there is departure from the normal state in many respects, both as regards the chemical processes going on in the blood, and the presence and accumulation in quantity in the circulating fluid of substances which ought to be removed from it in a very dilute state as fast as they are formed and passed into it. Instead of this, many of the excrementitious matters are in such a high degree of concentration that they readily separate from the fluid in which they are dissolved, and in the case of the urine some are deposited soon after the secretion has been passed and has become cool.

These and many other phenomena, which are undoubtedly due to exceptional chemical change, are often set down to excessive oxidation, although a careful consideration of the facts would lead us to entertain the opposite conclusion, that oxidation was deficient, instead of being in excess.

In many books you are told that body-heat is invariably the result of the combination of carbon and other elements with oxygen, that the

increase of temperature in all fevers is due to increased oxidation. There is, however, evidence of a most striking kind that in various morbid conditions in which the temperature of the body considerably exceeds the normal standard, the process of oxidation is much interfered with. If, for instance, a man has one lung solid from the air-cells being plugged up with lymph poured out from the blood, as occurs in pneumonia, is it not unreasonable to maintain that oxidation is going on to a greater extent, or is more complete, than in health? In this case are not the air-cells filled with solid matter, which renders the entrance of air less constant and its renewal quite impossible? And yet we are assured that the elevation of temperature in pneumonia, and in all other febrile and inflammatory states, is due to increased oxidation, and to that alone. Again, the body of a person who has died from a terribly severe attack of acute rheumatism can hardly be considered to be in a state favourable to free oxidation. Nevertheless, the temperature, which at the time of death may be as high as 107° or 108°, often rises three or four degrees of Fahrenheit during the first hour or two after death. How, then, can we reasonably attribute this rise of temperature to increased oxidation? Consider not only that the rise continues for some time after the lungs have ceased to act at all, and the heart can no longer propel a drop of blood along the vessels, but that for many hours or even days before death, the conditions of the body had been most unfavourable to the introduction of air and its free distribution to distant parts, as also to its absorption by the tissues and fluids. We can show that in all probability the high temperature is due to the increased growth of bioplasm, not to increased oxidation.

The generalisation that the elevation of temperature in fever and inflammation is due to increased oxidation is, I think, a grave mistake. It is more probable that the phenomenon is occasioned by changes in the bioplasm or living matter of the blood and tissues of a nature far removed from the process of oxidation. I shall have again to refer to this very interesting subject, and hope to consider it more in detail.

Method of ascertaining the Temperature of the Body.—The actual temperature as indicated by the thermometer is found to vary slightly according to the part of the body which is selected for observation. If, for example, you place the thermometer under the tongue, you will find, as you would anticipate, that it will mark a degree or so higher than if the same instrument is placed in the arm-pit. In medical observations on the body-heat we restrict ourselves to observations in two places—the mouth underneath the tongue, and the arm-pit. But if you try the mouth in the case of children you will not unfrequently have the bulb of your instrument bitten off. Such an accident is serious, for good clinical thermometers cost from twelve to sixteen shillings each. It is, therefore, upon the whole, better to take the temperature in the arm-pit only. In

order that you may be able to compare the records of different cases, you must take care to work in precisely the same way, and to place the thermometer in the arm-pit for at least two minutes if the bulb is a very small one, and for double that time if it is not of the smallest size. You will have little difficulty in using the small thermometer even in the case of the most irritable and violent children. For you can always put it in the arm-pit and keep the child's arm nearly still for the length of time required.

Thermometers for medical observation, *clinical thermometers* as they are called, may be obtained of all the instrument makers. Those with the smallest bulbs respond very quickly and the index comes to a stand in two minutes, or even in less time; but the degrees are small, and more difficult to read off than those of larger instruments, which require to be inserted in the arm-pit for four or more minutes before you can feel sure that the mercury has come to a standstill. Of late a great improvement has been made in the construction of the very small thermometers. The bore is so fine that observers whose eyesight is not the most perfect, often find it difficult to see the index. By grinding the glass away somewhat at the sides and making the front of a greater convexity, the effect of an elongated lens is produced, and the almost invisible mercurial thread is made to appear as a broad band of mercury, which can be seen without the slightest difficulty. These instruments may be obtained of Mr. Hawksley, 357, Oxford Street; Messrs. Matthews, Holborn, and other instrument makers.

Further consideration of the Essential Phenomena of Fever and Inflammation—Rigors and Cold Stage—Hot Stage—Sweating Stage.—When a severe form of fever or inflammation is about to attack a patient, instead of mere chilliness and a sensation of creeping or tingling of the surface skin, an actual rigor is experienced. This is often so intense that the patient trembles in every limb, his teeth chatter, and he feels dreadfully ill. The very bed on which he lies may be perceptibly shaken, so violent and so general is the nerve and muscular disturbance. Among severe inflammatory maladies, a sharp attack of inflammation of the lungs, *Pneumonia*, and among fevers, small-pox, *Variola*, and scarlet fever, *Scarlatina*, are ushered in thus. If you were called to the patient as soon as he was taken ill, you would see his limbs trembling violently, his face pale and anxious, the patient considerably depressed in spirits, and suffering from nausea. And perhaps every now and then violent retching adds to his distress. If you put your hand on his pulse you find it quick, feeble, and small. The temperature will be higher than normal, perhaps by four or five degrees.

It would seem that the blood is diverted from the general surface of the body, and is driven in greater proportion to internal parts,—to the lungs, to the intestines, to the liver, and to other internal organs. These

preliminary symptoms, with the shivering which is developed in a remarkable degree, represent what is known as the "cold stage" of an "intermittent fever." *Ague* is a very remarkable form of feverish attack, inasmuch as the several special stages which are to be traced with more or less distinctness in all fevers and inflammations are very manifest, and are well defined and sharply marked off from one another. In the cold stage, blood not only leaves the surface, but temporarily parts with much of its water, which then occupies the interstices of the tissues. After a time it again enters the blood, or passes off by the intestines, in which case it may be altogether removed from the body as in Diarrhœa, or in Cholera, in which disease the blood becomes of a thick and tarry consistence, and stagnates in many of the vessels, scarcely moving at all in some of the capillaries which are distributed to very important organs of the body.

The shivering and other symptoms which constitute the first indications of derangement in febrile diseases are referable to conditions favouring the formation of deleterious matters in the blood itself. In some cases these are due to changes originating in the organism, in others to the introduction of a poison from without.

The phenomena which mark the accession of a common cold correspond to the cold stage of the ague-fit. I think it probable that the so-called collapse stage of cholera is also analogous to the first stage of the ague-fit, and consider that it represents, only in the most severe form, the general phenomena which usher in every form of febrile and inflammatory malady. It is in a sudden and very severe form of that most terrible disease, Cholera, that we see the cold stage of a fever in its highest conceivable degree of development; for, in fact, the collapse is so severe and so widely spread, so manifestly deranging the action of every tissue and organ in the body, that in too many instances death results in a very short time during this stage. But Cholera, like other febrile affections, has not only its cold stage. If the patient lives, the terrible state of collapse at length gives place to great heat and dryness of skin, and this *hot stage* in turn is followed by a *crisis* or critical change, when the kidneys and skin again resume action. The blood regains its colour and begins to freely flow along its accustomed channels, and the various glands and tissues gradually recover from the shock they have suffered, and return to their normal state. The patient, in fact, soon becomes convalescent. The feverish condition which, in cholera, follows the stage of collapse after a varying interval of time is called Secondary Fever. Happily few of you have seen either a case of ordinary cholera or the secondary fever, which was not so common, but not a few of your teachers have seen and have done their utmost to save many a case. In most epidemics the disease was very fatal during the cold stage, and where very much water had been already drained off

from the blood into the intestinal canal, the patient died in collapse. In some of the cases which recovered the secondary fever was so slight that it attracted little or no attention; but occasionally I have seen it very marked indeed, and have lost patients from secondary fever, who, some days before, had passed through severe collapse and were considered to be recovering. I believe that this febrile stage of cholera corresponds very closely to the prolonged feverish condition characteristic of *typhus* or *typhoid* for example, and to the so-called hot or *febrile stage* of an intermittent. In an ordinary cold the feverish state usually lasts but a very short time, perhaps not longer than from ten to twenty-four hours. In *typhoid fever*, however, it may last for six weeks or more; and in acute rheumatism it may extend over two months. During the whole of this long period the temperature of the patient's blood may not once, even for a single hour, fall to the normal standard; though in many cases it falls and rises several times in the course of the attack, passing three or four degrees above the normal, and then perhaps going down to that point when the temperature is above the normal, again rising, and so on. In an ordinary cold or catarrh the chilly stage is usually followed in the course of five or six hours by free perspiration, which immediately brings down the temperature and brings relief, and in many instances the patient recovers at once.

In fevers and extensive inflammations the nervous system generally is affected. In some forms the action of the brain is very much disturbed. Soon after the preliminary phenomena of the common cold have occurred, the pulse increases in frequency, and there is, possibly, severe headache, the whole of the head perhaps feeling full, almost to bursting, as if it had been forcibly distended with more than it could properly contain. The action of the mind is affected. No one at this time can perform much intellectual work. His memory suffers, and to think at all is a painful effort. He probably feels more inclined to lie down and do nothing. If he goes to bed, instead of falling asleep he tosses about from one side to the other in an uncomfortable way; perhaps he dreams of horrible things, and wakes up suddenly, finding his mouth, fauces, and tongue dry and uncomfortable. There will be still more or less feeling of fulness and distension about the head. The patient again tries to go to sleep, only to be disturbed by more unpleasant dreams and to wake again, perhaps frightened, in a short time. Oftentimes the chilliness persists, or a creeping sensation is experienced over the general surface. The muscles seem to be fatigued, and there is a general feeling of lassitude. These phenomena indicate a widespread disturbance of the nervous system, cerebral, spinal, and ganglionic, caused probably by the action upon the nerves and nerve-centres of certain materials which ought to have been eliminated, but which have unduly accumulated in the blood.

Such are some of the broad phenomena which almost everyone has experienced, who has taken a bad cold or has suffered from any form of fever. In severe and specific fevers and general inflammations, all these nerve phenomena are more strikingly developed, and trouble the patient for a longer period of time. In any well-developed fever, for instance, the patients may pass many sleepless nights. They may be troubled with headache for a fortnight or three weeks, or even longer, and may be restless and wakeful during the whole of the time.

The chilly sensation, like the *cold stage* of an ague-fit, is succeeded after a varying period of time by a very different state of things. The blood returns in volumes to the surface of the body. The little arteries dilate, the capillaries are distended, the colour returns and is intensified, and the skin becomes hot to the feel, but it remains dry. There is often headache and the patient will perhaps tell you that his head feels ready to burst. This is the *hot stage*, which is soon followed by the last or *sweating stage*. The skin is bathed with perspiration, which continues it may be for several hours, so that the cuticle becomes completely soddened and softened. In this way a quantity of water with certain organic matters dissolved in it, and often amounting to several pounds in weight, is very quickly removed from the blood.

Of Free Secretion which leads to Recovery.—The action of the skin and other excreting organs of the body, which had been partially suspended during the accession of the attack, and in many cases for some days before, is a general fact of great importance, and marks the temporary abatement or actual cessation of all febrile and inflammatory disorders. Now if these phenomena can be caused to come on somewhat earlier than in the natural course of events, the duration of the febrile or inflammatory attack is to that extent reduced. As soon as the sweating comes on the patient may feel relieved, but until it has occurred he may experience much discomfort. Till then you may have felt very anxious about the case. We are unfortunately unable to ascertain at the commencement of the attack how bad the patient is likely to be; we never know to what extent the grave symptoms of the malady may continue to increase, or for how long a time the patient will continue to get worse. Until sweating and free secretion have occurred we can seldom judge as to the probability of recovery, or the duration of the time of illness.

Recovery from every febrile illness is associated with the gradual removal from the organism of substances which probably have been accumulating for some time in the blood and nutrient fluids. These substances are slowly removed by the agency of the kidneys, skin, bowels, and other emunctories. When the skin acts pretty freely, you become thirsty and imbibe a quantity of fluid, which is again quickly removed by the kidneys. For some time before the illness and during

part of the attack the bowels may have been confined, or have only acted imperfectly, especially when the febrile action was most intense. The glands of the mucous membrane of the intestinal canal, like other glands, do not act as freely in the early period of a cold as they should do. When, however, the patient returns to the normal condition these glands resume work, and the tendency to constipation and defective excretory action passes off.

Moreover, as the feverishness abates, there will be exaggerated action of several glands as compared with their activity in the ordinary state of health. Not only do the kidneys and the cutaneous glands act in an unusual way for some time after recovery, but the glands of the mucous membrane of the nose and those of the mucous membrane of the air tubes also continue to secrete freely for some time. Many of us while in perfect health might leave our pocket-handkerchiefs behind without experiencing inconvenience, but when suffering from a cold it is well not to be neglectful. A quantity of secretion is poured out from the mucous membrane of the nose, and in many cases also from that of the wind-pipe and bronchial tubes, and this exaggerated secretion often continues for some time after we seem to be pretty well.

The "secretion" I am speaking of is modified mucus with much fluid associated with it. In the healthy state the mucus which is formed is extremely small in amount and very tenacious. This mucus is principally produced in minute glands connected with the mucous membrane and which open upon its free surface. The same glands, when the fever of an ordinary cold is passing off, secrete an undue quantity of a diluted and sometimes fluid mucus. Exaggerated action proceeds in connection with all the mucous surfaces, and persists for a certain period of time, varying from twelve or twenty-four hours to many days. The patient then usually gets better, and everything slowly returns to its normal rate of action.

Now this very free secretion in certain cases is a matter of serious importance. There are certain forms of inflammation of the mucous membrane of the air-tubes, including the nasal passages, in which there may be an undue secretion of altered mucus, amounting to six or eight ounces in the twenty-four hours. In some sad cases, happily not very common, an excessive quantity of secretion is so quickly poured out, that it accumulates in the smaller air-tubes and death may be caused by suffocation in the course of a few hours.

The mucous membrane of some persons' air-tubes is constantly in so sensitive and irritable a state, that whenever the weather is either cold or damp they suffer more or less. Such patients ought to spend their winter in a warmer climate, where they can be out in the open air almost daily, for if they remain in London they generally have to be shut up in warm rooms for a great part of the winter—a course very

detrimental to the general health, and likely to render the mucous membrane still more irritable, and of course more sensitive to adverse atmospheric changes as life advances.

Coryza is the scientific name for a cold associated with the secretion and removal of a considerable quantity of fluid secretion and viscid mucus from the secreting follicles and surface of that part of the mucous membrane which lines the nasal passages and adjoining cavities. *Catarrh* and *Gravedo* are terms applied to a cold in the head. The word Coryza, κορύζα, is supposed to be derived from κόρος or κάρα, the head, and ζέω, to boil. I am not, however, sure whether this derivation is perfectly accurate. The condition was, perhaps, so called because some people, suffering from a very bad cold, said that they felt as if the blood in the head was in a boiling state.

OF THE PRINCIPLES UPON WHICH THE TREATMENT OF A COLD SHOULD BE CONDUCTED.

As regards treatment, I suppose many would say "let a cold alone," "it will get well of itself," "do nothing." I am quite ready to admit that an ordinary cold will get well without any active treatment. Nevertheless, a bad cold is a very unpleasant affection in many ways, and it is desirable to mitigate its severity, and shorten the attack, if we can do so. Besides, as I shall have to explain, many serious maladies in their early stage may be easily mistaken for an ordinary cold, and in many cases real advantage does result from the early adoption of judicious treatment. We will therefore endeavour to decide as to the principles according to which the treatment of a cold and allied derangements should be conducted.

The phenomena characteristic of an ordinary cold, as I have just remarked, are present during the period of accession of many forms of fever, and sometimes in a greatly intensified state. You ought, therefore, to know whether, and by what means, these symptoms may be modified, or the changes which usher in convalescence encouraged, so that the latter be made to occur somewhat earlier than they would do if the malady ran its ordinary course. Obviously the thing to try to do, in the treatment of maladies of the class we are considering, is to bring on the period of perspiration as early as possible, and to excite the action of the various glands of the body.

The blood has been diverted from the surface to the internal organs of the body, and we want, if we can, to determine its flow towards the skin, in order that much of its water and some of its organic constituents may be removed by the glands and discharged in the form of perspiration. External warmth will relieve the feeling experienced when a cold is coming on, and I think that sometimes

the malady, and possibly some severe acute affections, may be cut short in this way. The patient is told to get into a warm bed, or to take a warm bath. But the application of cold externally has been as strongly recommended as warmth, and for the very same purpose in the same case; and you might be led to suppose that here, as in some other instances, opposite and conflicting practices had been advised and adopted for the relief of the very same malady. But this is not really so, for whether you wrap a patient in a sheet dipped in warm water or in cold water, it makes very little difference, except that a cold sheet is somewhat more disagreeable to the patient than a warm one. Cold wet packing will bring about just the same action as warm packing or a warm bath. For the chilly feeling produced by the first contact of the cold wet sheet is soon followed by reaction, and is replaced by a gentle glow succeeded by free perspiration.

Diet.—In treating a severe cold it is necessary to bear in mind that the regulation of the diet is a matter of importance. The patient for a few days should be kept on liquid food, good strong beef tea or ox tail soup, or milk or bread and milk only being allowed, and in small quantities at a time at short intervals, the patient not going for more than three hours without nourishment. Wine, brandy, or whiskey, in doses of one or two teaspoonfuls at about the same intervals, the quantity being increased if the patient gets worse and becomes weaker.

Diuretics.—But besides trying to excite perspiration, you may endeavour to cause various eliminating organs to act freely. You should give unirritating diuretic remedies, such as *Liquor Ammoniæ Acetatis*, *Citrate of Ammonia*, *Citrate of Potash*, *Nitrate of Potash*, and *Chlorate of Potash*. These all act more or less upon the kidneys, and increase the flow of urine; some of them act upon the skin, and in other ways promote the removal from the blood of noxious substances which have accumulated in it. They and many other remedies are thus of use in the treatment of an ordinary cold as well as allied ailments. I often suggest the following prescription:—Spirit of Mindererus (*Liquor Ammoniæ Acetatis*), two ounces; Spirit of Chloroform (*Spiritus Chloroformi*), from one to two drachms; Nitrate of Potash (*Potassæ Nitras*), sixty grains; or Chlorate of Potash (*Potassæ Chloras*), from one to two hundred grains; Syrup of Orange, of Squill, or of Tolu, half an ounce, and water to six ounces. The dose is half an ounce, or a table-spoonful, with as much water, once in two hours, or less frequently, for three or four days.

Purgatives.—And lastly, the elimination of noxious matters which have accumulated in the blood may be further promoted by exciting to a moderate extent the action of the intestinal canal. In a cold the bowels are generally more or less confined, and in many cases there has been but imperfect action, perhaps, for some time previous to the attack.

I therefore recommend you to make full inquiry upon this point, and if necessary order for the patient some mild laxative that will act upon the bowels and favour excretion. Thus you may perhaps shorten by a day or two the period of the duration of the cold. In the highly feverish condition which often comes on soon after a surgical operation, relief may be afforded in the course of a few hours, by the administration of purgatives, sudorifics, and diuretics. One or two grains of *Calomel* or gray powder will be found to act admirably in many of the most serious of these cases. The temperature falls soon after the dose has been taken, and the patient often experiences great relief long before the medicine begins to act on the bowels.

The fact of improvement so immediately following the use of remedies which increase the action of the skin, kidneys, and bowels, favours the conclusion that the fever is due to the accumulation of certain materials in the blood, the elimination of which is followed by relief, and, as we say, the resolution of the fever. It is important to consider these matters, the more so just now, because there is too great a tendency to altogether discard the use of many medicines which are of great value in the treatment of disease.

If the disease you are called upon to treat should be only a common cold, you will, nevertheless, find in practice that many persons who experience suffering, discomfort, or even mere inconvenience, strongly desire to be relieved of their troubles, and as quickly as possible. Of the sick who send for you a considerable proportion will certainly expect that you will *do something for them.* If you were in the same condition yourself you might be inclined to leave the case to nature and not to take any medicine nor desire to follow any course more unusual than indulging in a little more rest than when in good health, but your patient will expect you to prescribe something that will relieve him or help him to get well, and I have known distinguished practitioners when ailing as anxious as the most unlearned patients "to have something done for them." Unquestionably you may help persons suffering from a severe cold if you give sudorifics, diuretics, and a gentle purgative, and perhaps a little ammonia or mild alcoholic stimulant.

OF FEVER WHICH BEGINS LIKE AN ORDINARY COLD.

Some cases, which at the outset seem to be nothing more than an ordinary cold or catarrh, do not prove to be of this nature, but issue in some form of serious acute disease. Those terrible fevers which occur in all the large cities of Europe, and which carry off so many thousands every year, may come on just as an ordinary cold does. During the period of accession the symptoms are much the same, and both the patient and his doctor may for some days think there is not much the

matter. The patient feels so strongly convinced that he is suffering only from an ordinary cold, that he goes about just as usual. When, however, he gets worse from day to day, and feels decidedly weaker, he begins to be alarmed. At length he is obliged to take to his bed, his temperature is found to be and to remain above the normal, perhaps rising to 102° and 103°. By this time the practitioner is able to determine the nature of the case. Instead of the attack being as the patient himself supposed, an ordinary cold, it perhaps turns out to be a specific fever of a kind which not unfrequently destroys life. It may be that under the most favourable circumstances, and with the best nursing and medical treatment, the rate of mortality will not be less than one out of every eight or ten attacked by the disease. It is a fact that many serious attacks of fever begin just like an ordinary cold. Now if you happen to be called in just when the fever is coming on, and you thoughtlessly remark that "this is only an ordinary cold, I need not do anything,"—think of the dilemma in which you may be placed. When the severe nature of the disease becomes apparent, you will be, as it were, convicted of having made a very serious mistake. Very likely neither the patient nor his friends will have any further confidence in you, and you may be pronounced to be an ignorant person who knows very little about his profession. You may in consequence get out of heart and feel altogether dissatisfied with yourself. Possibly even the most sagacious and experienced practitioner would have known no better, but he would not have committed himself to a definite opinion. As a fact it may have been impossible for any one to diagnose the case at the very early period of the attack, but the right course would have been to have waited until the premonitory symptoms had begun to pass off, or until some definite characteristics of a special malady had manifested themselves. You should always carefully inquire into all the facts of any given case, listen attentively to what the patient has to say concerning the symptoms which disturb him, and do all you can to relieve them, but postpone any decided expression of opinion as to the precise nature of the disease until the facts of the case enable you to speak with definiteness and decision.

Especially in the case of children is it necessary to be very cautious before committing yourself to a positive opinion at an early period of a febrile attack. You may mistake a serious case for a slight one, or the reverse. You will be astonished at the very serious aspect sometimes presented by many a case of mere stomach disturbance. A child who has partaken of unripe fruit may be very ill indeed a few hours afterwards, with a temperature of 104°, flushed face, quick pulse and respiration, with a suffering, anxious look. An inexperienced practitioner would perhaps tell the friends that some severe fever or other acute disease was certainly about to establish itself, when perhaps a few hours

afterwards the bowels act, the temperature falls to the normal, and when he next visits his patient he finds him well, and the friends laughing about his gloomy prognostications.

In children suffering from slight ailments, I have observed the temperature rise from the normal to 104°, or even higher, and descend to the normal, within twenty-four hours—so rapidly may considerable changes in the temperature of the blood of children occur. Such cases, I need scarcely say, require simple treatment. A purgative dose of castor oil is sometimes needed, and the patient is well again as soon as it operates. The child, as often happens, is very thirsty, and you may allow it to drink water. Plenty of *toast and water* may be given, or plain water if the patient likes it better, provided it has been well boiled. Water, or milk and water, will help the skin and kidneys and bowels to act freely, and in consequence the feverishness will subside, and the patient regain the usual state of health. Sometimes, however, a feverish attack, instead of subsiding, continues for several days. Sometimes, after a feverish attack, a child may be ill for a week or two, and require careful management, although there may be no fresh fever. Again, although neither scarlet fever nor typhus fever, nor any other specific disease may be manifested, a general feverish state may be established and may continue for several days, and then gradually subside, leaving the patient thin and weak and for some time out of health.

It must be admitted, that in former days many doctors gave too much physic, and were somewhat too fussy. In these days, however, I fear there is a tendency, or more than a tendency, to err in an opposite direction. Some practitioners, having convinced themselves, seem to be most anxious to convince the public and the profession that the chief duty of a medical adviser is to study, note, and carefully watch the progress of a malady,—to observe, if he is qualified to do so, the minute changes taking place in the tissues of the sick man, in order that he may discover facts which will increase our knowledge of the nature of the pathological processes, and possibly lead to the enunciation of new principles of treatment for the benefit of sufferers in the next and succeeding generations. But this view of medical aspiration is not always appreciated by the patient, especially if the doctor's visits are not purely of an honorary character, and even then it will be found that there are some few patients so peculiar in their notions as to object to their bodies being used for observation, or their sufferings studied and noted as interesting pathological phenomena, which may be further elucidated as the case proceeds. You must really bear in mind that patients want to be relieved as well as watched, and unless you can be of some use to them,—unless you can advise and help them, they may regard you as a nuisance instead of discovering in you a consolation. But further, we really ought to do all we can not only to remove bodily

aches and pains, but also to relieve our patients' minds. You will not reduce the mental anxiety of a sick man if you tell him you can do nothing to relieve his pain, nothing to expedite his recovery, nothing to avert impending morbid change, or to mitigate the severity of the disease. I find that some doctors, if they get ill, even though the illness is obviously not a serious one, become very anxious, and of all sick people they are oftentimes the most difficult to manage. They usually think themselves worse than they are, and are almost invariably desirous that something *practical* should be done. I have sometimes ventured to discuss with a medical friend the actual nature and import of the symptoms from which he was suffering, but I generally find that my friend is sadly disappointed if I do not propose to "do something" for him or suggest some operation to relieve him. If I remark to a medical patient that the malady will probably get well of itself, he perhaps feels disappointed, if not hurt, but if I propose that he should take a few doses of the Liquor Ammoniæ Acetatis, Nitrate or Chlorate of Potash, and Sal Volatile, a practitioner of even a philosophical turn of mind will feel quite happy, and take the medicine ordered with regularity, and bear his ailment with cheerfulness.

Bear in mind the principles upon which the treatment of an ordinary febrile attack is to be conducted, and be careful not to commit yourselves too hastily to a positive opinion as to the exact nature of feverishness which has only lately come on. It is important not to make too light of it on the one hand, or on the other to cause needless alarm by suggesting to anxious friends that what is probably only a most trifling and unimportant temporary derangement may turn out to be a grave disorder.

Now it is probable that many of the attacks we meet with, severe though they be, but which are not followed by serious illness, are due to ptomaines or other poisonous matters which are formed in the blood and very soon excreted. A patient feels suddenly ill; there are nausea, chilliness, and even very decided rigors. In many such cases there is actual pain in most of the muscles concerned in walking, as well as in most of the joints, sometimes so distinct and severe as to raise in the patient's mind, especially if he is a doctor, visions of an attack of acute rheumatism or rheumatic fever, or the breath may be quick with or without sharp pain in the side, and he thinks he is in for an attack of pleuro-pneumonia or pleurisy. He cannot take food, he totters if he attempts to walk, his hands tremble, his teeth chatter, and he feels altogether prostrate. The condition must not be mistaken for the effects of drink. Naturally a patient in such a state looks for a warm bed at once. In an hour or two of this first, and most sensible of all, remedial measures he gets into a profuse sweat, and continues to perspire freely for several hours. In the morning he feels almost well,

though perhaps a little weak, but this feeling passes off in the course of the day, and within twenty-four hours he returns to his usual state of health, and is able to work as usual.

Whether the sudden attack ends within twenty-four hours in complete recovery or ushers in an illness, which may extend over several weeks, requiring good nursing and careful management, and in which there may be danger to life, seems to depend, at least in many cases, upon the general state of the patient when attacked. If he happen to be a person who has lived freely, eating and drinking largely in proportion to the hard work he performs, there will soon accumulate in his organism an amount of noxious matters too considerable to be excreted at once, and the illness soon follows. If he be a small feeder and his excreting organs in good order, he gets well at once. If in either case he have exceptionally active eliminating apparatus, he is seized with sudden diarrhœa, perspires very freely, and passes a large quantity of water, but is not even threatened with any definite derangement in any tissues or organs whatever.

If we think over these points we shall see why the treatment recommended is so successful in bringing about the return of the natural state of health. We also see why a full blooded, freely eating and drinking man should have an active, quickly acting, purgative—two or three grains of calomel, to be followed by a senna draught or a dose of castor oil. In this way the old doctor would say "we cut short" many an attack of acute disease, and I think he was right. Then we give diuretics —Effervescing Citrate of Magnesia or other saline, or plenty of linseed tea, or two or three pints or more of plain water, or soda water, if the patient prefer it, in the course of twenty-four hours.

If the patient is, and has been, a small eater and a water drinker, he will be all right after a night's perspiration. If the attack occurs in winter, a good fire, a hot bath, putting the feet in hot water, a glass of hot brandy and water will excite the desired perspiration. In addition, sudorific and diuretic remedies, with plenty of water, may be given.

THE ACTUAL CHANGES IN FEVER AND INFLAMMATION.

Although we have much to learn concerning the causation of many slight pathological changes, several highly interesting facts have been recently added to our knowledge as regards the origin of the febrile state. While fever is undoubtedly caused in many cases by the introduction from without of some poisonous material which enters the blood, and then multiplies a thousand-fold, it is quite certain that a feverish state may be engendered by the accumulation in the blood of certain excrementitious substances which are ordinarily excreted as fast, or nearly as fast, as they are produced, and perhaps also of certain

chemical compounds which have not reached the full degree of oxidation they would have obtained in a perfectly healthy state of the system and normal condition of the circulating fluid. Again, exceptionally hot weather will give rise to a feverish state in many persons, especially if at the time they have subjected themselves to over-exertion. The fever established under these circumstances is not unfrequently of a very severe form, and sometimes it is fatal. Excellent accounts have been given of it by writers on tropical diseases.

Over-exertion, violent and long-continued muscular action may be followed by a state of high fever lasting, perhaps, for many days, and this may happen in the case of persons who have been in perfect health up to the time of the attack. "The Fever of over-exertion" by Dr. Knott, "Transactions of the Royal Academy of Medicine in Ireland, 1888." A form of "Fatigue fever" is said to be induced by excessive brain work. This is one of the conditions which is said to result from over-pressure in schools. M. Peter has described the symptoms as observed by him in some children attending French schools. I have not myself seen instances of this and many of the other disturbances of the health attributed to over-pressure in schools in England. No doubt such cases are occasionally met with, but, as far as I can judge, there is no conclusive evidence of health disturbance being frequently caused by undue mental exertion in more than a very few exceptional cases—indeed, my own opinion is that there is more suffering from too little than from too much brain work.

I will now consider more particularly the actual phenomena of Fevers and Inflammations, and the general nature of the minute changes upon which they depend. I have already pressed upon your attention the important fact that in all fevers and inflammations there is an elevation of temperature. Whether the rise begins in the blood or in the tissues outside the capillaries, is a question concerning which some difference of opinion may be entertained. In some cases, it is certain that the tissue elements exhibit the earliest departure from the normal state, and in all probability it is there that the rise in temperature begins. But the blood is soon affected, for in all cases the blood in the adjacent capillaries becomes hotter, and the heat is distributed by the movements of the blood, and the red blood corpuscles are the principal agents in this distribution of heat. On the other hand there is reason to think that in some fevers and inflammations the change in the blood itself constitutes the first departure.

In every form of marked inflammation and fever, the vessels of the affected part contain more blood than they do in the normal state. The capillary vessels and the small veins are distended. If you watch the phenomena of local inflammation in one of the lower animals, as for example that form which may be excited in the web of the frog's foot

by the application to one spot of a small portion of mustard for a few minutes, and carefully observe the alteration in the circulation thereby induced, you will gain much important information concerning the nature of the vascular part of the phenomena. You will notice in the first place that the vessels have become much dilated, while the movement of the blood along them gets slower and slower. At last the circulation completely stops. If at this stage of pathological change the mustard be removed and the web be kept perfectly moist, it will be found that the movement of the blood will begin again, and that much of it will find its way on to the small veins. The vascular distension passes off, and the capillaries resume their normal calibre. In fact the normal state of the circulation will be restored, and without any damage whatever to vessels, nerves, or other tissues having taken place.

In fever there can be no doubt that the same sort of change occurs in the capillaries as in inflammation, but the degree of change, though widely spread, is so slight in any one spot that it is not in all cases to be demonstrated. You may look upon an ordinary cold as a slight fever, while a chilblain may be adduced as an example of a slight inflammation.

Some authorities consider that febrile disorders should be classed among nerve disorders, and the arguments advanced in favour of this view also apply to the case of inflammations. But would it not be unreasonable to include flea-bites, and boils, and abscesses, scarlatina, typhus, and measles in the class of nervous disorders? Nerves and nerves-centres are invariably affected in all fevers and inflammations, however slight, and indeed no changes involving alterations in the diameter of the small arteries can take place in the body without nerves being concerned. The essential phenomena both of fever and inflammation are intimately connected with disturbed arterial and capillary action, but these conditions can hardly be regarded as nerve diseases. The pathological action does not begin in nerve structures, and the nerves and nerve-centres, so far from being the points of departure of the morbid change, are only affected in consequence of preliminary changes in the blood or textures, or in both.

The phenomena of some fevers and general inflammations are due to changes which have taken place in the blood, and there is, as I have remarked, undoubted evidence of the blood being, as it were, the starting point of all the phenomena. The disease begins in the blood. A poison, or *materies morbi*, may infect the blood in the first instance, and through the blood various tissues and organs may suffer. It is very probable, I think, that the afferent nerve-fibres distributed to the capillary vessels are disturbed either by the action upon them of the altered fluid which transudes through the vascular walls, or, in certain cases, by the growth and multiplication around them of minute particles

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of morbid bioplasm, which, leaving the blood in countless numbers, traverse the thin walls of the capillaries, and pass into the interstices of the surrounding textures. In Scarlet Fever (*Scarlatina*) the "rash depends upon the capillaries of the surface of the skin being dilated to such an extent that the redness of the affected parts is as intense as that of the skin of the lips in the ordinary state. The bright red colour of the skin of the lips is due, as you are probably aware, to the number and considerable diameter of the capillaries of the skin of the part, and to the circumstance that these vessels are covered by a thin layer of epithelium only. In scarlet fever the redness is due to a dilatation of the vessels, somewhat like that which occurs in those of the skin of the cheek when we blush. In the fever, however, the blush lasts for a much longer time. The period of vascular congestion of the cutaneous capillaries is, in most febrile diseases, fixed and definite, but it varies considerably in duration as well as in the course which it takes in different kinds of fever. In eruptive fevers then, and in some general inflammations, the "eruption" or "rash" is caused by the dilatation of the capillary vessels, which lasts for a certain time. The mechanism instrumental in bringing about the result and the precise changes taking place in the vessels are considered in page 318. I do not say that the redness of the skin is due to *increased supply of blood, for probably a less proportion of blood goes to the part than in the normal state.* In a given time less blood passes along the vessels, but they are distended, and more blood remains in them; their walls, being stretched, are much thinner and are more permeable than in the normal state. The blood is not usually stagnant, but it circulates very slowly.

Slight exposure of a part of the body to cold may cause a severe febrile attack. In considering how cold operates, I think we shall find the following explanation in accordance with the broad facts of the case:—The heart's action being at the time feeble, blood will be flowing but slowly through the capillaries of the skin. The blood will therefore, for a much longer time than usual, be exposed to the detrimental influence of cold. No wonder that under such circumstances chemical changes of an unusual kind are induced. Substances are formed which injuriously affect the tissues and interfere with the proper performance of many of the normal phenomena of secretion and nutrition. The noxious materials dissolved in the fluid, transuding with it through the walls of the capillaries, would come in contact with the delicate nerve-fibres, and disturb their action. As long as such matters remain in the blood, there must be in many ways a departure from the healthy state, but as soon as these compounds have been eliminated, the organism will be restored to its normal condition. For these reasons the free action of organs concerned in excretion is, as I have already stated, of the first importance, and is associated with the

subsidence of the fever, and the discomfort which accompanies the attack.

FEVERS AND INFLAMMATIONS.

There are several affections which may be correctly termed either *fevers* or *inflammations*. If in many cases you looked at the local phenomena only, you would use the term *inflammation*, while to the general symptoms consequent upon the local change and varying with it in intensity, you would apply the term *fever*. Not only is inflammation the cause of fever, but fever in many cases leads to inflammation. In truth, there is no inflammation without a degree of fever, and there is no fever in which the phenomena essential to inflammation are entirely absent. That which is common to both—to all fevers and to all inflammations—is the increased growth of bioplasm, consequent upon increased facility of access, or of the greater abundance or greater permeating property of the nutrient fluid. This increased growth of the living matter is invariably associated with a rise in the temperature of the tissue or organ in which it takes place, above the normal standard. *Erysipelas* may be fairly called an inflammation, though in many respects it exhibits all the characteristics of a fever. In the slightest local inflammation, however limited its area may be, a flea-bite for example, the phenomena are essentially the same as in a fever, only they are limited to a particular spot. If you consider the actual changes which occur in both pathological states, you will find that they approach so nearly in their essential features, as to justify the generalisation that *Inflammation is a local fever, and Fever is a general inflammation.*

If we consider the actual phenomena of fever and inflammation, as they are revealed by careful microscopical examination of complex tissues involved, we shall find that we have :—1. *Temporary enlargement or dilatation of the capillary vessels, which soon become filled with blood.* 2. *If this state of the vessels lasts for a time, exudation of fluid occurs and minute particles of bioplasm pass through the capillary walls, and grow and multiply in the new situation.* 3. *The bioplasts of the vessels, nerve-fibres, and other tissues, being supplied with more nutrient matter than in the ordinary state, grow larger and tend to divide and subdivide.*

The particles of *bioplasm*, or *living matter*, in all the tissues and fluids affected are invariably enlarged in all *fevers* and *inflammations*. I believe it to be impossible for fever or inflammation to occur without this enlargement of the bioplasts or particles of living matter, without the temporary increase of the living matter of the part of the body affected. The living particles always experience increased nutrition under the conditions present when fever or inflammation exists, and this phenomenon—this increase of the bioplasm—is invariably associated with

a rise in the temperature of the part. Rise in body-heat in fever and inflammation is constant, and I must ask you to note the important fact that this remarkable rise in temperature is invariably associated with *slow and impeded capillary circulation, with the exudation of fluid and of minute particles of living matter from the blood, and with the increased nutrition and growth of bioplasm.* So far from depending upon *increased oxidation*, inflammation and fever often coincide with impaired respiratory function, and the introduction into the blood of far less oxygen than in health, and with the formation and removal of less than the ordinary proportion of carbonic acid.

Slight fevers and inflammations do not necessarily result in permanent tissue changes. Many leave no traces behind them. There may be no degeneration of any tissue in the body, no structural change, no evidence left of the attack. After a fever or inflammation the organism may be left precisely as it was before the attack occurred. Nay, one or more attacks of feverishness during early life seem to be the rule. Almost every child suffers; and amongst young vertebrate animals, dogs for instance, attacks of feverishness occur in almost every individual, and the disease, especially in varieties having delicate constitutions, is often fatal. In many cases, however, the feverishness after a few days passes off, leaving no structural change or damage.

OF A FLEA-BITE.

If we thoroughly understood the phenomena which result from the "bite" of a common flea, we should know very much more about the exact nature of the changes which occur in serious inflammations and fevers than we do at present. Possibly, also, such information might enable us to suggest means by which an attack might be prevented, or at least an inflammation kept from spreading until a considerable extent of the surface of the body was involved in the disease.

You may remember, that, in one of my early lectures, I described how by the minute but exquisitely sharp lancet of an insect the formed material of a cell of cuticle might be easily injured, and in such a manner that a part of the bioplasm in its interior would be exposed to the contact of the nutrient fluid which moistens the tissue. I showed that, under the circumstances, the access of the surrounding nutrient material to the bioplasm in the interior of the cell must be greatly facilitated. It is obvious that much more nutrient matter would reach the bioplasm in a given time when the so-called cell wall was thus damaged than when it was intact. In the normal condition of the cell, every particle of nutrient fluid must slowly permeate the thick layer of formed material which constitutes the outer part of the cell, the so-called cell-wall, before it can reach the bioplasm and be assimilated by it. On

the other hand, when the formed material has been torn, nutrient fluid will pass at once to the bioplasm, and come into immediate contact with it. As the ordinary formed material or "cell-wall" consists of several layers of firm cuticular matter, not very permeable, the ordinary passage of soluble nutrient substances through it must necessarily be a slow process. But when the formed material is injured so that the bioplasm is exposed, the access is free and the pabulum is at once appropriated. The result is the rapid increase of the bioplasm or living matter. Outgrowths or diverticula soon make their appearance at different parts of the circumference of the mass. Some of these are from time to time detached, and being freely supplied with pabulum they grow, and multitudes of separate masses of bioplasm quickly result. These are *pus-corpuscles*, many of which may in this way be formed from the bioplasm of an epithelium cell in a short time.

Pus may result in the course of a few hours by the growth and subdivision of any form of bioplasm if it be supplied with an unusual amount of pabulum. The appropriate pabulum coming into contact with the bioplasm, the latter *must* take it up and *grow*. If the excess of pabulum were not taken up by the bioplasm and converted into the quickly growing living matter, *pus*, it would become decomposed, and the products resulting from decomposition would infallibly cause the death of every particle of bioplasm in the neighbourhood. "Mortification" of a portion of the affected tissue would result. The bioplasm of any tissue, then, as well as that of which colourless blood-corpuscles and lymph-corpuscles are composed, may give rise to a form of bioplasm—pus—a kind of living matter having general powers and properties, irrespective of the particular form of normal bioplasm from which the "pus" may have been derived. The formation of pus from the bioplasm of an epithelial cell may be studied in the epithelium of the skin, as well as in that of the air-tubes, the bladder, and other mucous surfaces. If living pus be examined, active *vital movements* will be observed in almost every corpuscle; and I beg you to study these wonderful movements for yourselves, and ponder over them, for they are worthy of your thoughts. *See* p. 329, *also* "Disease Germs" or "The Microscope in Medicine," 4th edition.

We are just now, however, chiefly concerned with the changes which occur in the true skin *beneath the epithelial layer*, in an ordinary flea-bite. These involve the vessels and the spaces and tissue around, and the nerve-fibres, and are of the highest interest. The lancet of the flea, I need scarcely tell you, goes deeper than the deepest layer of the cuticle, for it penetrates the vessels and occasions changes in the capillaries as well as in other tissues of the skin, and invariably damages one or more fine nerve-fibres. This is of importance, inasmuch as the change affords an excellent illustration of the remarkable phenomena which occur in

inflammation of a complex tissue. Here we have a comparatively circumscribed inflammation admirably adapted for the investigation of the actual phenomena which constitute the inflammatory process as it occurs in a compound tissue, like the true skin. In consequence of the wound inflicted upon the capillary vessels, there is a slight escape of blood into the adjacent tissues. This hæmorrhage gives rise to a very small deep red punctum or spot, which does not disappear on pressure, called a *petechia* (from the Italian *Petechio*, a flea-bite). The important fact to which I wish to direct your attention, is not the petechia caused by the escape of a minute quantity of blood, but the less intensely red area around it, which disappears when the finger is pressed upon it, because the blood is for a moment driven out of the distended capillaries. A short time after the lancet of the flea has penetrated the cuticle and subjacent tissues, there appears this bright red blush for a certain distance around the point which indicates the position of the wound. The area forming the round red spot, with the appearance of which most of those working in hospitals are familiar, is of the same diameter in all cases where the lancet of the flea is of the same size, the wound of the same depth, and the irritating poison discharged the same in amount.

In the case of an ordinary flea-bite, then, the injury is not confined to the particular portion of tissue transfixed and injured by the lancet, but the disturbance extends to a definite distance around. Those who have not studied flea-bites should do so, and I need hardly assure you that you have abundant opportunities in the wards of the hospital for the observation of flea-bites in every stage of change—from the most recently inflicted injury to the case in which the redness is disappearing and the bright red tint is giving place to the ordinary colour of the adjacent skin.

If in a recent bite you carefully notice the redness, you will observe that the red blush ceases at a definite line; the red tint does not *gradually* shade off into the hue of the surrounding skin, but the red limiting line is abrupt, and, if the skin happens to be pale, what is seen is a little circular patch, about the one-eighth of an inch or more in diameter. This area is of a bright red colour, almost as red as the cheek, and if you look closely you may often see a dark spot in the centre, which, as I have said, is the perforation made by the lancet of the insect, rendered evident by the passage into it of a little blood. Now there is no doubt that the redness depends upon the distension of the capillaries by blood. These little vessels obviously contain much more blood than they do in their usual state. As regards the precise manner in which this redness is produced, there is, however, room for some difference of opinion, and we have indeed yet much to learn in connection with this interesting phenomenon. There can be no doubt that the capillaries of the red area contain twice or three times as much blood

as do the contiguous capillaries of the skin continuous with them. Now you are probably aware that when we blush, the cutaneous capillaries of the cheeks are suddenly distended, their diameter, of course, being considerably increased. If it were not so, the difference in the quantity of blood would not be sufficient to produce the intensity of colour which is so remarkable.

You see, then, that an instrument which is much less than the smallest needle, having passed directly through the skin, quickly leads to dilatation of the capillary vessels for a certain distance, perhaps the one-sixteenth of an inch or more, around the line of perforation; but none of the vessels beyond the circumscribed line are dilated, though these freely communicate with the dilated vessels. Does this action depend upon some influence exerted upon certain fine nerve-fibres lying in the course of the wound, or is it due to any direct influence upon the vessels themselves? This last suggestion may be dismissed at once, because by no direct influence upon vessels of which we have knowledge can such a phenomenon be produced. There is no doubt whatever that the change in the diameter of the vessels is occasioned by injury to the nerves, and it is probable that the congestion of the capillaries depends, not upon direct injury done to nerves by the passage of the lancet of the flea, but upon the influence exerted on the nerves in consequence of the escape of a small quantity of irritating poisonous material, which is extruded at the same time, and poisons and irritates the nerves in the course of the wound and those at a short distance around the line of penetration. This disturbance necessarily occasions change in the nerve-centre.

Alterations of Calibre of the Small Arteries.—The redness of the flea-bite is due to dilatation of the capillaries, but what is very remarkable and of great interest is this—that the little arteries which communicate with and supply the capillaries with blood are dilated to a *certain definite* extent. Of this you may convince yourselves by trying the following little experiment. Press the finger firmly upon the skin corresponding to the flea-bite and skin around it, so as to drive the blood from the distended vessels into the neighbouring capillaries. The whole of the skin subjected to pressure of course becomes perfectly pale, the area corresponding to the flea-bite being as pale as the skin around, from the capillaries of which the blood has been temporarily driven. Now a few seconds after the finger has been removed, the blood streams back into the vessels of the area of the skin rendered pale by the pressure, so as to restore the exact tint which existed before. *The flea-bite will resume the precise degree of redness it had before pressure was applied, being neither paler nor darker.* The pressure has caused only a temporary change. Although the blood had been completely squeezed out of the capillary vessels, the moment it is

allowed to return, it fills these vessels and distends them to *precisely the same degree as before.*

By this simple experiment we conclusively prove not only that the capillary vessels are dilated, but dilated to a definite extent, so that every capillary will resume the same diameter, and is capable of retaining this, at any rate, for some hours, though the blood may be thoroughly squeezed out and allowed to run back as often as you please. How is this brought about? By what mechanism is it effected, and how can the phenomenon be accounted for? The change is complex, and not to be explained in a few words, but as it illustrates some very important physiological and pathological principles, the matter is well worthy of attentive consideration. In the first place, we must take note of the conditions which determine and regulate the flow of blood at a certain rate through the capillary vessels, and these are somewhat complex.

The capillaries are elastic tubes which have no power, as far as is known, of active contraction. They can be distended, and they will recoil or contract, so as to be very much less than their ordinary diameter, indeed they may be so reduced as to appear like mere lines, their cavity being for the time obliterated, not a blood-corpuscle passing through them. Nevertheless, the capillary has no active power of contraction or dilatation. Its thin walls are eminently elastic, and yield if blood or other fluid is forced into the tube by pressure. If they are allowed to react upon the fluid it will be gradually expelled, and the cavity of the tube almost obliterated, the capillary vessel looking like a fine cylindrical cord. If the little arteries are distended and enlarged, more blood will be permitted to pass into the capillaries, and these tubes will be distended, and their walls stretched. If the diameter of the arteries becomes reduced, the capillaries will shrink. These phenomena are repeated whenever the pressure by which the blood is forced into the vessels is increased or reduced.

The Degree of Contraction of the Minute Arteries determined and maintained by Nerve Action.—The smaller arteries, we know, are capable of undergoing very great alterations in calibre, the alterations being of an *active* character. By *active* I mean that the diameter of a small artery can be maintained for a time at a certain uniform standard, the canal being completely obliterated, or increased to twice the area of its usual section, or half the area, as the case may be—and this irrespective of any temporary changes produced by mechanical pressure applied from time to time.

The smaller arteries are encircled by numerous muscular fibres, placed as close as possible to one another, often arranged in very many layers. This muscular tissue constitutes the greater part of the thickness of the arterial walls. An idea may be formed of the arrangement

of the muscular fibre-cells of a small artery, and of the manner in which, by contracting, the tube of the vessel may be constricted, as well as of the mode of distribution of the nerve-fibres, if the accompanying figure, p. 311, be carefully examined. When the encircling muscular fibres contract, the tube of the artery is of course diminished. When the muscular fibres undergo relaxation, the tube of the vessel will be enlarged.

The calibre of the artery is entirely dependent upon the maintenance of varying degrees of contraction or relaxation in the contractile fibres, and the change takes place in all little arteries from time to time. This is not a passive change, like the mere dilatation and recoil of the elastic capillary vessels, but a change due to varying degrees of contraction or relaxation of the muscular fibres which encircle the tube, and which may be retained at a precise point without the least variation in extent or vigour for a considerable time. The contraction of the muscular fibres may even remain constant in spite of an alteration in the pressure by which the blood is driven into the tubes.

Next, we must enquire by what means a definite degree of contraction and relaxation of the muscular fibres of the little arteries is determined. It has been conclusively proved, partly by the results of experiment and partly by reasoning based upon the fact of the arrangement and distribution of nerves to muscular fibres which has been demonstrated by microscopical investigation, that the wonderful changes in question are brought about through the instrumentality of nerves and nerve-centres only. For every set of minute arterial vessels there is a nerve-centre, and by alteration in the condition of this nerve-centre the calibre of the little arteries, or, in other words, the degree of contraction of the muscular fibres of their coats, will be determined. Each nerve-centre is connected with other centres by intercommunicating fibres, so that only a few arteries may have their calibre altered, or the change may occur in hundreds and thousands of vessels, distributed to a large extent of tissue at the same moment.

Every thing I am telling you is based on observation and experiment, and I shall be able to show you the actual nerve-fibres concerned. We can easily demonstrate the muscular fibres of the minute arteries of the body of man and vertebrate animals generally. We know too, that there are nerves abundantly distributed to these arteries, and that the nerves are connected with ganglia.

Of the Ganglia governing and regulating the Calibre of the small Arteries.—In many instances I have followed fine nerve-fibres, distributed to the muscular fibres of a minute artery, for a long distance and have traced them to their origin in an individual nerve-cell in the nerve-centre.

The nerve-centres connected with these and other nerve-fibres

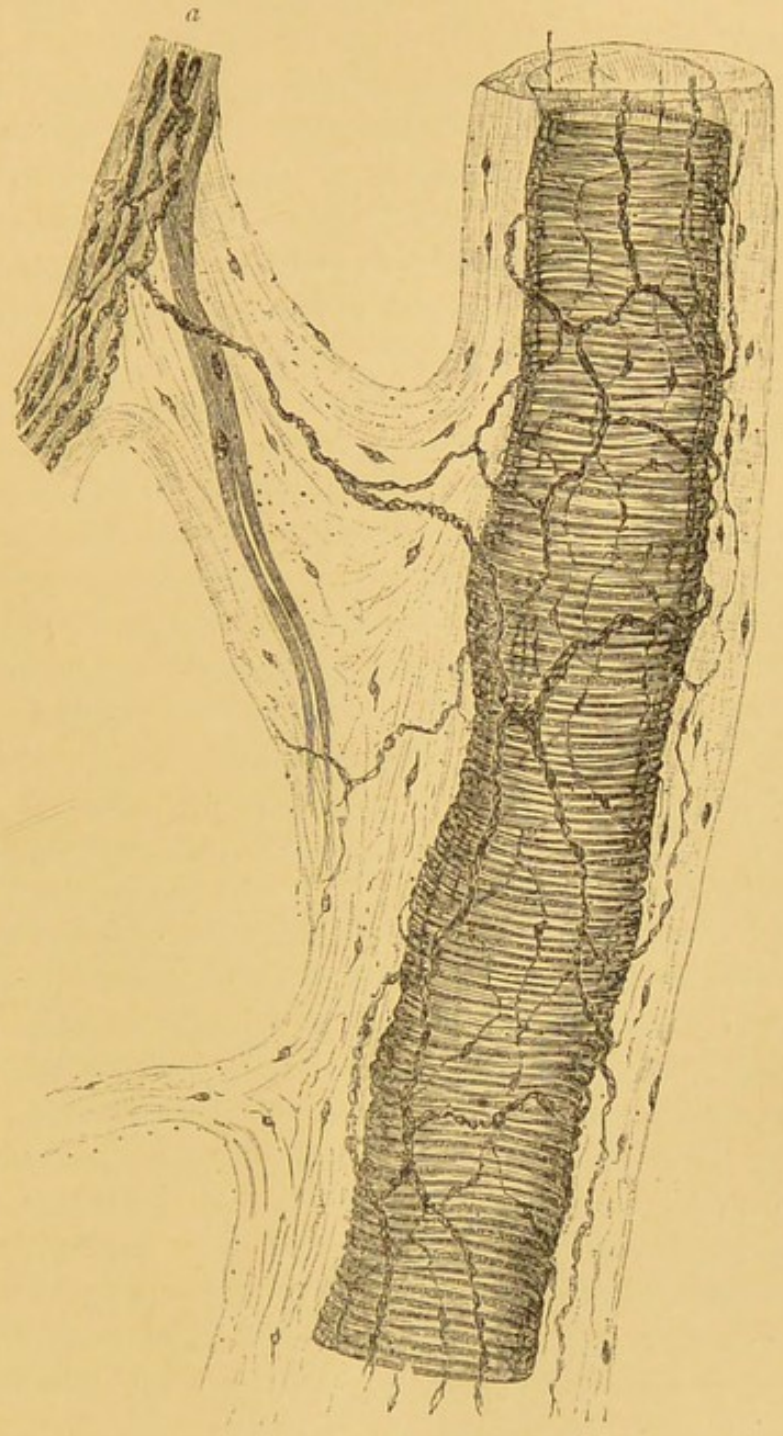
concerned in governing and regulating the flow of blood through the arteries and capillaries are extremely numerous. The arrangement of the centres or ganglia, and of the entering and emerging nerve-fibres, can be most easily studied in the coats of the intestine of any small animal, but for investigating the structure of the nerve-cells themselves, the little green tree frog (*Hyla viridis*) should be selected. If you examine the mesentery near the intestine of this animal and the areolar tissue in the back part of the abdominal cavity, you will find the ganglia as numerous as is indicated in this drawing. If you take a portion of the mucous membrane of the small intestine of man, or of one of the higher animals, say not more than a quarter of an inch square, and prepare it carefully, you may find from half a dozen to a dozen or more ganglia. Each ganglion will contain from two or three to two or three hundred cells; and every individual cell will have at least two fibres issuing from it ("Phil. Trans.," May, 1863). This investigation will enable you to form a conclusion concerning the general nature and structure of the nervous apparatus which exerts an influence upon every part of the vascular system, and particularly as regards the finest ramifications of the nerves distributed to the walls of the small arteries, veins, and capillaries, and in certain cases to the tissues which intervene between the capillaries.

Ganglia and intercommunicating bundles of nerve-fibres exist in every part of the intestinal canal of man and the higher animals. Although no nerve ganglia exist very near the ultimate distribution of the nerves to the small arteries of the skin of the body and to the tissues of the limbs we know that these nerves are all connected with nerve-centres exhibiting the same general structure and arrangement as those found in connection with the mucous membrane of the intestines and other viscera of the abdomen and thorax. All belong to the so-called Sympathetic system. Nerve-centres or ganglia are placed in certain special parts of the trunk, and from these, bundles of nerve-fibres are derived which are distributed to the vessels of the head and extremities. The minute arteries by which blood is distributed to the muscles of the limbs, to the large nerves, to the brain and spinal cord, and their membranes, are as fully supplied with nerves and are as much under the influence of nerve ganglia of the so-called sympathetic system, as are the arteries of the lungs or the heart, or those of the liver, kidney, and other secreting organs.

I propose now to describe more fully the mechanism by which the varying calibre of the small arteries is determined. You will form a correct idea of the degree to which little arteries may contract if you take note of what is represented in this drawing (not introduced in this work) of the arteries of the pia mater of the common sheep, which were injected, immediately after the death of the animal, with Prussian blue

DISTRIBUTION OF NERVE-FIBRES TO SMALL ARTERY.

FIG. 1.



A small artery from the bladder of the hyla or green tree frog, showing the distribution of fine nerve fibres to the muscular fibre cells of the vessel. The nerve fibre can be followed from the nerve trunk, a, containing dark-bordered nerve-fibres, to the vessel. In the connective tissue to the left are seen two muscular fibre cells with nerve-fibres distributed to them. These belong to the muscular coat of the bladder to which the artery was distributed and are not connected with the vessel itself. About the middle of the figure the tube is somewhat constricted, in consequence of slight contraction of the muscular fibre cells in this part of the artery. × 215.

$\frac{1}{1000}$ of an inch —— × 215.

fluid. (For the composition of this fluid and the method of injecting, see "The Microscope in Medicine," or "How to Work with the Microscope.") The walls of the vessels, with their muscular fibre-cells, are well shown. The little arteries at the time of death have contracted so as to produce great irregularity in the calibre of the vessels. You see in one place the muscular fibres of a considerable length of the vessel have vigorously contracted, so as to obliterate the canal. Very few blood-corpuscles would have passed through this part of the vessel at the time of the contraction of its muscular fibres. This firmly contracted portion of the little artery is immediately continuous with another part of the vessel where the coats are relaxed, and the diameter of the tube here would be perhaps twenty times that of its continuation in the contracted portion of the vessel. Many different portions of small arteries in various degrees of contraction are represented in different parts of the drawing. (A very slight degree of contraction is seen in the little artery figured on page 311.)

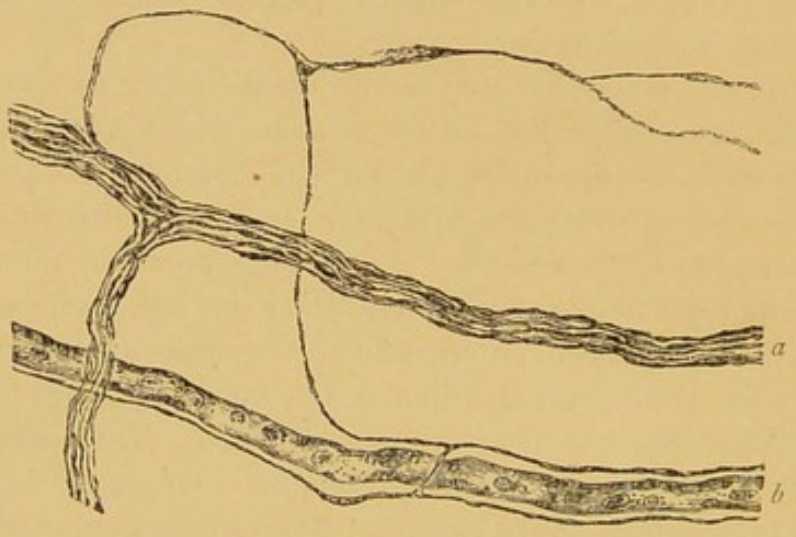
We must yet go somewhat more into detail before we can expect to have an adequate explanation of the changes which take place in the coats of the small arteries during life, by which variations in their calibre are determined, and which are intimately connected with the causation of the phenomena of the flea-bite. It must be borne in mind that the arteries are not the only small vessels which are supplied with nerve-fibres. It has long been known that to the coats of the small veins nerve-fibres are abundantly distributed, but the general arrangement of the finest fibres has not been fully investigated. They exist in great number, and indeed in much greater number than would be expected, considering the paucity of the muscular fibres of the veins and the thinness of the coats of these vessels. From the great number of the nerve-fibres one would incline to the notion that some were *afferent*, that is, concerned in the transmission of impressions to the nerve-centre. If motor fibres, their number in proportion to the amount of muscular tissue is far greater than in the arteries, and indeed greater than is to be found elsewhere. But besides the distribution of nerves to small arteries and veins, I must beg you to pay attention to the arrangement of the nerve-fibres which belong to the capillary vessels, a subject of great importance, but one which is scarcely referred to in our text-books.

Of the Nerves of Capillary Vessels.—As far as I know, it is not stated in any text-books, even at this time, that nerve-fibres are distributed to capillaries. Not only is this the fact, but upon many capillaries a considerable number of fine nerve-fibres may be seen to ramify. As long ago as 1860, I succeeded in demonstrating this new set of nerve-fibres, distributed to the capillary vessels, which had not been previously described. Numerous observations upon the capillary vessels

of various vertebrate classes have convinced me that the capillaries of vertebrate animals generally are freely supplied with nerves, or, to speak more accurately,—just outside, or at a short distance from the outer surface of the walls of the capillaries, very fine nerve-fibres exist, which in many cases form a lax network or plexus of extremely delicate nerve-fibres on the outer surface of the vessel.

The fact is not of anatomical interest only, but the distribution of the nerve-fibres in question has an important bearing upon questions concerning the action of the minute vessels during life. Upon carefully examining capillaries in many tissues of the frog, according to the plan I have described ("Microscope in Medicine," "How to Work with the Microscope"), you will meet with little difficulty in demonstrating the nerve-fibres to capillary vessels. I could show you more than twenty

FIG. 2.

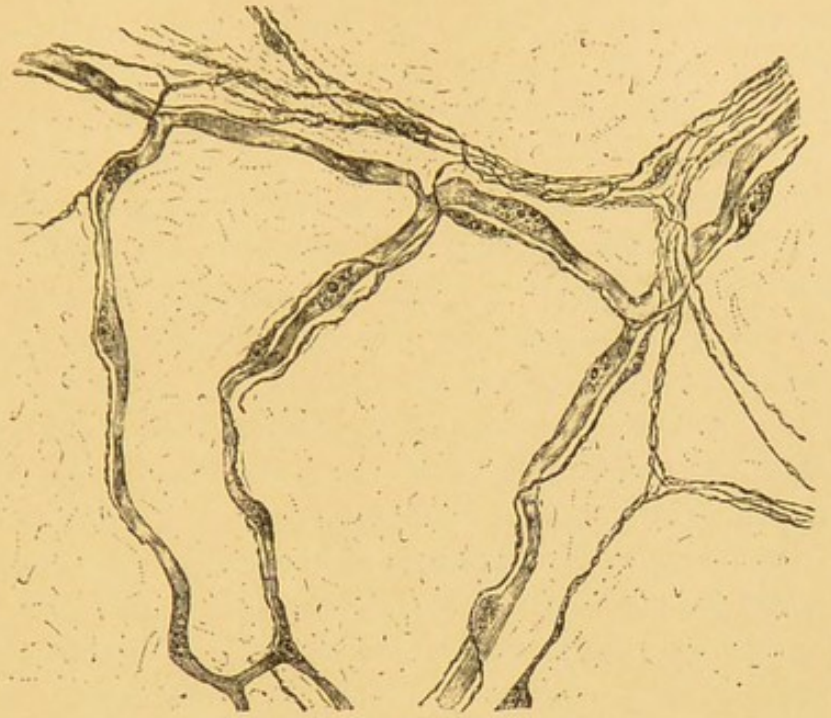


From an interval between the fibres of the mylohyoid muscles of the hyla. *a*. Trunk of fine dark bordered nerve-fibres, with fine fibres coming from them; one of which may be traced to the capillary *b*, while others are distributed to the muscular fibres, which are not represented in the drawing. The arrangement of the nerves supplying the capillary vessel is well seen. From a specimen mounted in glycerine, and more than twenty years old. × 215.

preparations from the frog in which branches of nerve-fibres to the capillary vessels are seen, without the slightest doubt. The fact cannot be explained away. There is no question whatever about the delicate fibres in question being nerves, because in many instances I have been able to trace the fibres from their distribution outside the capillaries to their connection with the ganglion cell, without one break in the continuity of the matter of which they consist. But many will not believe that a structure which may be demonstrated in a cold-blooded vertebrate animal like the frog necessarily exists in the higher vertebrata and in man. I have, however, succeeded in demonstrating nerves to capillary vessels in several mammalian animals and birds, and have been able to permanently preserve several of the specimens. One of the best animals for this investigation is the white mouse, because there is very little connective tissue in this animal to obscure the

CAPILLARY VESSELS AND NERVE-FIBRES FROM THE BAT'S WING.

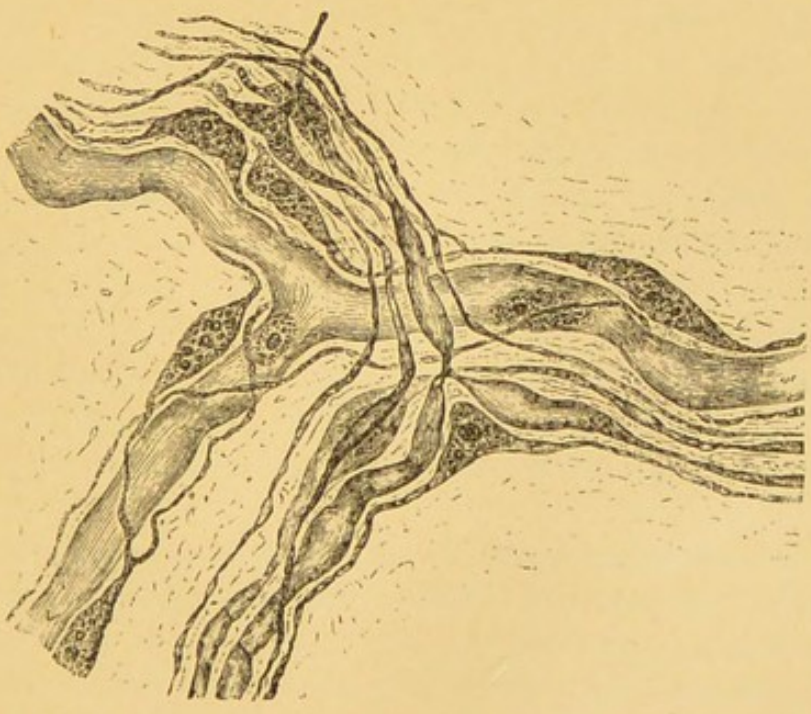
FIG. 3.



Capillaries and very fine nerve-fibres distributed to the bat's wing. In many parts of the specimen the nerve-fibre could be followed from a bundle of fine nerve-fibres to the capillaries. Two instances of this are shown in the drawing.

$\frac{1}{1000}$ of an inch —— × 215.

FIG. 4.



A small part of fig. 3 highly magnified. The distribution of the nerve-fibres to the capillary and their relation to its walls are well seen. The mode of branching and division of some of the finest nerve-fibres are also well shown in the lower part of the drawing. × 700.

extremely delicate nerve-fibres. Upon the whole, however, I prefer the bat's wing. Of the arrangement of the nerves upon the capillaries and in other tissues connected with the thin membrane of this wonderful organ I have preserved several specimens. I have represented a very clear specimen in the accompanying figure 3. It has been magnified only 215 ; but to see the points clearly, a magnifying power of 700 is required, as in fig. 4.

Of Demonstrating the Nerves distributed to Capillaries.—In order to see the delicate nerve-fibres and the capillary vessels, it is necessary to obtain a structure in which the capillaries themselves can be seen without much dissection, or the necessity of section cutting ; for if you have to dissect the tissue, you will tear the capillaries, and then you will not be able to follow the nerve-fibres for any great distance. In the bat's wing, and also in the bladder of a small frog, particularly the hyla, you have as it were a natural dissection almost ready for observation. (Arrangement shown in several enlarged copies of drawings.)

Of the arrangement of nerve-fibres in a tissue, a considerable extent of which is altogether destitute of capillary vessels, one can hardly point to a better illustration than is afforded by the cornea of a small animal, particularly the hyla or little green tree frog. The nerve-fibres in this transparent fibrous tissue are exceedingly numerous, forming extensive networks of wonderfully delicate nerve-fibres, with which, at short intervals, small masses of bioplasm are connected. From these the fibres grow, and the network of nerve-fibres increases in extent as the cornea expands in dimensions. A thin section, which includes the anterior surface of the cornea (placed uppermost so as to be just beneath the thin glass cover) is most favourable for observation. High powers ought to be used (from 300 to 1,200 diameters). In such a specimen you can trace all that is represented in my drawings. The nerves divide and subdivide at short intervals, and extensive networks of excessively fine fibres are formed, which lie on different planes, and are to be found in every part of the corneal tissue, though the networks are more numerous near the anterior surface than in other parts. These nerve-fibres may be regarded as extensions of those belonging to capillary vessels, for at the margin of the cornea some are undoubtedly continuous with the latter, though some of the nerve-fibres of the corneal tissue may be followed to bundles of nerve-fibres at the margin of the cornea.

Of the Mechanism by which the Capillary Circulation of Man and Animals is regulated.—My chief object in troubling you with this somewhat detailed anatomical description is, that I may be able to explain the probable action of these fine nerve-fibres distributed to the capillary vessels, and give some account of the very important office they discharge during life. It is true that much of this discussion strictly

belongs to the province of physiology, but inasmuch as the inquiry has a very important bearing in connection with the determination of the nature of the phenomena occurring in the simplest pathological changes —in a flea-bite, for example—I need make no apology for referring to it here. Without the facts above referred to and deprived of the inferences deduced from these observations, I should be unable to explain to you the phenomena of inflammation or fever as these pathological changes occur in man and warm-blooded animals. In order to make my meaning clear, I must refer to this diagram, which is, as it were,

FIG. 5.

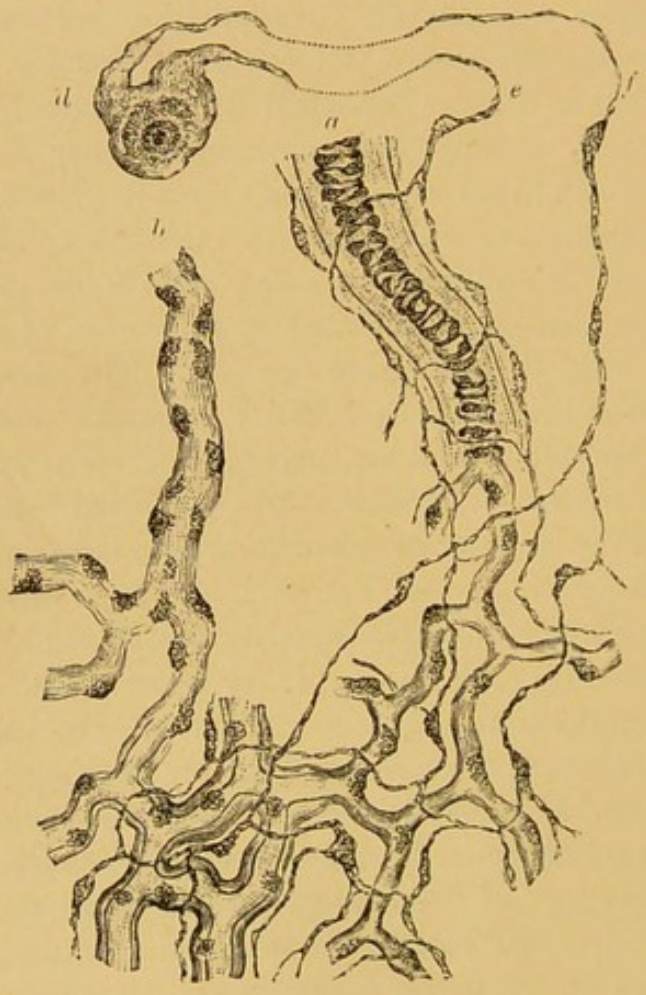


Diagram to show self-regulating mechanism connected with the minute arteries and capillaries. *a*, artery with muscular fibre cells; the dark lines at the circumference show its diameter when dilated. *b*, small vein. *c*, capillary net-work. Over No. 1 the capillaries are dilated, and over No 2 they are contracted *d* is a ganglion cell with at least two sets of nerve-fibres connected with one of which, *e*, divides and subdivides, giving off nerve-fibres which are distributed to the artery *a*, while the other, *f*, is continuous with the plexus of nerve-fibres ramifying close to the capillary vessels. Nerve fibres are also distributed to the small vein, *b*, but these are not represented in the drawing. The bioplasm of the vessels and nerve fibres is shown.

made up from observations actually carried out on several different specimens, and should be carefully studied as I think it represents the actual active structures present and gives us a not inaccurate idea of the changes which occur in connection with the vessels in inflammation.

The vessel to the left, *b*, is intended to represent a small vein, while

that marked *a* is a small artery, and the network of small tubes below, which are continuous with both vessels, are the capillaries, outside which you see here and there delicate fibres, *nerve-fibres*. These are really distributed to the capillary vessels in very much the same manner as is represented here. The nerve-fibres, distributed to the capillaries, join to form a fine nerve-trunk, and are by continuous fibres connected with a cell, *d*, of the nerve-centre. *e* is the nerve-fibre distributed to the artery, and *f* is that connected with the branches distributed to the capillaries; those capillaries near the vein, over 1, being distended, so that the nerve-fibres are nearly in contact with their walls; while those over 2 are contracted.

The greater part of the nerve-circuit, which I have endeavoured to depict, has been demonstrated by actual observation, but there is a break or hiatus as regards the connection of the particular fibres distributed to the artery and those to the capillary, with the nerve-cell. One cannot identify the afferent fibre and the efferent branch connected with the very same cell as is here represented. There is, however, no doubt whatever as regards the existence of two fibres in connection with each nerve-cell in any nerve-centre as long ago pointed out by myself. Nor, as I have already stated, is there any doubt about the connection of one of these fibres with the fine nerve-fibres which are distributed to the artery, for I have traced the continuity in several specimens. The ramifications of the nerve-fibres upon and amongst the muscular fibres of the artery have also been demonstrated in numerous specimens from representatives of the different classes of Vertebrata. I have not succeeded in tracing the nerve-fibres from capillary vessels to the same identical nerve-cell as that from which the nerve distributed to the little artery which subdivides into the capillaries takes its rise, but I consider the arrangement to be as follows:—The very fine nerve-fibres which I have shown to be distributed to capillary vessels are probably *afferent*. These transmit centripetally to the nerve-cell impressions from the sides and immediate neighbourhood of the capillary vessels, and from the tissues between the capillary vessels. In the cells of the nerve-centre a change takes place whenever the peripheral ramifications of these afferent nerve-fibres from the capillaries are irritated. In consequence of this change effected in the nerve-centre, an impulse to movement would be transmitted by the nerves which are distributed to the muscular fibres of the little artery. The muscular fibres would in consequence contract, and the tube of the artery would be reduced in diameter. Under these circumstances, the calibre of the artery is at once reduced and the blood stream which flows onward from it into the capillary vessels is diminished; or, in other words, the quantity of blood passing to a given area of tissue in a given period of time is much reduced.

Under other circumstances the nerve-fibres distributed to the capillary

vessels, instead of being irritated, suffer from a paralysing influence, in consequence of which a corresponding action is produced in the nerve-centre, and, instead of contraction, we have relaxation of the muscular fibres of the little artery; and the quantity of blood occupying the vessel must be increased to an extent proportionate to the increased diameter of the vessel, though it does not follow that under these circumstances a larger quantity of blood must traverse the capillaries in a given time. Here, then, is a self-regulating nervous and muscular apparatus connected with the distribution and regulation of the blood-current in the capillary vessels of the body of a most effective kind, coming into action on the slightest disturbance of the equilibrium of activity either at the peripheral distribution of the nerves or in the nerve-centres connected with them. The quantity of blood passing through these vessels can be regulated to a nicety. The stream may be increased or diminished suddenly, or a uniform flow maintained for a considerable period of time. These changes in blood distribution are brought about by the influence of the afferent and efferent nerves and central nerve-cells, by which the degree of contraction of the muscular fibre-cells which encircle the artery is maintained and varied, and thereby the blood flow through the capillaries regulated.

Let us now apply what we have learnt to the phenomena of the flea-bite:—When the lancet of the flea, after penetrating the cuticle, reaches the capillaries of the skin, and perforates them, leading to the escape of blood, some of the fine nerve-fibres distributed to the capillaries will be severed, others no doubt being stretched or pressed upon by the blood and fluid which escape from the vessels in consequence of the distension which the latter undergo. The result is a relaxing or paralysing action upon the nerve-centre. The efferent nerves being thus influenced, the muscular fibres of the little arteries yield, and become flaccid and elongated. Hence the diameter of the tube of the vessel will become largely increased. A greater quantity of blood will flow into the capillaries, and these vessels will in consequence become distended. This action probably depends partly upon severance of fine nerve-fibres by the cutting action of the lancet of the animal, but is perhaps mainly due to the influence of poison expelled at the moment, which spreads for a short distance among the elements of the adjacent tissues, perhaps acting chemically on the nerve-fibres or on their bioplasm, also producing a paralysing influence.

But what is highly interesting and very remarkable is this:—The relaxing or paralysing action is exerted *to a definite extent, and maintained without variation at a given point for some time.* The dilatation of the little arteries is effected, and the degree of constriction exerted by the muscular coat is altered for a time. The muscular fibres yield according to the degree of paralysing influence produced upon the

afferent nerves at the seat of injury. That the degree of dilatation does not vary from moment to moment may be proved in a very simple manner. If you squeeze the little vessels of the congested area of skin by pressing firmly for a second or two with one finger, so as to drive the blood out of the vessels, the whole of the skin subjected to the pressure will be seen at the moment when this is removed to be uniformly pale. In a few seconds, however, after the pressure has been withdrawn, the blood will re-enter the vessels, and the inflamed area will resume its red colour, while the surrounding skin will regain its original tint. The varying degrees of redness observed in different flea-bites are due entirely to the varying degree of dilatation of the hundreds of little arteries which supply the capillary vessels of the inflamed area. If complete paralysis of the nerve-fibres distributed to the little arteries, or of the centres from which they emanate, were to occur, the capillaries would become distended to the utmost limit, and the circulation through them would cease. The surrounding tissues deprived of their blood supply would become disorganised and might at once pass into a gangrenous state, or might slowly degenerate and waste. Such is the nature of the very important vascular phenomena which occur in all cases of inflammation, and which, when affecting a considerable extent of tissue, may cause serious structural changes, and result in the development of chronic disease, or, where certain important organs are affected, may cause even sudden death.

General Vascular Disturbance resulting from Local Injury.—But in many instances, the result of the local injury is much more widely spread. In some cases this is due to poison being introduced into the blood, so that the whole mass of nutrient fluid is poisoned, and, through it, every tissue and organ of the body may suffer. But there are not a few instances in which the facts cannot be thus explained, but seem rather to be due to the same series of changes which occur in an ordinary flea-bite, the action being more intense. The bite of a gnat, the sting of a bee, wasp, or hornet, will occasion phenomena in connection with the vessels of the same kind, but more serious and extensive than the injury inflicted by the lancet of the flea. Such local injuries may cause dilatation of the little arteries and capillaries over a considerable portion of the body. In consequence of the bite of an ordinary gnat, the whole of one arm may become enormously swollen. So large a quantity of exudation may escape from the vessels that the areolar tissue of the limb may be much distended, the elements of the tissues generally being in a state of tension, their action much deranged or entirely marred. In short, a condition of very acute and serious inflammation may result.

In such a case, I think that the more extensive local mischief is perhaps due to a more severe and more extensive local change having

been produced at the seat of injury. Instead of derangement of the action of the vessels of a very limited area of skin, as in the flea-bite, we have evidence of extensive disturbance in the circulation affecting small arteries, capillaries, and veins of the tissues, of part of a limb or of the entire limb. The influence, however, is still limited, and such a case must be distinguished from those in which the tissue-changes result from the whole mass of the blood being poisoned. As a general rule, a gnat-bite does no harm whatever. Most of us have been bitten over and over again; and I dare say some have carefully watched the interesting operation performed by the insect, and, when the instrument had penetrated the cuticle, and had reached the true skin, have experienced the pricking sensation indicating the arrival of its point upon the nerve-fibres adjacent to the capillary. The perforation of the capillary follows, and soon the blood will be seen to ascend, and the abdominal cavity of the insect become gradually distended by the inflowing blood. In a short time the creature is satisfied, and, after carefully withdrawing his proboscis, he contentedly flies away, though slowly, for his body will be more than twice as heavy as it was when he first attacked. With the exception of slight tingling, which lasts for a little while, no further effect, as a general rule, will be produced; but I know persons who do not escape so easily. Sometimes a single gnat-bite will cause the whole of the hand and arm to swell enormously, and the state of inflammation may last for two or three days, and may be accompanied by much pain. A similar remark applies to the sting of a bee, or wasp or hornet. Some individuals will be seriously affected, although most will escape with very little inconvenience.* Such facts are not incompatible with the view of the phenomena being essentially due to nerve change, and we have ample evidence that some persons' nerves are more susceptible to the same degree of irritation, mechanical or chemical, than are those of others A mechanical injury or a poisonous influence sufficiently

* An interesting fact has been made out by Dr. Manson in China, with regard to the transference by gnats of embryonic or immature entozoa from the blood of the human organism to water. The minute *Filaria sanguinis hominis* is the entozoon in question. It exists in the blood in certain cases in immense numbers, and has been removed from the circulating medium, and transferred to the situation where it is to undergo further change in the remarkable way just referred to. An excellent *résumé* of what is known concerning this entozoon will be found in a paper read at the Epidemiological Society, by Sir Joseph Fayrer, and published in the "Lancet" for February 8th, 1879. We have long known that many infectious diseases may be spread by the agency of insects, but here we have an insect extracting blood from the interior of the vessels, and carrying some of this very same blood, and diffusing any special living particles it may contain into other media, where these organisms may pass another part of their existence, and possibly grow and multiply. It is obvious that other living disease-causing organisms may be distributed far and wide in the same manner, and thus many special fevers and inflammatory diseases occurring in man and animals, and depending upon a living poison, may be carried to a distance, and preserved for long periods of time, or undergo further development.

severe to cause death in one case might scarcely produce any serious change in another. It is possible that there may be some structural difference in the nervous system of the two persons, but it is perhaps more probable that the cause of difference in the result is deeper, and depends upon some difference in the individuality and powers of the bioplasm of the nerve of a nature not to be rendered evident by physical investigation. We note corresponding peculiarities as regards the action of medicine. I have known instances in which the smallest dose of Morphia will occasion, within three or four hours of its being swallowed, dilatation of the capillary vessels of the greater part of the surface of the body, shown by a diffused redness in patches. Less than one-tenth of a grain of Morphia has led to this result, but such a dose, as a general rule, would produce only a very slight effect, or the person might be unconscious that any such drug had been given at all. The nerves and the nerve-centres connected with the vascular system exhibit very different degrees of sensitiveness or susceptibility in different persons.

In discussing the probable nature of the actual changes induced by such poisons which act upon the fine ramifications of the nerves distributed to capillary vessels, we have to consider :—1. The direct local action of the poisonous material on the nerve-fibres and other tissues with which it comes at once into contact ; and, 2, the local action of the poison on the capillary nerve-fibres in many tissues and organs of the body at a distance from the seat of injury, through the contamination of the whole mass of the blood.

In both cases, whether the action be local or general, circumscribed or diffused, the widest difference as regards the degree of action exerted by the same poison and the same amount of poison on different persons will be observed, and this must be referred to the peculiarity of constitution of the individual, to the degree of tolerance his nerves may have acquired by the influence of previous exposure, and a number of other circumstances. The same amount of poison in the blood may be sufficient to cause the most grave symptoms in one person and not give rise to the slightest change in others.

You see how large a subject is opened for consideration by the demonstration of the nerve-fibres to capillary vessels, and what a number of important and widely separated physiological and pathological actions may be explained and accounted for by the influence of this important part of the nervous system.

OF THE FORMATION OF PUS IN AND NEAR THE CAPILLARIES, IN INFLAMMATION AND FEVER.

I have already advanced arguments which as it seems to me fully justify the conclusion that fever is a *General Inflammation*, and inflam-

mation a *Local Fever*. Some among you who have considered the matter may, perhaps, object to this inference on the ground that what is known as "pus" is a very constant product in inflammations, but is not generally formed in fever. Such an objection will, however, disappear if we carefully study the mode of formation of this living matter, *pus*. Indeed, in most fevers the pathological phenomena are, happily, not sufficiently intense for pus to be produced. The changes do not proceed to the extent necessary for the development of the pus-corpuscles. There are, however, fevers in which the development of pus is common enough.

In Erysipelas, which may be correctly included under fevers or inflammations, pus, as you are aware, is often formed to an extent sufficient to destroy important tissues and to cause death. Some of you of late years may have been assured that erysipelas, like many other fevers and inflammations, is due to the presence and growth and multiplication of bacteria. The process of suppuration itself, it has been said, is occasioned by these organisms. I have already treated of this question in "Disease Germs" and elsewhere. I shall, therefore, only remark here that, in my opinion, there is no reasonable ground for either hypothesis, and that the facts can be adequately explained without invoking the aid of bacteria. In the course of the changes taking place in erysipelas, pus unfortunately is very often formed. You may have suppuration of the tissues in the greater part of the affected limb. Indeed, in some cases the areolar tissue, extending over a considerable part of the body, may be the seat of the formation and multiplication of pus-corpuscles.

Now, in ordinary fevers life is usually destroyed before that degree of change which involves the process of suppuration has been reached. If, however, severe fever lasted for a considerable period and life was sustained for a sufficient time, many of the tissues might pass into the state of suppuration. Such is unfortunately but too frequent in very severe cases of scarlet fever, in which disease suppuration sometimes occurs in several of the joints, besides which small abscesses are not unfrequently developed in many different parts of the body. It is easy to see why suppuration should be more commonly developed in connection with intense local inflammation than in the more widely spread, but less intense, action which occurs in fever. In inflammation the change is comparatively circumscribed, and may therefore go to a much greater extent without destroying life than is possible in the case of fever, for the mass of the blood and every tissue in the body is more or less affected, while the action of some of the most sensitive organs is seriously deranged and the organs themselves damaged. Not unfrequently the brain and some parts of the nervous system seem to be poisoned by the altered blood. A huge abscess, containing pints of pus, may be formed in the course of a fever, and the patient nevertheless get perfectly well, if only

his strength can be sufficiently supported and the case be well nursed and judiciously managed. Anything like general suppuration of all the tissues of the body is, however, impossible in fever, just because death would take place long before such an event could occur.

The formation of pus, and the manner in which the pus-corpuscles move and grow and multiply, have been already referred to on p. 305.

Of the Passage of Blood and Living Particles through the Walls of Capillary Vessels.—Diapedesis.—I have now to say a few words about certain other phenomena of inflammation. When ordinary inflammation takes place in a part, the vessels, as I have already said, are more or less distended with blood, and as the walls of these capillary vessels are stretched and rendered thinner by extension, fluid will more readily transude through them than when they are in their usual medium state of tension. Suppose this outline (chalk diagram) to represent the area of a section of a capillary vessel in the ordinary state, neither contracted nor stretched. This larger circle with thinner outline (diagram) may stand for the same capillary vessel, with its walls much thinner and its calibre greatly increased, as in the state of congestion, which gradually passes into inflammation. Now, it is obvious that, if the walls of this capillary are to be so stretched as to form a tube as much more capacious than the vessel in the ordinary state, as would be the tube of which this circle is the limit than that indicated by the last outline, great thinning of the walls must take place. Whenever capillary vessels are distended with blood, there must be increased tenuity of their walls. The greater the diameter of the vessel the thinner will be its walls, and the thinner the walls the more readily will fluid permeate them. Now, in Inflammation and Fever, fluid, and often not only fluid, transudes from the blood through the walls of the capillaries of the affected parts into the tissues around the blood-vessels.

The material which is poured out has long been called *Exudation*, and this material varies somewhat in character and composition in different cases. Certain changes taking place in the blood itself may cause the fluid to become more permeable than the ordinary fluid portion (*liquor sanguinis*) of healthy blood. In many forms of disease the quantity of matter dissolved in the fluid which permeates the vascular walls is greatly increased, and probably the fluid itself is otherwise changed. But you must bear in mind that, beside the fluid which transudes through the capillary vessels in inflammation and fever, multitudes of excessively minute and very soft particles also traverse the capillary wall. Of these the great majority are less than the one hundred-thousandth of an inch in diameter, but some are very much larger than this. Indeed, particles as large as a red blood-corpuscle may find their way through the capillary wall without causing any rupture or permanent damage to the vessel, and through openings which it is not easy to

demonstrate. Of this, instances have long been known in the case of what has been correctly termed capillary hæmorrhage. After this hæmorrhage has taken place, the stretched and distended vessels may return to their ordinary condition without any deterioration of the structure occurring in the walls which have been stretched. Such phenomena characterise every case of ordinary pneumonia.

But you will naturally ask how large particles like the red blood-corpuscles pass through the walls of vessels in which no fissures or openings can be discerned. When we study the changes taking place during development, we learn that the walls of the capillary vessels are, as it were, laid down in such manner that the tissue of which they are composed, though exhibiting no definite indication of actual fibres, will tear much more readily in the longitudinal than in the transverse direction. Whenever the capillaries are distended by the accumulation of blood, and their walls stretched by lateral pressure, the fibre network, of which they may be regarded as consisting, would have its meshes considerably widened in such a way that longitudinal rents or fissures would result, which would be large enough to permit the passage even of more than one red blood-corpuscle at a time through them. The distending force ceasing, the elastic tissue of the capillary wall would react, and the vessel gradually return to its ordinary size, the rent slowly closing up.

We can, therefore, readily imagine that a body as large as, or larger than, a blood-corpuscle would easily escape sideways through one of these fissures and pass amongst the tissues outside the vessel. Such escape of blood-corpuscles, a few at a time, takes place from the capillaries of the walls of the air-cells of the lungs in every case of ordinary "inflammation of the lung." In cases, however, in which blood extravasates to any great extent, as where blood escapes from a surface in drops, a free tearing, or other solution of continuity, of the walls of the vessels undoubtedly occurs. Even where violent hæmorrhage has taken place from vessels of considerable dimensions, it is often most difficult to demonstrate the opening. You need not, therefore, be surprised to learn that it is almost impossible to expose the actual holes, rents, or fissures in the walls of *capillary vessels* which have allowed the exit of a few blood-corpuscles. There are cases in which hæmorrhage occurs from a vast tract of capillary vessels, as for example, of the mucous membrane of the small intestine, and yet the fissures or rents cannot be detected, although several pints of blood may have been lost in the course of half an hour by *capillary hæmorrhage*. This may cause faintness and death. In such cases of fatal capillary hæmorrhage, no doubt, degenerative changes have been taking place in the walls of the capillary vessels involved, during a considerable period of time previous to the occurrence of the hæmorrhage. When one comes to examine the

mucous membrane after death, the whole of the surface is found suffused, and the tissues, so to say, infiltrated with blood which has issued from millions and millions of capillaries, distributed over perhaps six feet or more of intestine. Indeed I have seen several instances of death from almost sudden and profuse capillary hæmorrhage from the mucous membrane, extending over many feet of the small intestine, consequent upon slow morbid changes proceeding in the liver, and resulting in the condition known as *cirrhosis*. In the course of this disease the circulation through the liver becomes greatly impeded, and, in consequence, congestion of the mucous membrane of the intestines ensues, and frequent slight attacks of bleeding occur, which may at last end in extensive and fatal hæmorrhage. If you were to inject the vessels in such a case, the injection would ooze from multitudes of minute openings, but no large aperture would be discovered in any large or small vein or artery. The case is very different where a large vessel is opened in the process of ulceration, as frequently occurs in the course of ulcer of the stomach, and in the lung in phthisis, or as sometimes happens in aneurism.

There are, however, certain forms of capillary bleeding or hæmorrhage which are very common, and not indicative of any actual disease, and which may fairly be regarded as slight ailments. Bleeding from the mucous membrane of the nose is one of these. Some children frequently suffer from this affection, and in certain instances relief to headache or to a sensation of fulness in the head is afforded by the slight loss of blood which occurs. Hæmorrhage of the same kind may take place from the back of the throat, from the gums, from the stomach, and even from the lungs. Occasionally bleeding takes place from *the rectum*, without producing more than temporary derangement, though of course it causes alarm to the patient and his friends. You must be very careful about giving a too positive opinion concerning the exact nature of many of such cases, for bleeding from one or other of the surfaces above mentioned may be a grave matter, and perhaps the first indication of serious disease. On the other hand, even several teaspoonfuls of blood may escape from capillary vessels, without the general health being in any way deranged. After tension has been relieved by this hæmorrhage the vessels return to their former state, and the blood circulates in them as before.

In cases of hæmorrhage from the mucous membrane of the nose, I believe that the capillaries become much congested, and that actual longitudinal rents or fissures are made through which blood escapes. If the attacks are frequent and severe, and the patient's strength fails, it may be necessary to adopt remedial measures even in a case of what appears to be ordinary bleeding from the nose. Perfect rest in the half-recumbent posture, the application of cold to the nose externally, suck-

ing small pieces of ice, are usually effectual, but it may be necessary to use styptics or "plug the nostrils" in severe cases. This, however, is not the place to discuss the treatment requisite in cases of such gravity. It must not, however, be forgotten that bleeding not depending upon actual disease may take place from many other organs and surfaces as well as from the mucous membrane of the nose.

Hæmorrhage from minute vessels used to be spoken of as hæmorrhage by exhalation; and the older observers believed the escape of blood from the vessels occurred in some mysterious manner not to be adequately explained. They seemed to think that the blood passed through the walls of vessels in some strange and inscrutable way. By the aid of recent investigations we can form a clear idea of the manner in which corpuscles pass through the walls of the capillaries. The phenomenon is of great interest, and we may conveniently consider under the same head a process which has been regarded by many observers as essential to more than one general pathological change, and which has been spoken of as *Diapedesis*.

It was proved experimentally by Cohnheim, of Berlin, that colourless blood-corpuscles might pass from the cavity of the peritoneum into the vascular system, and that in the case of the membrane of the frog's foot and other tissues when in a state of inflammation, colourless blood-corpuscles made their way through the capillary walls, though no openings could be seen, and the capillaries themselves were not unduly distended. Cohnheim maintained that this migration of colourless blood-corpuscles was an ordinary phenomenon; that it was common, and constantly took place to a great extent in every case of inflammation. Nay, he went so far as to insist *that pus itself consisted of colourless blood-corpuscles, which had made their way out of the vessels.* Of course it occurred to many that the last proposition was rather difficult to accept, for the number of pus-corpuscles in an ordinary abscess formed in the course of twenty-four hours is so great, that had every colourless blood-corpuscle in the body made its way into the abscess a mere modicum of the total quantity of pus present would be thus accounted for. The pus-corpuscles in a small abscess or on the surface of an inflamed mucous membrane outnumber, by many times, the whole of the colourless blood-corpuscles in the organism. Of those who profess to have *seen* the phenomenon in question not a few will tell you that it is easily demonstrated and occurs constantly. He who proceeds to study the matter for himself will, I think, find that only very occasionally can he feel at all sure that a colourless blood-corpuscle has actually passed through the vascular walls. The careful observer will not infrequently find that a corpuscle which *seems to pass through the walls of a vessel* does not really do so, and is, in fact, either in front of the capillary or behind it, and has not come out of the vessel at all.

There is, however, no doubt that this migration of colourless blood-corpuscles does occur, but I believe it to be an exceptional rather than a common or ordinary phenomenon, while I feel sure that, in many cases, the process of inflammation may run its course entirely, without the escape of a single blood-corpuscle.

The corpuscles found outside the capillaries in great numbers in cases of inflammation are produced not by the passage of colourless corpuscles from the blood, but by the growth of very minute particles which have escaped with the transuded fluid. These particles do not consist of colourless blood-corpuscles, which, as such, have traversed the walls as has been supposed. So far from having been colourless blood-corpuscles, it is doubtful whether at any time one of them ever circulated in the blood as such. What, then, are these bodies, and how did they attain the position in which we find them?

Some years before the above views were published and popularised in this country, I had described another process of migration, or rather pouring out, from the blood, suspended in *liquor sanguinis*, of minute particles of living matter or *bioplasm*, which no doubt play a very important part in the complex phenomenon of inflammation. I showed that, if a very thin layer of healthy blood was examined by a high magnifying power, a number of corpuscles, infinitely smaller than either red or colourless corpuscles, were to be detected; and not only so, but I proved that these minute corpuscles, varying from the one hundred-thousandth to the one ten-thousandth of an inch in diameter, and probably corpuscles still more minute, consisted of bioplasm, or living matter. The blood of man and the higher animals, while circulating in the living body, ought to be regarded as a fluid holding in suspension countless multitudes of minute particles of living matter which, at death, undergo a great change, and become converted into several different substances, among the most important of which is the matter we call fibrin. Similar minute particles of living matter are held in suspension in the circulating and nutrient fluids of every living organism, and are present even in the nutrient juices of plants. In the large cells of Vallisneria spiralis, which you may easily grow in a glass jar in your sitting room, you may see the rotation of the so-called "cell-contents." The most important of the contents being the apparently clear homogeneous fluid which passes round and round the cell, as long as the very minute particles of bioplasm suspended in it, but to be demonstrated only by the aid of very high powers, continue alive. No one has succeeded in accounting for these movements by physical and chemical change, though many have attempted to do so. Many more have affirmed that it can be so explained, and with the confidence and satisfaction characteristic of the new philosophy, have affirmed that, even if the explanation they have given is not quite adequate

and satisfactory at this time, it will be found to be so at some future period.

The power of moving resides in the minute particles themselves. As long as the matter of which these consist lives the particles may move, but when it dies the moving power is completely lost. This remarkable *spontaneous movement*, which cannot be explained, which we may see in the pus-corpuscle, in the colourless blood-corpuscle, and in other forms of bioplasm belonging to man, to animals, and to plants, has been attributed to certain reactions between the particles themselves and things in their environment; but if you will only look for yourselves and ponder over what you observe, you will soon be convinced of the incorrectness of the hypothesis. At no period of history have such ridiculous statements been made concerning the nature and actions of living things as in our own time. So far from being in advance of old doctrines, the ancients would have ridiculed much that now passes for philosophy. Untenable views concerning many things have been received as true simply because they have been repeatedly urged in strong language. When people hear an assertion repeated again and again they think there must be "something in it." So they believe it, or act upon it, as the case may be. The confidence with which physical explanations of purely vital phenomena are insisted upon and taught is most extraordinary. On the one side there is audacity and something approaching arrogance, on the other meek acquiescence, and an almost incredible credulity. Some teachers claiming to be scientific do not hesitate to tell the public that they *know* many things which have never been and cannot be proved. They are, we are assured, peculiarly *strong* and may be "privileged" to prophesy, and to do other out of the way things. Some affirm that they discern all sorts of wonderful things, but they cannot tell us how to discern, nor do they explain by what means they have been able to discern. They are "gifted spirits," and do not belong to the class of ordinary mortals. Some prophetic philosophers, without having earnestly studied the phenomena of any living thing in nature, nay, without being even practically skilled in the ordinary methods of investigating the structure of any living thing, dare to assault the whole world of life, and recklessly declare that all living things are produced and built up and worked according to the very same principles and laws by which the non-living world is fettered and confined in eternal helplessness.

Let me persuade you to observe what happens as the simplest of living things grows. Take, for instance, ordinary mildew, which can be obtained easily enough, or which each can grow for himself, for its germs are always present in the air. You may grow it in a little acid urine if you like. By carefully watching it, you will be convinced that it grows by taking up nutrient matter, which is not deposited upon its

surface, but taken into its very substance, where it becomes converted into living matter, from every particle of which new particles may result. Ask the physicist to explain, if he can by any physical laws, the phenomena which have occurred while the organism has been under your observation. Up to this time instead of telling us what is going on—instead of describing by what means matter is changed in composition and acquires new properties whenever it is caused to assume the living state, confident physicists assert, and with an air of superiority, what according to their power of prevision is certainly to be achieved by physicists in the far-off future. Perhaps the materialist gifted with prophetic powers enlarges on the subject of chemical affinity and its possibilities, perhaps he will tell you about properties and attractions, tendencies, molecular forces, potentialities, and evolutions and laws, and discoveries concerning things that may be, or according to him must be, and which he, but no one else, can discern in his imagination. He will *not*, however, tell you what happens whenever lifeless matter is made to live, or when living matter dies. All the assertions made during the last ten years or more on the identity of vital and physical processes and properties have but retarded real advance in biological science. No adequate explanation as regards the nature of the change from non-living to living, and from living to dead, has been discovered. Nothing definite is known to the physicist at the present time, but what cannot be discovered by him now is, he asserts, to be rendered evident by his successors in the future,—that future which is now very far off, and which gets dimmer and more remote as time passes. The truth is the materialist view of things is an absurdity, based on fancies and dicta instead of on facts.

The vital phenomena observed in the case of the mildew or any other simple organism, closely resemble those which are observed in the case of living particles belonging to man and the higher animals, both in health and disease, and can be accounted for only by attributing them to the influence of a peculiar power or agency associated with the matter while it is alive, and which is absolutely distinct from any of the known properties or forces of ordinary matter.

The minute particles of bioplasm or living matter which pass through the walls of the capillary vessels in cases of ordinary inflammation soon begin to undergo alteration. As long as they were being rapidly moved about in the blood stream these particles would undergo little or no active change; but as soon as they become still and quiescent, by their own inherent power of movement some begin to make their way through the walls of the vessels (p. 325), and soon take up and appropriate the nutrient material which surrounds them in great quantities. While in the blood, probably in those organs where the circulation of the blood goes on very slowly, these minute particles grow and slowly

undergo conversion into the bodies known as the colourless blood-corpuscles. When outside the vessels, as in inflammation, the particles grow more quickly and soon assume the form of the colourless corpuscles which we see in such immense numbers in the interstices of various tissues and just outside the walls of the vessels in inflammation.

1. Under certain circumstances the bioplasts in question soon die, and the products resulting from their death are quickly re-absorbed.

2. Under other conditions they develop a delicate fibrous material.

3. If supplied with plenty of pabulum they may continue to grow and multiply very rapidly until the form of living matter known as pus results.

Pus-corpuscles are particles of living matter or bioplasm, which have been developed by direct descent, but with modification in power, from the minute living particles under consideration, or more directly from colourless blood-corpuscles, or from the bioplasm of some tissue.

From such particles of bioplasm every form of adventitious fibrous tissue which we find outside the walls of the capillaries and in the interstices of the tissues, in various forms both of acute and chronic inflammation, is produced. The delicate fibrous tissue at first formed loses water, contracts, and gradually becomes condensed. The "thickening" and condensation which you often meet with in tissues which have been inflamed is thus brought about.

As I have already remarked, the minute particles of living matter, or bioplasm, outside the walls of the capillaries may also grow and multiply until multitudes of "pus-corpuscles" result. Even at this time the fact that pus-corpuscles grow and multiply of themselves by the formation of little offsets, outgrowths, or diverticula, which are from time to time detached, is not generally recognised. You may remember, in a former lecture I described how the bioplasm of a cell might increase in size, and might give off diverticula, which being detached, form separate portions of bioplasm, each of which may grow and give off more processes, until by the growth and multiplication of a few particles millions of the masses of bioplasm known as pus-corpuscles are formed, every one of which may be regarded as the descendant of the bioplasm or nucleus of an epithelial cell. The pus-corpuscle cannot, therefore, be looked upon as an individual colourless blood-corpuscle, which has simply migrated from the blood by traversing the walls of the vessel.

The idea that the formation of pus is in any way dependent upon bacteria or other forms of so-called micro-organisms is negatived by what may be easily seen in the production of pus-corpuscles in epithelial cells. The growth of the bioplasm and its division and subdivision under conditions which involve increased nutrition will convince any one who observes the phenomenon how pus is produced in epithelium;

and as exactly corresponding facts are to be demonstrated by the examination of bioplasm in other tissues, cartilage, fibrous tissue, muscle, nerve, &c., when exposed to the influence of an unusual supply of nutrient pabulum, no room is left for doubt as to the exact nature of the pathological process of pus-production. I cannot agree with my colleague, Professor Lister, in considering that bacteria may be the cause of suppuration, nor can I admit that this process can be properly attributed to chemical substances or to nervous disturbance, but a state of things may be brought about by these which may indirectly occasion the free distribution of nutrient matter to bioplasm to which the production of pus is directly and solely attributable in all cases.

SOME COMMON FORMS OF SLIGHT INFLAMMATION AND OF THEIR TREATMENT.

We will now endeavour to determine what are the essential changes which occur in epithelium and in some other tissue elements in ordinary slight inflammations. These changes do not necessarily lead to any structural alterations; but if the inflammatory process continues for a certain period of time, it may be followed by tissue degeneration and other pathological phenomena, from which, complete recovery—return to the normal state—cannot be looked for. Not a few of the slight inflammations are superficial, involving a very thin layer of the surface tissue only, and although most of them are by no means serious, some are very troublesome and many excessively painful. It is desirable, therefore, not only that you should know how to detect and distinguish them, but you ought to be fully conversant with the exact nature of the minute changes taking place, and the methods by which a return to the normal state may be encouraged.

The treatment of some of the inflammations in question has been already considered, but it seems to me very important that I should do my best to press upon your consideration the character of the changes effected by simple remedies in the vital actions which are proceeding in the inflamed tissue, the results of some of which have been rendered evident to us by careful microscopical research. He will be most successful in the management of the disease who most nearly succeeds in picturing to himself the wonderful changes which proceed in such marvellous minuteness and detail, and which can only be revealed to those who have long and earnestly studied, and have taken full advantage of the elaborate means of minute investigation now at their disposal.

The mucous membrane of the nose, and its many passages, as has been already stated (p. 293), is very liable to slight inflammation. In the changes which occur during an ordinary cold we have an illustration

of the very gradual passage of physiological into pathological actions. There is a particular point in these changes when it would be impossible to decide whether it would be more correct to say that the membrane still remained in a healthy state or had just passed from this into a morbid condition. The difference between certain normal and inflammatory states unquestionably depends only upon an exaggeration of the activity with which normal changes are performed. In suppuration there is no depression or reduction in intensity of vital processes, but there is too much vital action, too much growth of a weak temporary character, and too rapid multiplication of living particles.

It is by the careful study of inflammatory changes only moderate in degree that we shall be able to answer the question why in one case the healing, and in another, apparently similar in all general respects, the opposite and destructive process occurs. A slight wound suppurates, which we desire should heal, an ulcer forms and increases in spite of all our efforts to stop its ravages. The observations made on p. 339 bear upon this most important question, and while one set of enquirers would attribute the want of repair to some derangement of the nervous system, another set to some chemical poison in the air, another to the presence of bacteria of a malignant type, I would refer it solely to the state of the patient's blood—to the presence in the circulating fluid of an abnormal quantity of material easily appropriated by low forms of bioplasm or living matter, and to the presence of multitudes of minute particles of these—of bioplasm particles which, passing through the capillary walls, grow and multiply and actually prevent the slower changes which ordinarily result in the formation of formed material, and which constitute an essential part of the healing process. If the matter upon which these particles live can be removed from the blood, we shall stop the growth and multiplication of the bioplasm particles and cause their death. Hence in cases in which the patient's strength is good, free purgation favours the healing process, and in the case of those who suffer from prostration, alcohol in the blood and the application of alcohol and things which act like alcohol to the wound acts in the same beneficial manner, for this substance interferes with the growth of living matter, and alters the pabulum in such a manner as to render it unfit for the nutrition of the living particles.

Formation of Mucus.—Mucus, as you know, is formed in small quantity in the follicles and glands in connection with the mucous membrane of the nose, even in perfect health. When we suffer from a common "cold in the head," these particles of bioplasm which take part in the formation of the tenacious mucus around them, grow and multiply more quickly than they do in the perfectly healthy state. The viscid material (mucus) formed by them is in greater proportion, softer in consistence, perhaps disintegrated and broken down, or actually de-

composed, and in it bacteria and low forms of life find materials favourable for their development, and eminently suitable for their nutrition.

Mucus Corpuscle.—I have many times spoken of the bioplasm which constitutes the so-called Mucus-corpuscle, but I have not told you how you should proceed to observe the wonderful vital movements which occur during its life, and especially at the commencement of a slight cold, when the activity of the movement is considerably increased. Having obtained, by coughing or sneezing, a small piece of the transparent mucus, about the size of a pin's head, place it on an ordinary microscope plate-glass slide. Next cover it with a piece of the thinnest covering glass you can obtain, without adding water or any other substance. Gently press down the thin glass cover with the aid of a pin or needle, and place the slide under the microscope, using first of all a quarter of an inch object glass, and then a twelfth or higher power, if you are fortunate enough to possess one. If not, you can gain the requisite degree of amplifying power in another way, and at the cost of a shilling or two. A piece of brass tubing, of the same diameter as that of the tube of the microscope, and arranged to carry the eye-piece, is fitted to it, sliding in just as the eye-piece does. The total length of the tube, to one end of which the object-glass, and to the other the eye-piece, is attached, is in this way increased to about eighteen inches. The intensity of the illumination being somewhat increased, you will find the little particles of mucus so highly magnified that you will be able to see the slightest changes which take place in their form and contour from moment to moment.

The minute oval particles in the thin layer of transparent mucus, and which consist of living matter or bioplasm, may be said to represent, and indeed correspond to, the "nucleus" of an ordinary epithelial cell, while the mucus—that viscid material which surrounds them—corresponds to the "wall" of the cell. If the epithelium of other mucous membranes grows unusually fast, a material which not only corresponds to, but resembles, mucus will be formed.

If now you select one of the oval corpuscles, the living matter of the mucus, and examine it intently, you will soon observe changes in its outline. Here and there protrusions will occur, portions of the mass moving away from the remainder, and then being withdrawn and incorporated. The movements indeed very closely resemble those seen in an ordinary *amœba*, and are *vital movements* of the same nature. They continue for a considerable period of time—perhaps for twelve hours, or longer, if you can keep the mucus in a moist atmosphere, and so prevent it from drying up. Changes of the same kind occur in bioplasm generally, but it is only here and there that we are able to demonstrate them so satisfactorily as in the case of the living Mucus-corpuscle, Pus-corpuscle, and colourless Blood-corpuscle. In these living particles any

one can study, and at any time he desires to do so, the vital movements of bioplasm or living mattter.

In an inflamed mucous membrane, besides those prominent derangements, increased redness caused by congestion of the capillaries, and increased dryness consequent upon the defective pouring out of the fluid from the blood to take the place of that which has been quickly removed from the surface by evaporation, we have to notice important changes in connection with the action of the nerves. Every one who has had a cold knows that the sensation of the part is affected. The mucous membrane is sore and painful, so that his attention is being frequently directed to it. He fancies something is adhering to it which requires to be removed, and is constantly making efforts to get rid of it. In some cases a certain quantity of mucus collects upon the surface and dries, in others the sensation experienced seems rather to be due to the tissues being infiltrated with fluid. Sometimes the mucous membrane, particularly at the margin of the nose, becomes excoriated, or a superficial ulcer may form. In the last case it will be found that the ordinary protective hardened epithelial covering has been here and there removed, and a raw and highly sensitive fissure formed, at the bottom of which are capillaries and nerve-fibres. From the capillaries fluid escapes holding in suspension numerous minute particles of bioplasm, and not unfrequently small quantities of blood itself are poured out. The pain experienced is due to the exposure or incomplete exposure of delicate nerve-fibres. The particular nerves affected are those which are distributed close to the capillary vessels, and which have been described in p. 314. But other nerve-fibres may be involved, for as I have already mentioned, there are tissues in which nerve-fibres are distributed, although no capillaries exist, which nerve-fibres are concerned in the pain experienced when the tissue is inflamed. At the same time it is probable that the nerves in question belong to the same system as those distributed to capillaries, while there is no doubt that the latter are concerned in transmitting to us the impressions which we call pain. I have already remarked that as regards many tissues to which numbers of nerve-fibres are distributed, we are quite unconscious of their existence so long as the normal or healthy state lasts, but as soon as this gives place to inflammation, pain, it may be of the most exquisite kind, results. The nerves concerned are, I think, those of the capillary vessels which belong to that self-regulating system of nerves before referred to (p. 318). These fine nerve-fibres become, as I have said, stretched or pressed upon by the distended capillary vessels, and perhaps otherwise affected by the exudation which takes place. And in consequence of these derangements, this departure from the normal state, as respects the nerve-fibre, and the bioplasm which is connected with it, that disturbance of the nerve-current which we term pain results.

The extreme pain accompanying pleurisy, that caused in the condition we recognise as a rheumatic state of the nerves distributed to the intercostal muscles, and the pain excited during inflammation even of very small portions of the subcutaneous tissues, as in the formation of a boil or even in the case of a chilblain, are illustrations of the exquisite sensitiveness of nerves in textures, of the existence of which in the normal state we are perfectly unconscious. In all these cases the actual nerve-fibres involved are probably those which run very close to the capillary vessels of the respective tissues.

Eruptions, particularly of a vesicular character, often occur in the course of sensitive nerves, and particularly in the course of nerves which are very commonly the seat of neuralgic pain. Whether the sensitive nerve trunk is directly involved, or whether the fibres distributed to the capillary vessels of the nerve trunk and of the skin situated over the nerve only are affected, it is not possible to say. What, however, seems quite certain is that the vesicles of an eruption, which generally is herpetic in its character, follow the course of the nerve. The pathological disturbance resulting in the formation of the vesicles may be of a most complex nature, in which reflex nervo-vascular action plays a highly important part. There must be increased nutrition, with pouring out of fluid from the capillary vessels, and this phenomenon is probably due to the relaxation of the muscular fibre-cells of the small arteries and consequent enlargement of their calibre, a change which may be caused by disturbance in the nerve-centre governing the arterial contraction and dilatation. The central disturbance may itself be due to impulses emanating from the sensitive nerve itself, or originating in the skin situated over its course and transmitted thence by afferent fibres connected with the centre. In this manner it is very probable that various peculiar eruptions and other disturbances connected with the nutrition of the skin and subjacent structures are occasioned.

But besides the alteration in the sensibility of the mucous membrane in sore throat, important changes take place in connection with reflex nervo-muscular action. You are all no doubt aware that if the fauces be tickled ever so slightly, convulsive movements of swallowing will instantly follow if the mucous membrane be in a healthy state. In slight "sore throat" it will be found that the response to slight irritation is slow and imperfect, while in severe forms of inflammation no efforts of deglutition can be excited even by severe irritation. The changes in question are due to an alteration in the sensitiveness of the mucous membrane, and probably depend upon pressure or stretching of the delicate nerve-fibres, in consequence of which they cease to conduct impressions from the periphery to the nerve-centres.

The dry state of the surface which is induced by slight inflammation of the mucous membrane may last for a short time, and then gradually

subside without any further pathological action. If however the dryness and diminished secretion should persist for some weeks, restoration to the ordinary condition takes place very slowly, and before the healthy state can be resumed, a condition opposite to that of dryness supervenes. Secretion is poured out, it may be in very considerable quantity. This tendency to secretion, being once established, may persist for days or weeks, and then begin to diminish in amount. By degrees the glands return to their normal state of slight activity, secreting only a very small amount of transparent viscid mucus.

Counter-action, Counter-irritation.—But we may reduce the secretion consequent upon exaggerated and abnormal action occurring upon a mucous surface by causing increased action elsewhere. Instead of trying to act directly upon the membrane which is the seat of the increased action, we may endeavour to establish increased action of surfaces or organs at a distance, situated in different parts of the body. In this way, for example, the inflammation and undue action which are going on in the surface of the nose in many cases of catarrhal inflammation may be reduced. This is, indeed, a very important principle connected with the treatment of disease, and it has been acted upon for years, or even centuries, but we are much better informed concerning the *rationale* of the process than our predecessors were. That we can reduce the rate or degree of action in one part of the body by increasing it in another, may be proved by a simple experiment. When a cold is coming on, you feel great discomfort about the nose, the mucous membrane of which cavity is so swollen that the nasal passages are obstructed, so that if you try to draw air down one nostril, you fail, or only a little air can be drawn through if a great effort be made. You are obliged under these circumstances to breathe entirely through the mouth. The discomfort caused by the swollen state of the mucous membrane, depending partly upon exudation into the submucous tissue, and partly upon increased nutrition going on in the epithelial covering, may be ameliorated in a very short period of time, and in a very simple way. Let the feet be put into water, as hot as it can be borne without severe pain. In the course of a quarter of an hour, the disagreeable feeling of fulness and obstruction in the nose will cease. The air will pass through the nasal passages quite freely. By increasing the flow of blood in the vessels of the skin of the lower extremities, much of the circulating fluid will be diverted, for the time being, from the mucous membrane of the nose.

Many cases of headache are also relieved by putting the feet into hot water. If, instead of this, a mustard poultice be applied to the back of the neck, a similar effect will follow. As soon as the mustard poultice begins to act, the nerve-fibres distributed to the capillaries ramifying just beneath the epithelium, after being first irritated and then poisoned

by the oil of the mustard, take part in initiating changes which result in the vessels becoming red and turgid from the increased quantity of blood which is driven into them. The blood in these vessels circulates more slowly, and gradually accumulates in them, the surface becoming red and exceedingly painful. Corresponding with this increased action in the healthy part we have reduced action at the seat of the morbid change.

In this way we are able to effect alterations which are of immense importance in the treatment of many different forms of disease. In cases where the morbid action is chronic, we keep up the counter-irritation to a moderate extent, or we repeat the application of the counter-irritant from time to time. Even in very chronic diseases, there is good reason for adopting this principle of treatment. In some cases of phthisis, where there was reason to infer that tubercle was limited to a very small extent of pulmonary tissue, benefit seems to have resulted from keeping a small open sore on the skin of the upper part of the chest on the same side of the body. This is a form of "issue." In these days, however, this system of treatment is now rarely, perhaps too seldom, employed.

It is not uncommon to find slight pathological derangements of the skin and mucous membrane of the lips. This surface becomes more or less dry, and the epithelium of the red part of the lip, which resembles that covering the skin, only forming a thinner layer, as well as the soft, moist epithelium lining the cavity of the mouth, may be deranged in its growth. The surface, instead of remaining quite smooth, becomes more or less harsh. Under these circumstances the patient often attempts to make the surface even, by rubbing it so as to remove the little projecting pieces of ragged cuticle. In this way the derangement is kept up or intensified. The cuticle tends to peel off in thin laminæ, and many people cannot resist the temptation to catch at the pieces, and tear them away. But then the surface becomes raw, and often bleeds. In consequence of the air coming into contact with it, the moisture soon disappears, and the soft, imperfectly-formed cuticle soon gets dry, the surface becomes corrugated, and the tissue is more painful than ever.

By the irregular growth of epithelium the arrangement of the finest nerve-fibres is disturbed, and constant irritation gives rise to irregular stretching or pressure. The sensations thus caused, and rapidly succeeding one another, excite the patient's constant attention, and in consequence he continually rubs the affected part or keeps constantly picking at any loose portion of cuticle. Immediately around the irritated nerve-fibres are multitudes of particles of living bioplasm actively growing and multiplying, forming a mass of soft, very moist, spongy matter, the constituent particles of which are always changing in position. The drying that is proceeding on the surface necessarily

disturbs the nerve-fibres, as well as other structures beneath. Schoolboys are very prone to pick their lips when in this state, and make them extremely sore, particularly at the line where the thin skin of the lip joins the ordinary skin, and at the angles of the mouth, where little cracks or fissures often form, which may remain for days or weeks, sometimes giving rise to ugly and troublesome sores. It is very desirable to prevent the irritation which so disturbs the patient and causes him to make the sore worse, and retards the healing.

Principles of Treatment.—It is by taking the hint afforded by slight departures from the normal state that you may be of the greatest use in preventing more serious changes, or in being led to anticipate their occurrence, and by adopting measures known to interfere with the expected pathological phenomena they may be prevented or modified. Half a grain of calomel or less given daily for four or five days will often be found to be more useful than one or two purgative doses. By the former plan you excite a series of moderate changes favourable to the desired effect, and oftentimes you will find that health is completely restored by the very free action of the organs of elimination throughout the body, an effect that might not have been produced either by violent treatment or by change of air, or by transference to high altitudes, or by drinking special waters.

Upon what principles should the local treatment of simple excoriations and slight superficial ulcerations be based? Our main object should be to reduce the growth and multiplication of the particles of bioplasm which are instrumental in keeping the fissure moist and open. This cannot be effected by causing them to dry up, because in that case a little crust would soon form which, in consequence of the contraction produced by desiccation, would afterwards be drawn away from the subjacent parts. In this manner a raw surface again appears, and is perhaps larger than the preceding one. We must at the same time try to prevent this drying up, and endeavour to reduce the growth of bioplasm, and the pouring out from the blood of fresh plasma containing more bioplasm particles. By effecting these objects certain celebrated lotions and other local applications promote healing. Some of them lead to the quick formation of a dry scab, but so thin that it does not become detached. Other applications are employed for the purpose of reducing the rate of growth of the masses of bioplasm on the surface of the sore, which is at the same time kept moist. The formation of the more permanent tissue slowly proceeds beneath this temporary protective covering. The latter process requires a considerable time for its completion, for much formed material has to be slowly produced by the bioplasts of the several tissues, and time must be allowed for it not only to be slowly formed, but to become properly condensed.

Alcohol.—One of the most potent applications for healing such slight

sores as I have referred to, is alcohol. The sore place is to be painted over once in an hour or so, with pretty strong spirit, a camel-hair brush being used for the purpose. Of course, there is a sharp pain at the moment the alcohol comes into contact with the delicate nerve-fibres, but it soon passes off. In many cases it is well to dilute the alcohol with an equal quantity of water or rose-water. It matters little whether you use any of the ordinary spirits, or Eau de Cologne, but pure spirits of wine, diluted with one-third part of pure water, is the best application. By this treatment the thin skin on the surface of the fissure or ulcer will become hardened, and the soft, new epithelium that is being formed beneath will become condensed, and the new cuticle will gradually assume the usual character of that tissue. Let us consider how alcohol acts advantageously under these circumstances:—By its property of coagulating albuminous matters, alcohol tends to retard rapid growth, and to interfere with the multiplication of those particles of bioplasm which are growing so rapidly just outside the capillaries. The bioplasm, as I have mentioned, is growing so very fast that there is not time for the development and consolidation of that firm, healthy formed material which, with the living matter or bioplasm within, constitutes a cuticle cell. By applying alcohol then, you favour the formation of cuticular cells. Wherever the cuticle is thin, by painting it frequently with alcohol, you promote the formation of firm cuticular formed material (the outer part of the so-called cuticle cell) and thus the condensation and increase in thickness of the new tissue is effected.

If there should be sores in the mouth, or if the mucous membrane of the gum should be soft and spongy from the infiltration of fluid in the substance of the mucous membrane, the surface of which may be very red and tender, the morbid action may also be quickly counteracted by painting the part three or four times a day with spirits of wine, *Spiritus Vini Rectificatus*, or some other form of alcohol, or with spirits of Camphor, *Spiritus Camphoræ*.

Solution of Nitrate of Silver.—Many lotions composed of metallic salts are employed in the treatment of sores. Most of them act by virtue of their property of coagulating and precipitating and forming compounds with albuminous matters. Among these salts is Nitrate of Silver, *Argenti Nitras*, which causes some sores to heal very quickly. With a small camel-hair brush you paint the fissure with a little solution of Nitrate of Silver, consisting of from five to ten grains of the Nitrate in an ounce of Distilled water. This will give pain for the moment, but the soreness soon passes off. The growth and multiplication of the masses of bioplasm are prevented. Time is allowed for the young cells to harden. Gradually, new cuticle is formed, the growth of healthy epithelium is favoured, and before long the healing process is completed.

Not only is new cuticle encouraged to form, but when a portion of the true skin is removed, the various tissues are reproduced as well as the epithelial covering.

Conjunctiva.—A good illustration of the pathological changes which occur when a complex tissue becomes inflamed is afforded by the mucous membrane which covers the front of the eye and lines the eyelids, the *Conjunctiva*,—when in a state of inflammation. This moist mucous membrane is very highly sensitive, and as all have occasionally experienced, readily becomes inflamed. If you go out in foggy weather, and afterwards examine the conjunctiva, you will often find many of its vessels distended, and you will observe that it is much redder than it was before it was exposed to the deleterious effects of the irritating substances which are suspended in the air. The pathological change in question is due to the poisonous action of the irritating matter on the peripheral ramifications of the sensitive afferent nerves, whereby is occasioned a disturbance in the nerve-centres resulting in a paralysing influence upon the nerves of the little arteries. In the case of persons who are in a low state of health, who have lived badly for some time, and especially in those who belong to scrofulous families, there is increased liability to inflammation of the conjunctiva, as well as the glands and other structures which are connected with it. When the mucous membrane is inflamed the little glands participate, and from them is poured out an abundant secretion containing numerous particles of bioplasm. The vessels are distended, and that part of the mucous membrane which lines the eyelids and covers the white part (sclerotic) of the eye is reddened and, as I have remarked, assumes an appearance which well illustrates the changes taking place in inflammation. The condition is called *Ophthalmia or Conjunctivitis*, and is of great scientific interest, because the transition from the normal or ordinary state of health to the abnormal and temporary state of inflammation may be studied in its gradations. It is easy to examine the membrane from time to time with a lens, and without causing the slightest pain or inconvenience to the patient.

The conjunctiva, especially in ill-fed, ill-nourished scrofulous children, not only readily takes upon itself this exaggerated action, but passes into a state of inflammation which, though slight for a time, may soon become severe and be accompanied with an abundant formation of a yellowish secretion. If a little of the discharge is examined in the microscope, it will be found to consist of multitudes of particles of living matter, well known as *pus-corpuscles*. Such is the virulence of these particular living particles that if no more of the discharge than can be carried on the point of a needle, be transferred to the surface of the eye of another person, a similar pathological state is quickly established upon it. Serious inflammation is excited, and the same series

of phenomena occurs. From this case the poison may be transferred to a third, and so on.

Now, if many children in weak health who for some time previously have been badly managed as regards food, air, exercise, and cleanliness, are allowed to congregate, and especially if they are confined in close, ill-ventilated rooms, the disease may not only arise but soon acquire an extraordinary degree of virulence. It may spread so quickly in such a community of children, that in a short time, out of four or five hundred, one-third or even a larger proportion may be suffering from the disease. Of the number affected many will suffer severely, and serious structural changes in the membrane and in subjacent tissues will result. The transparent part of the eye in front, known as the cornea, may ulcerate, and when after some time it heals, the tissue will be so altered that the very transparent texture will become opaque, or the eye itself may be destroyed, blindness of course resulting in either case.

This very virulent poison of purulent ophthalmia may, as I have remarked, be evolved *de novo* without contagion. The contagious material may in fact originate upon the membrane which during its formation passes from the normal into the pathological condition. A highly contagious poison is also developed, in the organism of a person suffering from peritonitis and some other inflammatory and febrile diseases. In this case it is to be remarked that the surfaces upon which the changes occur which result in the development of the living contagious poison are not and never have been exposed to the air. The contagious matter once developed, however, may spread far and wide, and with a rapidity which is quite remarkable. You see, therefore, that a living animal poison of a highly contagious kind may be developed, the most minute portion of which, not more than would remain on the point of the finest needle, might establish a similar series of pathological phenomena in a comparatively healthy tissue if transferred to it. Probably many of the pus-corpuscles found on the surface of the conjunctiva in a case of purulent ophthalmia do not result from the particle inoculated. Some, no doubt, are formed from the young bioplasts of conjunctival epithelium. There are, therefore, in such cases, two kinds of bioplasm growing and multiplying at the same time, but so intermingled that it would not be possible to obtain particles of each kind separately.

In inflammation of the conjunctiva, not the least important of the phenomena is the dilatation of the vessels. Of the little arteries many are dilated to three times their ordinary diameter, and the capillaries are also distended and choked with blood. Capillary vessels so small that hardly a single row of red blood-corpuscles would lie in them, and quite invisible in the ordinary state, become so large in inflammation and are so filled with blood that through an ordinary lens they can be

seen as distinct dark-red lines. The injection of the vessels may continue for many days and then pass off or it may become chronic, when other pathological changes take place in consequence. The influence of the nerves and nerve-centre in these vascular changes has been already considered in page 307.

Treatment.—Inflammation of the conjunctiva requires to be carefully treated. It is undesirable to allow this inflammation to go on, especially in children, because it may reach a stage in which there is danger of damage, not only to that very important structure of the eye, the cornea, the clearness of which is essential to distinct vision, but, as before remarked, to the whole organ. Good hygienic conditions are essential in the treatment of the disease as it occurs in children; and it is very important to look for and relieve that preliminary state of inflammation and enlargement of the glands in the membrane which almost invariably precedes an attack of purulent ophthalmia.

Many astringent substances are of use in the treatment of inflammation of the conjunctiva. These may be applied in various ways. In former days it was the practice to project a small quantity of some astringent powder on the surface of the inflamed conjunctiva, by placing a little of the powder in a quill or piece of straw, and blowing it suddenly upon the eye, which was kept open for the moment. These powders were usually made of sugar and the potent substance, in the proportion of from ten parts or more of the former to one part of the latter, the whole being very finely powdered and carefully mixed. *Oxide of Zinc*, *Nitrate of Potash*, *Alum*, *Sulphate of Copper*, *Nitrate of Silver*, and other substances have been used in this way; but the practice is a bad one, and has been almost entirely abandoned in favour of solutions, which may be applied as drops, or by using an eye-glass or an eye-fountain. Strong astringent applications should never be used except under proper advice, or serious damage to the eye may result.

Of Lotions and Eye Waters.—One of the best is a weak solution of Sulphate of Zinc, *Zinci Sulphas*, in water, or, if you wish to order a more elegant lotion, in Rose Water, *Aqua Rosæ*. As regards the quantity, you may prescribe from a quarter of a grain to a grain, to the ounce of water. A very dilute solution will often produce a favourable change in cases of mild inflammation of the conjunctiva in a few hours. *Sugar of Lead*, *Plumbi Acetas*, *or Sulphate of Copper*, *Cupri Sulphas*, may be used in the same proportion as Sulphate of Zinc; but the latter and *Nitrate of Silver*, *Argenti Nitras*, are probably the most efficacious. Of the last, the proportion should be half a grain or less to an ounce of distilled water. If the eye is very painful, a grain of Opium or two or three drops of Laudanum, *Tinctura Opii*, to the ounce of water, may be prescribed. In all cases the solution should be carefully filtered before

it is applied. A lotion consisting of *Spirits of Wine*, *Spiritus Vini Rectificatus*, or good brandy, *Spiritus Vini Gallici*, in the proportion of one part to thirty or more parts of water, has also been recommended; and where the vessels are diluted without any production of pus, the careful application of a weak spirit solution may be useful.

Lotions may be applied to the surface of the eye in two or three different ways. One of the best methods is to seat the patient in a chair, and make him throw his head back. You then take a good-sized camel-hair brush, which will take up two or three drops of the lotion, which may thus be caused to flow into the inner corner of the affected eye. Of course the patient will instinctively close the eye at the moment, but he must be encouraged to open the lids a little, so that some of the solution may pass in, and the surface of the conjunctiva be thoroughly moistened by it in every part. Another plan is to bathe the eye with an ordinary sponge or rag, but you must always be most careful that the particular sponge or rag is used for no other purpose whatever. Where there are several patients each must have his own sponge, towel, &c., kept exclusively for his own use. Another way of applying lotions to the conjunctiva is with the aid of an *Eye-glass*. This is a little glass made something like a small wine-glass, the free edge being shaped so as to fit within the margin of the orbit. The eye-glass is half filled with the lotion, and the patient is directed to hold the glass steadily against the eye, while the head is to be moved about in such a way as to cause the fluid to splash against the surface of the mucous membrane. Lastly, there is the little *Eye-douche or Fountain*, by the aid of which a jet of lotion can be thrown against the eye. All these instruments may be obtained of surgical instrument makers.

Astringent lotions generally by their indirect action upon the nerves of the part, and by their direct action upon the particles of bioplasm which are growing and multiplying, favour the formation of the firm material, upon which the consistence and the protective character of the epithelium depends. Thus a "raw," or nearly raw, surface gradually becomes again protected with a layer of ordinary slow-growing epithelial tissue.

Sore Throat.—In an early lecture I have adverted to some of the changes which occur in sore throat, but in this place I shall consider one or two questions in connection with the subject which were then passed by. Most of us have suffered more or less from this affection. In the case of those who are susceptible, there frequently occurs a certain amount of congestion and inflammation in the mucous membrane of the fauces, and of the back of the pharynx. If you look at the palate in such a case, you will find it in very much the same state as I described when referring to the mucous membrane of the nose in an ordinary cold. Many of you will have opportunities of making the observation

in your own persons. You may easily examine the fauces with the aid of an ordinary looking-glass. Instead of the membrane appearing moist, you will find it nearly dry, and perhaps you may see a piece of half-dry viscid mucus intimately adhering to it. The sensibility of the membrane is also affected. Although it feels sore, you will, however, find that it is less sensitive than in the normal state, while certain of its nerves do not respond so readily to a stimulus as they do in health.

If the throat is perfectly healthy, the process of swallowing, or deglutition, is easily performed, and almost unconsciously—at least without any great effort; but if the throat is sore, deglutition becomes difficult, and you have to make a very decided effort, perhaps more than one, before the morsel of food can be successfully swallowed.

Then there is another fact of some importance with regard to the action of the mucous membrane. Not only are the nerves which are connected with the capillary vessels, and which are concerned in the sensation of pain and discomfort, obviously affected, but those which are instrumental in exciting by reflex action the contraction of the pharyngeal muscles. If, in the normal state of health, you tickle the soft palate ever so slightly with a feather, if the mucous membrane enjoys its proper sensitiveness, movements of deglutition almost instantly succeed. But if the throat is "sore," the mucous membrane red, and perhaps dry, you may tickle it very decidedly, and only feeble contraction will follow after an interval of time, or no contraction of the muscles will occur. In this action the muscular fibres fail to contract, because the nerve-fibres which carry impressions from the surface of the mucous membrane to the nerve-centre are deranged. Their action for the time being is prevented. There is, as it were, a peripheral paralysis. The motor nerve-fibres, the nerve-centre, and even the afferent trunks themselves, may be all right; but the fine ramifications of the afferent fibres in the mucous membrane are so affected by the effusion in its substance and other changes, that they do not receive and transmit impressions.

In many cases of sore throat you will see the little glands, which exist in great number in the mucous membrane of the pharynx and fauces much enlarged, the orifices of the ducts standing out prominently. The little glands participate in the inflammation, and not unfrequently the change is chronic, and lasts for a considerable time.

When sore throat attacks persons who have for some time been in a low state of health, or exposed to adverse influences, as sometimes happens in the case of those resident in workhouses, hospitals, jails, and other places, it may run on very quickly to extensive superficial ulceration, which may affect the substance of the tonsil, and progress for several days. The fetid products resulting from the decomposition of the secretion taking place upon or near the ulcerated surface are some-

times absorbed into the blood and occasion a form of blood-poisoning. If swallowed, the discharges give rise to much disturbance of digestion. It is, therefore, most important in the treatment of such cases to apply substances to the surface which have the effect of completely changing the organic matters and destroying the infecting material.

If Diphtheria exist in the neighbourhood, persons in a low state of health, and those already suffering from sore throat, are very likely to take the disease, which sometimes runs its course so very quickly that life is in jeopardy in a few hours after the malady has declared itself, or even before there has been time for the formation of a false membrane, or for the development of any characteristic phenomena of the disease. It is, therefore, of the utmost consequence to very carefully watch cases of sore throat, especially when of an epidemic character. You should see the patient at intervals of a few hours, and you should give quinine and stimulants early, instead of waiting till the patient is very low. In some cases of what is called "hospital sore throat," as well as in Diphtheria, you will be surprised to find that persons may take in twenty-four hours from ten to thirty grains of quinine and eight or ten ounces of brandy, divided into doses given every two hours, without any indication of the quantity of either remedy being excessive; and it may be necessary to continue this treatment for many days, giving at the same time plenty of beef-tea or milk.

The Treatment of Sore Throat.—We are often consulted by patients who complain that they are almost constantly suffering from soreness of the throat. It is sometimes better, sometimes worse, but they will tell you the throat always feels rough and uncomfortable. Many local applications are of great use. You may paint the fauces with a solution of Nitrate of Silver, *Argenti Nitras*, but a stronger solution may be employed than was recommended for applying to the conjunctiva. A solution consisting of from five to ten grains to the ounce of distilled water answers well, or you may employ a mixture of solution of Perchloride of Iron, *Liquor Ferri Perchloridi*, and an equal quantity of glycerine, *Glycerinum*. This mixture is very valuable in the treatment of sore throat, whether it be mild or severe. The glycerine causes the Perchloride of Iron to adhere to the surface for a little time, and in that way increases its beneficial effects. The application allays the irritation, and not unfrequently the enlarged glands of the mucous membrane return to their healthy condition.

In forms of sore throat in which there is a quantity of viscid mucus, accompanied with excoriations, or ulcers on the palate or tonsils, the mixture of Iron and Quinine may be applied every two hours, or oftener. The solution is a potent antiseptic, and destroys any deleterious properties the secretion may possess. By its application efforts of vomiting are often excited, and thus much of the secretion is got

rid of. I have successfully treated in this way many bad forms of sore throat, which by some would be called "*diphtheritic.*" The condition is associated with great depression of strength, and as I have before said, it is necessary to give quinine and wine or brandy in very decided doses. Any of the foul secretion swallowed by accident is rendered innocuous by the action of the iron. In this way stomach disturbance, so apt to ensue in these cases, and which so much increases the risk to life when it does occur, may be prevented. Tannin dissolved in glycerine, *Glycerinum Acidi Tannici*, is also a good application. In applying such local remedies, whether a solution of Nitrate of Silver, or Glycerine and Perchloride of Iron, or the Tannin, perhaps the following will prove to be the best plan. Take a good large camel-hair brush, which must be carefully tied to the end of a stick. This latter point is important, because if the brush is simply placed on the stick, it may unfortunately fall off at a critical moment, and be swallowed by the patient. The possibility of the occurrence of so awkward an accident may be thus prevented. The brush is to be thoroughly wetted with the application, and a few drops being taken up in it, the wet brush is to be well smeared over the surface of the affected mucous membrane. After a quarter of a minute the patient may be allowed to gargle with a little cold water.

Although severe forms of sore throat cannot certainly be included among "slight ailments," it is important that your attention should be directed to the general treatment of the patient. I have no doubt that by judicious management many cases are prevented from assuming a severe form. If the patient gets low with a quick weak pulse, especially if ulceration which may be present should be extending, and there is infiltration of the tissues around the tonsils, it is necessary to give wine or brandy and tonics such as iron and quinine. One is often surprised at the large amount of supporting remedies required in some of these cases. In what used to be called "hospital sore throat" we often find it necessary to give six or eight five-grain doses of quinine in the four-and-twenty hours, and as much as twelve or more ounces of brandy during the same period, and this treatment may have to be maintained during several days.

Gargles.—Various gargles are used in the treatment of sore throat, and an inflamed or aphthous (p. 126) state of the mucous membrane of the mouth. The influence of some of these is due to the presence of matter having astringent properties, while others depend for their efficacy upon some form of alcohol. *Port wine* is an excellent gargle in cases of ordinary relaxed sore throat, but some people do not like port, or any other kind of wine, and in that case you may order a gargle consisting of one part of spirits of wine to four or five parts of water. *Alum* used to be a favorite remedy, dissolved in a little water in the proportion of

one drachm to six ounces. A good gargle may be made by dissolving a drachm of Nitrate of Potash, *Potassæ Nitras*, or Chlorate of Potash, *Potassæ Chloras*, in six or eight ounces of water. An ounce of glycerine or honey may be added. Some like gargles made acid; for this purpose you may order a drachm of Dilute Acetic, Phosphoric, or Hydrochloric Acid, to six or eight ounces of water. Many persons derive benefit from the use of a stimulating gargle, which may be made by adding a little Cayenne pepper, or Tincture of Capsicum, *Tinctura Capsici*, in the proportion of one drachm or less to six ounces of gargle, but this is not suitable in the case of a very sensitive irritable mucous membrane, and indeed may do harm instead of good. A solution of *common salt* is valuable as a gargle. A weak brine may be made by adding a dessertspoonful of salt or less to half a pint of water. The throat may be gargled with this solution once in two or three hours. In ordering gargles it is necessary to give the patient exact directions, to tell him to use the gargle frequently, for it is useless to gargle once or twice in the four-and-twenty hours. If the sore throat is at all severe, the gargle should be used once or twice in the hour.

Of exciting increased action in distant parts.—You may sometimes relieve a sore throat as well as other forms of local inflammation and congestion by causing increased action in other organs and tissues. The action of a purgative is often followed by the relief of the throat affection. Diuretics and sudorifics may be prescribed with the same object, and counter-irritation may be applied in some other part of the body. A mustard poultice to the neck, by establishing increased action on the cutaneous surface, often reduces the congestion of the mucous membrane of the throat. When slight, and not depending upon a general low state of the system, or altered blood, a sore throat may sometimes be cured in this way in a couple of hours.

Inflammation of the Mucous Membrane of the Air Passages.—Inflammation, as has been already remarked, very commonly affects the mucous membrane of the nose and all the cavities which open into it. There is increased secretion from all the glands and follicles opening upon the surface, increased formation of soft, moist, and imperfectly formed epithelium, taking the form of mucus, and undue turgescence of all the vessels. In consequence there is what is ordinarily called "running from the nose."

When the mucous membrane of the large bronchial tubes is inflamed, and there is an increased formation of mucus on the surface, we have an ordinary catarrh, the phenomena of which have been already referred to. There is in these cases also congestion of the fauces, increased formation of mucus, and increased action of the glands. The transition from the ordinary epithelial cell to the viscid material known as mucus, and from the mucus-corpuscle to the pus-corpuscle,

may be observed and studied. In cases in which the inflammation continues for a considerable time, instead of viscid transparent mucus being formed, we meet with ordinary pus, or pus mixed with mucus, which is known as *Muco-pus*, the microscopical characters of which must be carefully studied, as well as those of other kinds of sputum formed in different cases of disease.

What is termed false membrane, or croupous exudation, is frequently formed in cases of inflammation of the mucous membrane of the larynx, trachea, and bronchial tubes. I have seen cases in which a complete and firm membranous cast of these passages was formed on the surface of the mucous membrane, and was expelled entire after much suffering. The firm material consisted entirely of viscid mucus. Casts of the smaller bronchial tubes are also sometimes formed of mucus, but more commonly they consist of fibrinous material which has been poured out from the blood, and has coagulated in the air-tubes.

Running from the ears is common among children of what is called "a scrofulous habit of body." The epithelium of the meatus undergoes change, and becomes soft, the new epithelium being imperfectly formed, and superabundant. The vessels of the skin are also congested. After the disturbance has existed for some time, the discharge resembles that from an ulcerated surface. Not unfrequently the discharge dries up and forms a crust, which in consequence of the itching and irritation excited, is often picked off by the patient. A raw and very sore surface is exposed, and from this fresh discharge escapes, which in turn dries, and then follows a repetition of the process. The condition is very often obstinate and difficult to cure. In most instances constitutional treatment by iron and other tonics and cod-liver oil is absolutely requisite. As the health improves, the discharge begins to diminish and at last ceases altogether.

Inflammation of the Mucous Membrane of the Stomach and Intestinal Canal.—The mucous membrane of the stomach is very liable to congestion and inflammation, much more so, I think, than is generally supposed. From time to time these pathological changes probably affect small patches of mucous membrane, last for a time, and then pass off if the mucous membrane is soothed and allowed to rest from active work for a few days.

In all our best works on Medicine, the subject of Ulcer of the stomach is fully treated of, but there is a state of things allied to ulcer, and leading to it, to which reference is seldom made. The state of mucous membrane to which I allude is not so serious as ulcer, but it is much more common, and if not relieved, may be succeeded by the formation of an ulcer. The mucous membrane of the stomach, like the nasal and bronchial mucous membrane, "takes cold." It becomes red

and less moist than in the normal state. There is often great discomfort and very frequently severe pain. The glands are more or less affected, and the functions of the stomach are very seriously disturbed. The secretion of gastric juice is interfered with and its qualities changed. Digestion is of course deranged, and sometimes completely checked. There may be much flatulence, which adds to the distress. Many patients, instead of allowing the stomach to rest for a while, are too prone to call for food when they experience any uneasiness. They feel exhausted and think a good meat meal will certainly relieve their discomfort. This they take, and very soon find they have made a mistake, for the pain is increased. If they are fortunate, vomiting will be excited, and all that has been taken, with perhaps other matters already in the stomach, will be rejected, when considerable relief will be experienced. When you have reason to think that a patient is suffering from this slight inflammation, it is desirable to at once carry out measures for his relief, and effect a return to the healthy state as soon as possible, for the stomach is an organ whose work cannot be suspended for long at a time without the whole organism suffering. You order, therefore, nutritious but unirritating, soft or liquid food for a while, and then take care that for the next few weeks only food of a soothing character, and which will be very easily digested, passes into the stomach. The patient must on no account be allowed to take ordinary diet, and you must tell him not to touch beer, and advise him not to take very cold or very hot liquids of any kind. Every form of alcohol should, as a general rule, be withheld, because in a great many instances alcohol only irritates, and sometimes greatly increases the pain. It may do much harm, though it must be admitted that not unfrequently it relieves for the moment the discomfort and sinking feeling which sometimes distress the patient. But if it relieves there is risk of the patient getting into the habit of taking it, and for this reason it is imperative to be cautious in permitting its use in such cases. We must never help people to find an excuse for permanently damaging their tissues and acquiring disease by indulging in alcohol.

The digestion of meat, as you well know, almost entirely depends upon the secretion formed by the stomach glands. When this secretion is temporarily deranged, it is better to allow the mucous membrane of the stomach to do as little work as possible. Meat and fish should, therefore, be withheld for a time. The patients should be put on a milk diet. You may order them to take bread and milk, or arrowroot and milk, or rice, sago, tapioca, maccaroni, vermicelli, and these should be cooked in such a way as to make a very soft moist food. By adopting this course the patient applies something like a poultice to the disturbed mucous membrane of his stomach, and in many other cases, with great and immediate benefit. It does no one any harm to live on soft food

of a farinaceous kind for a few days or a week. Indeed, not a few would gain in health if they systematically adopted such a diet for a week or two once in every two or three months. A very good substance to recommend patients to eat under these circumstances, only you will find many will refuse to eat it, is lentil flour, well boiled and made thick like gruel.

Any part of the mucous membrane of the small or large intestine may be affected by congestion and catarrhal inflammation. There are many cases in which the patient complains of severe pain "in the stomach," the pain being really due to derangement of some part of the small or large intestine. The mucous membrane may be congested in patches, in which case the action of the follicles and of the villi for a time becomes seriously disturbed. By taking care that only bland substances, and as little as possible of these, pass along the small intestine for a time, the mucous membrane will be soon restored to its normal state, and it is important to do all you can to relieve such disturbances as soon as possible, for though, according to the patient himself, he may be suffering only from "pain in the stomach," if he does not submit to take complete rest, what is only a slight ailment may soon become a grave malady. In such cases, diet is of more consequence than medicine, but if the pain is very severe, it may be necessary to give small doses of sedatives. Advantage also results from employing mild counter-irritants over the belly. The best counter-irritant perhaps is a poultice made of half mustard and half linseed-meal. This may be applied to the surface, near the seat of pain, and it unquestionably relieves. A mustard leaf is more easily prepared, but a piece of writing paper should intervene between it and the skin, or the action will be too strong, and the patient will remove it before there has been time for the counter-irritant to have done good.

The external application of warmth greatly relieves pain which results from a congested or inflamed state of the mucous membrane of the intestinal canal. A linseed poultice, or flannels wrung out in hot water, will be of service. If, however, this does not soon afford relief, the surface of the poultice or the flannel may be sprinkled with turpentine. The thick india-rubber bottle for hot water should find a place in every traveller's trunk. It is most useful in the treatment of abdominal and other pain. I have already referred to it on p. 219.

Stimulating liniments are, as a general rule, not advisable. You do not want to move the bowels about in the least degree, or to disturb the parts at all. If you allow people to rub things in, the chances are they add to the sufferings of the patient, and do harm to tissues already tender and irritable, and perhaps in a state verging upon actual disease. This rubbing in of liniments is often adopted most injudiciously for every kind of pain, and you sometimes even find a self-constituted and most

self-confident but unqualified medical adviser "rubbing away!" the pain of an inflamed joint. Many nurses and ladies having a turn for doctoring require to be cautioned on this head, for many conditions are made worse by rubbing, and in some instances very serious inflammation may be excited by the operation.

Congestion and inflammation of a portion of the mucous membrane of the large bowel is not uncommon. There is in such cases severe pain, and the action of the bowel is much deranged. The condition may pass on to ulceration, which may endanger life. Ulcers frequently form in the lower part of the small intestines in cases of Typhoid fever, the healing of which is always a very slow process. Every case of Typhoid fever requires the most careful management and constant attention, not only at the time ulcers are forming and the sloughs separating, but during the healing process. Though this disease cannot be included among "slight ailments," it is very desirable that you should know that health is only very slowly restored, and that three months sometimes pass before a patient suffering from Typhoid can with safety be allowed to resume his usual diet and habits of life. All attempts to hasten convalescence are unwise, and every now and then a patient is lost in consequence. Full time must always be allowed for the healing of ulcers in any part of the alimentary canal.

There happens to be just now a case of mild dysentery under my care in the Hospital. The man suffers much pain, and from the usual symptoms. He passes liquid motions with a good deal of mucus. In this case we are adopting, with the greatest benefit, a mode of treatment which may be considered "empirical" (ἐμπειρία, experience); for, although the remedy employed is undoubtedly useful, we do not know precisely how it acts. Ipecacuanha powder is of the greatest value in many such cases—not only where there is actual ulceration of the mucous membrane of the colon, but where there is an approach or tendency to this condition. In India this drug is much used in the treatment of dysenteric affections. You may begin with doses of two or three grains of Ipecacuanha, in the form of a powder or pill, and you may increase the dose up to twenty grains or more, twice or three times a day; or five or ten grains may be given with a half a grain or less of opium, which will prevent its emetic action. Some persons cannot take opium, and in this case the Ipecacuanha must be given at first in small doses. The medicine may be continued until the symptoms are greatly relieved. In many cases the patient is completely cured in a month or six weeks. It is remarkable how soon tolerance of Ipecacuanha is acquired, for a dose which a patient may take two or three times daily without discomfort would act as a powerful emetic upon any of us. Indeed, if you desire to study the mode of action of an emetic in your own organism there will be no harm in trying the experiment with this

drug. You may take twenty grains of Ipecacuanha powder, *Pulvis Ipecacuanhæ* (not *Pulvis Ipecacuanhæ Compositus*), suspended in half a tumbler of warm or lukewarm water. The dose may be followed by one or two tumblers of warm water, and in the course of ten minutes or a quarter of an hour, you will have an opportunity of studying the violent contractions of the muscular coat of the stomach which will be excited by reflex action consequent upon the irritating effect of the Ipecacuanha upon the afferent nerve-fibres of the mucous membrane of the organ. Ipecacuanha is one of the most potent, and in action one of the least disagreeable, of emetic remedies.

Congestion and inflammation occur in connection with other mucous membranes, as well as those to which I have specially drawn your attention. Thus, the gall-bladder and gall-ducts may suffer congestion ; and inflammation of the mucous membrane of the urinary bladder, of the ureters, and of the pelvis of the kidney are unfortunately frequently met with, but these cannot, I regret to say, be classed among slight ailments, and they will come under our consideration in another part of the course.

Chilblains.—This troublesome and often very painful affection is due to local changes in the vessels of the skin of parts of the body most distant from the large vessels,—notably the fingers and toes, and occasionally the ears and nose. These parts are more exposed to cold than the rest of the body, and to them the blood will be driven through the ramifications of the arteries with less force than elsewhere. Anything that retards the return of the blood towards the heart, such as the pressure on the superficial veins by tight gloves or shoes or garters increases the tendency to chilblains. On the other hand, anything that promotes the circulation either by increasing the force of the heart's action or by favouring the flow in the smaller vessels, as the use of large and easy boots and gloves lined with wash-leather or other warm material, will prevent their occurrence in persons predisposed to the malady.

Chilblains seldom occur in the adult, and they are far more common among ill-fed weak children than among strong and healthy ones. Insufficient exercise, especially in the case of those, and in towns such are very numerous, who suffer from weak heart's action, sitting in cold rooms and sleeping in chilly bedrooms favour the development of chilblains, which are also encouraged by insufficient clothing. Warm woollen under-garments down to the wrists and ankles often prevent the occurrence of chilblains in those who have been subject to them. Exposure to cold, more especially when the vessels of the skin have been for some time previously subjected to pressure, is usually the immediate cause of an attack.

In the capillaries of the affected skin the blood flows slowly and remains too long in the vessels. The composition of the stagnant

blood is probably altered by being too long exposed to the influence of cold, and in consequence does not flow onwards towards the veins. Soluble matters transude through the walls of the vessels, and the skin and subjacent textures in consequence become swollen. The afferent nerve-fibres running with the capillaries are necessarily affected, and their action becomes sluggish, and the muscular fibres encircling the minute arteries soon undergo relaxation. When the force of the heart's action becomes greater, and the activity of the circulation is temporarily increased, as occurs after meals or when the patient gets warm in the evening or in bed, a rush of blood occurs to the extremities. The relaxed arteries and their capillaries become greatly distended, the temperature of the part rising several degrees. The sensitive nerves at the same time being disturbed in such a way as to occasion the intense itching and discomfort experienced by the patient.

In some cases there is little or no itching, but, nevertheless, the congested state of the vessels and consequent soddening of the tissues may result in damage to the cuticle, which may be raised in bullæ, which soon rupture, and in the formation of troublesome sores, which heal very slowly, and add to the patent's suffering. In bad cases the skin around the vesicles becomes dark and soddened, and sloughs of considerable size may be formed, which often leave deep and bad ulcers, requiring a considerable time for healing.

Treatment.—Chilblains often give rise to very severe suffering, and are difficult to cure. Appearing to be a local affection, the disease is too often treated by purely local measures only. In a great many instances it will, however, be found that improvement in the general health and strength is followed by a cessation of the painful inflammation. Tonics, especially preparations of Bark and of Iron, should be given. One or two tablespoonfuls of wine daily often effect great improvement without any local treatment whatever, and if this plan is adopted early in the winter season, the subjects of chilblains will sometimes escape an attack.

Great care should be taken to clothe in woollen next the skin all children who are tortured with chilblains. The rooms in which they live should be well warmed in winter, and everything done to assist the weak, and in many cases slow, circulation. The gradual cooling down experienced in chilly weather, sitting still in cold rooms, does more harm in the case of those subject to chilblains than sudden exposure to cold for a short time only.

Local Treatment of Chilblains.—If the skin is not very tender it may be painted with Tincture of Iodine, or very gently smeared with a liniment composed of equal parts of Soap liniment, *Linimentum Saponis*, and Tincture of Iodine, *Tinctura Iodi.* Smearing the inflamed skin with a little Turpentine, *Oleum Terebinthinæ*, or Acetic Acid,

Acidum Aceticum, or the Liniment of Turpentine and Acetic Acid, *Linimentum Terebinthinæ Aceticum*, or Camphorated Spirit, *Spiritus Camphoræ*, undoubtedly much relieves the itching; but if the cuticle is tender or sore such remedies do harm instead of good. In this case the tender part is to be painted over with several layers of Collodion, or the *Collodion flexile*, made of Collodion, Canada Balsam, and Castor Oil. In this way a sort of artificial cuticle is made by which the tender parts beneath are protected until they recover their healthy condition, and time has been allowed for the formation of new cuticular cells beneath, and for the hardening process to be carried out by which the protective property of the cuticle is established. If the skin is actually broken a small poultice is to be applied with or without some stimulating substance, such as Resin Ointment, *Unguentum Resinæ*, or Peruvian Balsam, *Balsamum Peruvianum*. The health must at the same time be well sustained by good food, wine, Quinine, and Cod Liver Oil. When the sloughing process has ceased a stimulating Zinc lotion, one or two grains to an ounce of water, or Carbolic Acid lotion, or one part of absolute Phenol to forty parts of water, may be used, or antiseptic dressing may be applied.

Boils, although brought about by very different circumstances, some unimportant, others indicative of grave disease, may be fairly included among "slight ailments." The old name for boil is *Furunculus*.

This affection played a more formidable part during and anterior to the middle ages than since that period. In former days many very serious and fatal febrile conditions were characterised by the formation of boils. Although at this time boils may be associated with certain forms of blood poisoning usually fatal, they are much more common in states of the system in which there is temporary derangement of the blood than they are in serious blood diseases which soon destroy life.

Pathologically the boil is of great interest, as the inflammation begins in one spot and quickly involves a number of tissues, including nerves, blood vessels, and lymphatics, as well as all the textures forming the true skin. A small portion of the complex tissue is destroyed, in fact all its living elements die, and the mass is cast off as a slough of dead decomposing tissue, the complete removal of which is soon followed by the healing process.

The local inflammation thus ending in mortification and removal of a portion of the skin and subjacent structures starts from within, but it is difficult to decide whether the local change begins in a capillary or lymphatic vessel. In most cases, however, I think the capillary is the seat of the changes which result in the formation of the boil. Particles, probably of living matter, adhere to the wall of the capillary, and grow

and multiply until the vessel is occluded partly by accumulation of matter caused by the growth and multiplication of these tiny particles, and partly by fibrin from the blood. The capillary being thus plugged, exudation takes place from the adjacent capillary vessels, and with the fluid poured out, minute particles of living matter also escape, and these multiply in the surrounding tissue. In this way the ordinary nutrition of the part suffers, and the usual flow of fluid to and from the living matter of the several tissues which takes place in health is stopped. The nerves of the capillaries and other parts are stretched and pressed upon in consequence, and considerable pain is experienced. The rapid growth and multiplication of living matter which occurs in every part of the affected region as usual is associated with the increased development of heat. The inflamed tissues constituting the boil are sensibly warmer than the surrounding healthy tissues.

The tissues which were supplied by the plugged capillary vessels soon change. The interstitial circulation ceases, the particles of bioplasm die, and soon a mass of decomposing tissue results, which is by the tension of subjacent vessels and the growth of bioplasm gradually forced towards the surface in the direction of least resistance. The pressure of the mass upon the tissues of the skin and the products of decomposition cause more destruction, and at last an opening results through which the mass of dead and decomposing tissue, the core of the boil, escapes. A certain amount of pus is formed between the core of dead tissue and amongst its elements, and the surrounding healthy structures. By this process the disintegration of the affected tissues is promoted, and the separation of the slough of dead tissue from the surrounding healthy part is ensured. As soon as the separation of the decomposing tissue mass is completed, repair and healing begin, and if all goes on well these processes uninterruptedly proceed. There are cases, however, in which gradual disintegration and death proceed, until a very large mass of tissue is destroyed. In such cases there is great danger to life, and the patient requires to be thoroughly sustained with strong soups and wine or brandy.

Boils may be caused by a poison developed within the system or introduced into the blood from without. The inhalation of infected air, eating diseased meat, over-eating, insufficient and bad food, too much animal food, may establish a state of health favourable to the formation of boils. An actual alteration no doubt takes place in the blood, although it is not possible to determine its exact nature. Boils are liable to occur after recovery or partial recovery from fevers, and are very common in cases of diabetes, but the precise influence exerted by the diabetic state upon the tissue which results in the development of the boil has not yet been ascertained. The bites of Mosquitos if

numerous may occasion blood poisoning and considerable derangement of the health, lasting for a considerable time and ending in the formation of boils of an obstinate kind in different parts of the body.

Carbuncle, Anthrax, is closely allied to boils, but is more serious from the much larger area and depth of the inflamed tissue, and from the more serious constitutional disturbance. The inflammation is more diffused; the slough formed is often so very large that the patient's strength is exhausted before its separation is effected, and the reparative process can begin. This affection cannot properly be included among Slight Ailments, and I therefore only refer to it as a farther development of the boil.

Treatment.—As regards the treatment of boils, the best advice I can give you is to leave them alone. Incisions are not needed, and any attempt to expedite the removal of the slough does harm by breaking down the temporary separation between the slough and the healthy tissue, thus causing some of the irritating discharge to pass into the surrounding areolar tissue, starting therein a similar inflammatory action leading to sloughing over a wider area. It is important, however, to prevent the boil from being rubbed or pressed upon by the clothes. A small piece of thick Amadou plaster like felt may be taken and a hole cut large enough to receive the boil, the summit of which may be partially covered by a piece of ordinary plaster. Yeast has been highly recommended internally, but its efficacy is doubtful. Quinine, mineral acids, and tonics of various kinds seem to be useful. Wine may be given in the case of patients whose strength has been worn out by prolonged exhausting disease, but in ordinary cases of boils more harm than good results from stimulants. In carbuncle large doses of quinine, or quinine and iron, and a liberal allowance of wine or other stimulants are required, —but this affection is hardly to be included among slight ailments.

It has been remarked several times, in these introductory lectures on Slight Ailments, that illnesses which apparently come on suddenly are themselves but the consequence of prior changes which have been going on for some time previous to the attack. These preliminary changes are a necessary and essential part of the illness; but for them, the attack could not have occurred. The invasion, it is true, *seems* to be sudden, but the apparently rapid passage from comparative health to decided illness is deceptive, for derangement even of a serious character may have existed for some time, though the patient may not have been aware of it. In many cases very grave disturbance may give rise to mere discomfort only, the patient himself having no conception of the serious changes which have been going on in his tissues. In not a few instances, especially in persons about or past the middle period of life, the nerves are more or less numbed owing to degenerative changes

having taken place in them. The nerves do not respond as readily as they should do, and in consequence their owner does not experience the pain and discomfort which ought to warn him of the occurrence of derangement in action or alteration in structure.

By paying attention to the signs and symptoms of derangements which may be correctly termed slight, and relieving them as soon as possible, we may succeed in preventing the occurrence of grave pathological changes. You will remark that many of those who will tell you they do not know what it is to feel well, have not in the whole course of their lives once been seriously ill. Such persons often live to be exceptionally old. The nerves are sound, and their peripheral ramifications in a healthy and highly sensitive condition, so that the slightest change in their neighbourhood is made evident to their owner by pain and discomfort, or by some form of nerve disturbance. The man who experiences slight derangements of health oftentimes takes steps to relieve his discomfort, and, by acting thus, very likely succeeds in removing the condition which precedes the development of actual disease. It is also probable that the very means taken to remove slight symptoms are also effective in bringing about a state of the system which is not favourable to the development of severe illness, or the invasion of morbid poisons. It would seem as if some preparatory changes were necessary to render the organism fitted either for the reception of morbid poisons, or for the initiation of the majority of morbid changes which commence from within in tissues and organs. Even in the case of many purely local lesions it is probable that, for some considerable time before any actual structural change has occurred, there have been congestion and disturbed action, and but for the persistence of these, the local disease would not have manifested itself. How important it is, therefore, that we should search for evidence of slight preliminary change, in order that, by altering the conditions of life for a time, by relieving local congestions, by promoting excretion or by establishing some increased local action in another situation, we may succeed in bringing about a return to physiological health before any of those grave morbid conditions, which will occupy much of our attention in this course of lectures on the Principles and Practice of Medicine, can be established.

I have already drawn your attention to the preliminary changes which occur in the conjunctiva and glands connected with it, by which it becomes fitted for the reception and propagation of the minute particle of that specific and poisonous bioplasm which is concerned in the development of a very formidable and destructive kind of inflammation. Although, undoubtedly, there are a few living poisons which are so virulent in their properties, and have such extraordinary power of vitality that almost everyone exposed to their influence is attacked with

the disease they engender, this is so decidedly exceptional that one may fairly venture to advance the conclusion that it is at least conceivable that individual human or animal organisms may exist, upon which the great majority of contagious poisons might beat in vain. And, as time goes on, I think I shall convince you that the prospect of our being successful in discovering the means of enabling the individual organism to resist the assaults of contagion is far brighter than that of our discovering how to exterminate contagion itself, or to prevent new forms of contagious living matter from springing into life.

The poison instrumental in carrying ophthalmia undoubtedly spares some exposed to its influence, and, amongst those attacked, varying degrees of severity of the disease will be observed. Even ringworm, and many other diseases invariably associated with the growth and multiplication of a special organism, will not indiscriminately invade every individual, and those who have been long under bad influence, as regards bodily health, are sure to be the first attacked, and to suffer most severely and for the longest time, from the disease. Of a number of persons swallowing the poison of Typhoid, or exposed for the same period of time to its baneful influence,—some will escape altogether, some will be violently assaulted by the poison, but will escape without the specific disease being developed, in consequence of a sharp attack of diarrhœa, some will pass through a mild form of the disease, and a small number will be severely attacked, of which perhaps one-third will be destroyed, by the fever or its consequences.

So, too, with regard to acute inflammations and various diseases of a non-contagious character,—what seems to be a sudden illness is probably but the climax of a series of changes which have been going on for a considerable time, although the patient may not have been aware that anything was wrong. An attack of acute rheumatism is always referred to exposure to wet and cold, or to sleeping in a damp bed, or to a long drive or walk in the rain, or to some single unfortunate circumstance or want of caution on the part of the patient. But how many of us are exposed, over and over again, to adverse conditions of precisely the same kind with perfect impunity. The peculiar state of the blood which precedes the attack of illness, and which alone renders the attack possible, has perhaps resulted after a prolonged course of pathological change. But if this special state of blood exists not, instead of the person exposed to the adverse influences being attacked by acute rheumatism or pneumonia, or pleurisy, or some other acute inflammation, he experiences, perhaps, a sharp rigor, accompanied possibly by local pain and general discomfort, succeeded in two or three hours by profuse sweating, perhaps diarrhœa, and most likely the secretion of urine rich in urates uric acid and other substances. In the course of a day or two, except that he may feel a little weak,

the patient regains his normal state of health. Perhaps, indeed, for some time afterwards he may even feel exceptionally well and vigorous. He has, in fact, been relieved by the removal of various substances which had been for some time accumulating in his blood, to his detriment, and which, at any moment, might have been instrumental in the development of local disease in some important organ. These considerations, supported by many more to which I might advert, suggest the general conclusion, that the maintenance of each individual organism in a good state of health, the careful attention on the part of the practitioner to slight ailments, and the recognition by him of any symptoms that may indicate slight derangement of function or action, are of far greater consequence than the hunting after and extermination of various species of hypothetical pathological organisms, even though it might be actually possible to catch and exterminate legions.

I believe that if the organism be in a proper state, almost all disease germs coming in contact with it, or entering it, will certainly die, instead of growing and multiplying and deranging or destroying important constituents of the blood and tissues. Many of the living particles in question are round about us—in the food we eat—in the water we drink. The foot of a fly will carry poison germs enough to infect a household. It must, therefore, be vain to be always seeking to annihilate contagion, which can only be destroyed to a very limited and therefore useless extent. On the other hand, it seems reasonable, and especially on the part of nurses and ourselves, who must be continually exposed to the assaults of disease germs, to do all that is possible to promote and improve the resisting power of the body. We always notice that, of those exposed to the same adverse conditions, but a very small percentage will be seriously ill. A moderate number only after exposure will catch cold or experience some slight derangement. The majority will entirely escape. No doubt such facts may, in part, be explained on the supposition of the existence of difference in constitution in the different individuals. Allowing amply for this, however, there is good ground for concluding that it is possible to preserve the body in such a state of health as would enable it to resist attacks of multitudes of living contagious poisons, to any one of which, in a different state, it would certainly succumb. In other words, there is good reason for the conclusion that it is possible to resist the onslaught of contagious germs, and therefore that it is possible to still further improve the health of the community. By detecting and treating slight derangements, it is highly probable that we may establish a state of system rendering the supervention of serious disease impossible.

The comparative immunity of those who are frequently troubled with various slight derangements of health has been frequently noticed.

Perhaps it is to be explained by the existence in particular individuals of a highly sensitive and exceptionally active state of those nerve-fibres and that part of the nerve system which is intimately connected with the healthy action of the circulating and digestive systems. In some persons these nerves respond to the slightest stimulus, and the least departure from the ordinary state at once occasions inconvenience or discomfort; while in others, considerable variation, as regards temperature, quality and quantity of food, will make little or no impression, and will occasion no immediate disturbance or derangement. But, in the latter case, pathological changes may take place, and may result in grave structural change, without the patient having experienced the least discomfort, or even being made aware that any departure from the healthy state had occurred in his system before the supervention of the serious illness which you are asked to investigate and treat. Perhaps, in some such manner, we may account for the fact that certain individuals are suddenly struck down by terrible disease while they seem to be in good health, and others, who never feel well, or look well, reach old age without experiencing one single attack of any illness so serious as to endanger life. Such persons, it must be noted, are often obliged to be very careful, as regards diet, and the feeling of tiredness after great exertion is in them so severe that it must be yielded to. Thus they are forced to take rest before any damage whatever has been done to their organs. Is it not probable that careful attention to the process of excretion, as well as to the quality and quantity of food that is taken, brings about and preserves a state of blood in which disease germs, instead of growing and multiplying, would die? How many ailments may be prevented by judicious starving, or by living for a day or two now and then on low diet? How thoroughly may not the blood be depurated by a sharp purge given, perhaps, just before *liquor sanguinis* was about to escape from the vessels, to be poured, perhaps, into the air-cells of the lung? Might not the purgation be fairly considered to have prevented an impending attack of acute Pneumonia or Inflammation of the Lungs, and thus to have really "cut short" the disease? May not moderate doses of Bicarbonate of Potash or Soda, taken in solution twice or three times daily for a week or two, avert an attack of acute rheumatism? Will not a small dose of certain preparations of Mercury now and then prevent attacks of gout or rheumatism or sick headache or dyspepsia or biliousness? Is it not reasonable to conclude that certain salts by their action on the bowels and kidneys, by promoting free elimination, establish a general state of the tissues which may for the time render it impossible that certain morbid changes of serious consequence should occur?

I have endeavoured, in these few lectures, to show you why we

should not fail to give careful attention to the study of those slight departures from the normal state which possibly, in these days, are sometimes too lightly passed over by the student and the practitioner, although, on the other hand, it must be admitted that the import of some very slight ailments has been strangely exaggerated by practitioners of a different mental tendency. As I have tried to impress upon you many times, slight derangements occasionally afford the first and only indications of commencing disease of a serious character. There is good reason for thinking that by judicious management, not only may some troublesome though slight ailments be entirely relieved, but further and progressive morbid changes sometimes prevented or retarded.

The principles upon which the treatment of many slight ailments may be successfully conducted are the same as those upon which the management of more marked developments of morbid phenomena is based. I have given illustrations of the simplest and slightest ailments, and have endeavoured to show how their treatment may be most simply and successfully carried out, and I have attempted to lead you on by degrees to consider more highly complex pathological changes, and have tried to make clear the principles upon which more complex methods of treatment are carried out. In no way, I believe, will you so quickly acquire that sound knowledge of pathological processes, and of the means of checking or modifying them, which is daily required in practice, as by adopting the course I have advocated. Let me, therefore, conclude by again impressing upon you the importance of not neglecting the study of the nature and treatment of "Slight Ailments," now, or indeed at any period of your professional career.

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