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FOUND

A NEW THEORY
OF
MEDIC

BY
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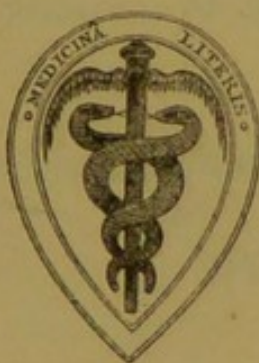
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JOHN CHURCHILL, NEW
LIVERPOOL, ADAM HILL
MDCCC

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FOUNDATION
FOR
A NEW THEORY AND PRACTICE
OF
MEDICINE.

BY
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"TREATMENT OF INFLAMMATION,"
"HISTORY OF ATHEROMA IN ARTERIES,"
ETC. ETC.



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FOUNDATION

NEW THEORY AND PRACTICE

MEDICINE

THOMAS LEWIS, M.D.

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FROM NOTICING HIS

CLOSE OBSERVATION AND CLEAR INDUCTIVE REASONING

IN "SEA SIDE STUDIES"

AND "THE PHYSIOLOGY OF COMMON LIFE,"

This Essay is dedicated,

BY THE AUTHOR.

IN A LETTER

TO THE EDITOR OF THE

NEW YORK

TRUTH AND JUSTICE

IN THE

NEW YORK

NEW YORK

BY THE

PREFACE.

FROM the period of his reading the first book on the Theory and Practice of Medicine which was presented to his notice, the Author has been struck with the absence of all trustworthy *principles* in such works. They contain descriptions of disease more or less accurate ; they detail the symptoms which are to be looked for ; they give names to certain groups of morbid phenomena ; they classify the various complaints according to one standard or another ; they speculate upon the causation of disease, and they give an account of what they consider to be the best method of cure. But on the broad principles upon which that treatment is to be conducted they are absolutely silent,—or if they do give reasons, such are based upon presumed experience and dogmatic teaching, and not upon a rigorous appeal to nature. From this category, however, the Author must exclude the recent work of Dr. J. H. Bennett, whose philosophical precision he fully appreciates and warmly admires.

Disease in such treatises is looked upon as if it were an entity, and the prevalent metaphor is, that it invades the body, and must be overcome and driven out. Medicines are spoken of as weapons or remedies ; and “a powerful remedy” is a name given to one, whose onslaught upon a disease is reckoned as energetic as that of the disease upon the body.

In consequence of this, the student is educated with the idea, that the patient must necessarily be well as soon as the disease is driven out, and the natural result follows :— viz., that endeavours are made to restore health by overcoming disease, instead of endeavouring to cure disease by restoring health.

Philologically, the difference between the two plans is small, but practically it is great ; for the former fixes the attention prominently on the condition of one organ, or set of organs, while the latter never loses sight of the whole constitution. In actual practice, the viciousness of the first plan soon becomes apparent, and our annals of Medicine are loaded with instances in which patients have suffered severely from the erroneous ideas entertained by physicians of the best means of combating disease. But if once the second is adopted, all these dangers are avoided ; for the daily question will be asked, Is the patient nearer health than he was ? and no plan of treatment will be continued which is manifestly depressing the patient's powers.

That we have not misrepresented the tendency of the former plan, will be evident to any one who will take the trouble to read those medical treatises which have hitherto been most in vogue.

We are told by the most popular of our modern medical authors, that blood-letting is the most effectual and important of all the direct *remedies* of inflammation : next in rank is mercury ; then purging, antimony, digitalis, colchicum, &c. These are to be given to overcome the disease, and there the account ends. There is not a word about the patient and his condition when the inflammation is over and done with ; a condition which, experience tells us, is generally a very deplorable one.

If we turn to a few other topics in the same author, we see a similar idea carried out. Is dropsy spoken of, we are

told to procure the evacuation of the fluid by one means or another, irrespective of the effect such a drain may have on the constitution or the condition in which the patient is left.

Is the disease hæmorrhage, hydrocephalus, iritis, catarrhal ophthalmia, or apoplexy, we have given to us, as weapons, venesection, purging, mercury, &c. Is the disease delirium tremens, we are told to use opium, to procure sleep at all hazards.

But throughout the book we are not told how long the remedies are to be used, or what *principles* are involved in their administration, and why and when they should be changed.

The thoughtful student naturally asks, why inflammation is treated by venesection, mercury, and the like, in one case, *e. g.* iritis, and by an opposite plan in another, *i. e.* bronchitis? and why it is that delirium tremens is to be treated by opium, which in the doses recommended is of itself a poison? He asks, why it is that the intense inflammation of the *skin* in small-pox is allowed to take its course?—and yet, if, in the same complaint, inflammation of the *lungs* supervene, why it is not to be allowed to take its course too?

Disappointed with books, the student naturally turns to the practice of their authors, and of others whose experience he may profit by. But he is no better thus, for one man swears by the lancet, another has quite abandoned it, and a third seeks for a middle course. One man treats his patients by large doses of medicine, another by small doses, and another by (such infinitesimal quantities, that they are, practically, good for) nothing. Yet all say they are successful.

But common sense dictates that all cannot be right: the questions then arise, Are any of them correct? if so, which? Are all wrong? if so, why do they find success? Or are all wrong and all right to a limited extent? if so, what have all these plans in common?

No sooner are these questions agitated than the inquirer finds fresh difficulties. He has to ask himself, "What is the standard of success by which I am to judge of the relative value of treatment?" Two replies to this query suggest themselves, viz., the *mortality* from certain diseases, and the *duration* of those complaints which are not fatal to life.

Ere, however, he can prosecute these ideas, the student finds himself in the presence of another difficulty—he does not know the natural mortality or duration of disease if left alone; and still further, he is positively without any data, whether, in any particular case under treatment, the symptoms of disease and its duration are due to Nature alone, or to the interference of the doctor with her.

Sundry remembrances of the past may now cross his mind about the surgeon's practice before the weapon-salve heresy, and after it; and he may entertain a fear lest, in the physician's practice of the present day, a fallacy may lurk akin to that which was prevalent amongst surgeons in days of yore.

If he be a shrewd observer, it will probably occur to him, that the popularly accepted doctrine of infinitesimal dosings bears the same analogy to Medicine as the weapon-salve heresy did to Surgery.

In working out the problems thus presented to his mind, the student would naturally ask, how it could be, that so transparent a fallacy as the weapon-salve, and of "power increased by diminution," could ever become popular? Turning to the past, he would find the same reason given as is applicable to the present age; viz., that the new plan was found to be more pleasant and less tedious than the old. Flitting still onward in his inquiry, the student would consider why it was, that, at the present day, charlatans had such a hold upon the public. If he laid himself out to receive the answer from the mass, he would find it run thus—that quacks *pro-*

mise always a speedy cure ; while regular doctors, it is known, too often keep their patients in hand for a long period.

This would give him the idea that the public tested the skill of the individual whom they chose for a medical or surgical attendant by the *rapidity* of the cure effected. Putting himself into the position of a sufferer, he would readily allow that the test was a good one. He would be equally satisfied with the *mortality* test.

Armed with these two tests, he proceeds to read the books of rival authors and rival sects ; and he finds, to his profound astonishment, that Hahnemann and his early followers were able to demonstrate that they had the advantage over the older school of Medicine, both in reduced mortality and duration of illness.

This fact being once established—and it would be ignoring the rules of evidence to deny it—the next question which suggested itself would be, whether there was not a principle wrapped up in Homœopathy, as there was one in the use of the weapon-salve.

The natural solution to this query would be the same as in days of yore, viz., that the value of the system consisted in letting human nature alone ; for of the potency of a twentieth or fiftieth dilution of a drug it is irrational to speak.

Now comes the most difficult part of the inquiry : how is the physician to test the unaided power of nature, and retain his patient's confidence and his own peace of mind ?

He can only do this by observing the course of disease in brutes, and in those of the human race who are unable or unwilling to have medical assistance.

Having satisfied himself upon this point, the student naturally again inquires, Can nature be assisted in any way, and by means which commend themselves to our reason ; or must we be content, after years of painful toil, to say that art can do nothing ? To answer this, he finds it necessary

to go to the first principles of human life ; to inquire into man's normal condition under varying circumstances, the influence that external agents have upon it in health and disease, and the extent to which those agents may be beneficially employed.

In this investigation, it is soon seen that disease is simply a departure from health, and that recovery is simply a restoration to health ; and the broad principle which must underlie all theory and practice presents itself as a truism thus—To cure disease, we must bring back the patient to health.

Absurdly simple as this truism appears, it involves an abstruse question which ought to be constantly present to the mind of every practitioner, viz. :—

On what principle do I endeavour to restore an individual to health when I use medicines in doses which would make a sound man ill ?

At first sight, the answer to this question seems easy enough. Nothing is more simple than to say, “bleeding lessens the force and frequency of the circulation, which is excessive in inflammation. Mercury bridles adhesive inflammation, which is a dangerous accident. Antimony produces faintness, and that empties the blood-vessels ; a purgative unloads the bowels, and they are always too full ; low diet makes a person weak, and prevents the continuance of inflammation ; opium relieves pain,” and the like.

But when these answers are rigidly examined, they complicate the subject greatly ; instead of one question we have a host, *e. g.*, Does bleeding lessen the force and *frequency* of the heart's action ? and, if so, is the patient better in consequence ? will not the force and frequency diminish without venesection being practised ? Again, if mercury bridles the adhesive inflammation, does it not promote suppurative or destructive ? is the latter preferable to the

former? Why must adhesive inflammation be bridled at all? Why is this Bucephalus, so much feared as it is, allowed to go on unchecked in one case while it is to be curbed tightly in another? and if mercury be really necessary, how much of it is to be used? Is it necessary for persons to be salivated, and how long must they be so? Cases of antimonial poisoning are now rife: why does the doctor, who would swear a man's life away for administering this drug to his *healthy* wife for the purposes of murder, use this same material in even larger doses when people are ill from pneumonia?

Again, the question is put, how can the low diet which weakens a strong man make a weak man strong? how shall we justify to ourselves in imitating the diet of the poverty-stricken for the cure of the wealthy who have similar diseases to the poor? In answering these and other questions, each one naturally turns to his own experience, or quotes that of others; but that only widens the number of questions still to be disposed of ere trustworthy results can be attained; *e. g.*, Does the man who has experience of the use of a drug in any disease, have equal or similar experience of the course of the disease, *without that drug*? or when another is used, can he be said to know the best remedy for any disease, or only what does the least harm?

Is he sure that he reads symptoms rightly? that apparent strength is real strength, and mental activity is necessarily intellectual power? Is he sure that the stout man is strong, the florid too full of blood, the spare, weak, or disposed to consumption? These, and a host of other queries, are involved in the question we have deduced as a corollary from the truism we have alluded to;—who can say they are unimportant?

In working out the subject which the preceding considerations suggested, the Author came upon many facts which

grouped themselves in a manner both new and interesting. He thought he could see the reasons why treatment once popular in the profession had died out ; why some thought drugs overrated, which others praised highly ; why such diseases as hysteria and dyspepsia were considered so intractable ; why it was that there were so many fluctuations in the general theory and practice of Medicine, and in the particular tenets of individuals.

He found, in ordinary cases, that a recognition of the broad principle above enunciated gave great clearness to diagnosis, and that in all, whether they were obscure, or apparently clear, it gave comparative precision to practice ; for in every instance the condition of the patient's health became the touchstone by which every direction or prescription was tried.

He has felt conscious that the necessity of a strict observance of this principle has a strong tendency to force the mind to close observation and thoughtful inquiry ; while, at the same time, it discourages routine practice and a blind subservience to " authorities."

Thus the principle—truism though it be—involves the necessity of progress : it cannot exist without it. It involves a new investigation into the action of all drugs and articles of diet, of the effects of every means used by the physician and surgeon. Hitherto the influence of these things *upon disease* has been the sole thing tested : now we must examine their influence upon life and health.

The investigation into the true value of the means generally employed for the cure of inflammation, was undertaken by the Author in 1856 ; and he hopes, at some future time, to extend the inquiry into other diseased conditions of the body ; meanwhile, he is content to lay before the profession, in a prominent manner, that broad principle of action on which, he doubts not, many a one has already acted ;

but which, having been attained at the end of a long life, has not been published, possibly from fear of being considered heretical.

We have heard of one physician, who said, that when he started life, he thought he had twenty remedies for every disease ; but when he was old, he found, on the contrary, that there were twenty diseases for which he had no remedy. Dr. Baillie doubted whether his medicines had not done more harm than good. Dr. Williams, we hear, had no faith in Medicine, and others there are who scruple not to declare that the present practice is unsatisfactory. Why is this so ? Simply because none of these men ever looked upon medicines in any other light than that of remedies for disease.

If, on the contrary, medicines had been regarded as adjuvants, not as independent powers, a far different estimate of their capabilities would be formed.

In conclusion, the Author would state, that he does not lay the smallest claim to originality ; the subject precludes the possibility of such a thing : his sole aim is to show that there exists in Medicine a fundamental principle, by undeviating attention to which, our science may surely attain that general position and esteem which, though it has always claimed, it has never yet enjoyed.

In the following pages, the words "force" and "power" are freely used. It is well to say a few words upon them. Some imagine that structures which are identical have their functions equally identical. It is not so, however ; for the structure of all eggs are alike, yet one becomes an eagle, another a fish, another a barn-door fowl, another a turtle, and another an alligator. The most striking illustration of power or force independent of matter, may be seen thus : we place on two slips of glass two drops of serum ; the chemist

and microscopist can detect no difference between them, and we should pronounce them identical, did we not know that the one when applied to a wound will produce vaccinia, while the other will have no effect. Again, we may take three specimens of pus : the microscope, &c., detects no variation between one and another ; yet one will reproduce a chancre, another gonorrhœa, and the third will be harmless. A scab from a variolous sore will give rise to small-pox, while a similar one from lepra will do nothing. Again, we may point to four specimens of saliva all apparently of the same structure, and containing the same physical ingredients : the first is saliva from a fasting or an angry dog ; the second from a full and placid one ; the third is from a rabid wolf ; the fourth from a rabid sheep ; but how different is their power ! The first and third will produce hydrophobia, the second and fourth are innocuous.

When it is remembered that all eggs are not hatched ; that vaccinia does not always follow vaccination ; that venereal disease does not always follow contact with syphilitic pus ; that variola does not invariably follow inoculation, or hydrophobia *necessarily* result from the introduction of rabid saliva into the system,—it is evident that an inquiry is necessary into the reasons why these things do or do not occur : we are driven to investigate “force” as well as structure.

This can only be examined satisfactorily in the living. Yet medical inquiry has for long been directed chiefly to the inspection of the dead, and pathology has been based upon *material change*, rather than a *modification of imponderable powers*.

No one can deny that a great advantage was gained, when every one felt it a duty to study the post-mortem results of disease. But it was only a step in the right direction.

To turn this knowledge to account, it is necessary to

know the powers concerned in such morbid changes, the circumstances that put those forces in operation, and the way they are to be restored to their ordinary condition.

The necessity of considering these forces has often been acknowledged, and we can find in Celsus the germs of the most important of those rules we are endeavouring to enforce.

In his writings we find him acknowledging that the medicinal art admits of scarcely any precepts of general application; that while we are well we should take care lest our barriers against disease be destroyed; that each individual has a constitution of his own, which he should study; that purgatives, &c., may be very prejudicial to some; that certain parts of the body may be constitutionally weak; that debility predisposes to disease. In his remarks about bleeding he lays it down, that it is more necessary to consider the state of the strength, than the age of the patient or the nature of the illness. We find him also duly appreciating the natural vital forces; for when speaking of certain critical fluxes, &c., he remarks, "Since most of these occurrences happen spontaneously, one may understand that, by giving effect to the means employed by art, *nature is of more avail than the remedies themselves.*" He uses still stronger expressions in the third book, viz., "To confess the truth, there is no disease over which chance exerts less influence than art, for with nature against us, our treatment is of no avail." What, again, could be stronger in favour of the views advocated in this volume, than the following sentences: "But even when the malady is not in the whole body, but in part only, it is more to the purpose to aim at increasing the strength of the whole system than to remedy diseased parts exclusively;" "If any one after imprudent treatment survive *with his energies unimpaired*, by instituting a proper method of cure he is soon restored to health"? And what

can be more pregnant than the following:—"There is another circumstance of which we ought not to be ignorant, that the same curative agents do not suit all patients. It is meet, therefore, when a remedy fails, to place a higher estimate *on the patient's life* than on the writer's authority (who has praised it)" ?

All these are jewels of their kind. Had they been accompanied by a close investigation of "chance" in medical matters, of "Nature" and her laws, of art and its tendencies, and had he given us any insight how we could fairly estimate the remedies and plans of treatment he recommends, his book might have stood alone as one of the greatest authorities in our science.

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FOUNDATION

FOR A

NEW THEORY AND PRACTICE OF MEDICINE.

CHAPTER I.

INTRODUCTION.

The human body not a machine—Necessity for knowing its motive power, as well as its mechanism—The living power not of equal duration in all animals, or in all individuals of one genus—Progress of man from conception to death—Whence comes the vital force?—Influence of parents—Hybrids—Influence limited—Growth modified by parental influences—Nutrition of the foetus in utero—Of the child after birth, at various periods—Growth always definite within certain limits—After growth, persistence—Then decay and death—Is the natural duration of life for man uniform?—The vital power is shown in repairing injury, as well as in growth—Value of the new part compared with the old—The reparative power is as definite as the nutritive, and varies with it—Case—Circumstances influence the reparative force—In health every organ performs a definite function—Disease essentially consists in a departure from health—That departure necessarily implies deterioration—Disordered function indicates a disabled organ and a diminution of vital power—A function can only be restored to its normal state by a restoration of the healthy condition of the organ—Conservative and reparative forces—Disease may show itself by departure from the definite changes consequent upon health—Individuals can only be restored to health through the instrumentality of the vital powers.

BEFORE any one is able to combat disease successfully, it is necessary that he should have a definite and accurate

knowledge respecting the laws of health, and of those natural processes which take place in the body under certain circumstances.

The human body is not simply a machine, turned out by a master hand, which will only continue working till the spring runs down, provided that no accident throws the machinery out of gear; but it is one which possesses in itself the power of repairing damages sustained, and of continuing to work in spite of temporary or other disorders in its wheels.

As in any piece of mechanism we cannot have motion without a moving force, so it is clear, that to understand its movements, we must have acquaintanceship with its motive powers, as well as familiarity with its machinery; without this knowledge, we should be unable to tell whether, when motion ceased, the cessation was due to a flaw in the mechanism or the expenditure of the motive force. In the same way, before we can fully understand the human body, we must not only investigate its integral parts, but the power or force which puts them all in motion, and keeps them going; we must endeavour to ascertain how a living man differs from the corpse, and how he comes to be a living man at all.

In passing a rapid glance over the phenomena of life and health, we recognise at least three stages—growth, persistence, and decay; we recognise the fact, that all living creatures have to pass through these stages, and that they would soon disappear from the world did they not reproduce their likes, each of which in its turn will grow, persist for a time, and then decay and disappear.

But a close investigation shows us that all creatures have not the same natural duration of life: the horse is longer lived than the dog, and the tortoise than the lion. A similar

inquiry shows us, that some men and some races of men have a longer duration of existence than others of the human family.

Reason would dictate, however, that the parallelism here drawn is not an absolutely correct one ; and we are, therefore, driven to inquire whether the varying duration of life in individuals, comprising a "genus," is not due to other causes than that which determines the generic period of existence, and these we shall by and by investigate.

Ere we go into the subject farther, we must notice more at length the phenomena of health.

Beginning our history of the individual man at the earliest possible period, we know that by the congress of father and mother a new being is produced. But here, in the very threshold of our inquiry, our attention is arrested by the fact, that congress may, and often does, take place hundreds of times without producing such new being ; and we consequently are not certain, whether it is the simple union of two vital products which gives rise to the future man, or whether there is not required for his formation something additional in the way of "*force*." In other words, we ask ourselves, has the material formed by the contact of the male and female element an inherent power produced by the act of commingling, or does that mixture remain simply living matter until a definite force is given to it, and if so, what furnishes that force ? The Holy Scriptures refer to life as something superadded to matter, and poetically speak of man as simple clay, until the Almighty breathes into his nostrils the breath of life, after which he becomes a living soul (or being) ; and say that, after death, his body shall return to the earth as it was, and his spirit or life shall return to the God who gave it. In whatever way we choose to answer this question for ourselves, of this there can be

no doubt, that it is not in the power of either the male or female to give or withhold this force at pleasure, as the histories of Abraham, and Sarai, and others, abundantly prove, yet that the future condition of the new being is most materially influenced by the condition of both parents, and especially of the father, at the time of the conception.

The microscope has revealed to us a wonderful similarity between the embryo in its earliest condition in man and in all other animals : a few cells, containing some mysterious matter in their interior, are alone to be seen, and from these proceed, by definite progression and change, all those organs of which the body is ultimately made up. The new being generally resembles its parents in all essential particulars : the duck does not, in the next generation, become a hen, or the dog a canary. But growth is necessary, ere the similarity is complete ; the child is not born with all its body, liver, lungs, or heart, closely resembling its parents. Its limbs and theirs have not the same proportions, yet everything is proportionate according to its condition, and such proportions will vary with its growth. It is clear, then, that the force called into existence at conception is a progressive one, and one which acts in a definite direction.

That the force is one in some way coming from parents is probable, for its direction may be modified by changing the parentage. Thus horse with ass, or ass with mare, will alike give rise to a mule—a creature possessing the physical and moral affinities of both parents, yet not being the image of either. But the circumstance that these hybrids cannot propagate their like, and keep up the new race, although to all appearance the reproductive organs are perfect, coupled with the fact that hybrids are not produced by the congress of such animals as the dog and cat, naturally leads us to the belief, that something more was necessary to the formation of

the embryo than the *physical commixture* of the male and female elements.

Be this as it may, it is clear that when conception does take place, and a child is formed, its mode of growth in the womb is modified by parental influences. These influences govern, to a great extent, its future figure, stature, features, moral qualities,* and the like ; and not only these, but the various internal organs of the body are likewise influenced.

* In saying that a child inherits moral qualities from its parents, we do not wish to touch upon the question of the religious responsibility of each individual, but simply to express the fact that propensities are hereditary as well as features and shape. In the lower animals, this is undoubted : no amount of education would make a hare bold, the wolf anything but a savage coward, or one of a herd of sheep independent of the proceedings of the flock. The offspring of a pointer has been known to point without the smallest training ; and comparing the domesticated dog with the dingo, we may fairly say that its educational capacity is an hereditary thing. In our own race, we see that certain propensities are clearly transmissible through many generations. Thus drunkenness is often hereditary in families for centuries, and this quite irrespective of education and example. I have repeatedly known it to occur where the fathers have died when the children were in infancy, and where the training of their minds has been most carefully attended to. Penuriousness, extravagance, timidity, courage, &c., are also hereditary. This descent is very noticeable in nations, whose moral qualities are as fixed as their physical ones. From the earliest age the Celts had the same qualities that characterise them now. Cæsar's description of the Gauls answers for the Frenchmen of to-day. Nor is there much difference between the Germans described by Tacitus and those we see now. For a far longer period the Arab has preserved his moral peculiarities, and those of the Jews are as clearly marked. What reader of our own history cannot see the very same Englishmen in Cromwell's time as he finds around him now, and cannot recognise in the heroes of Inkermann the descendants of the warriors of Cressy, Agincourt, and Poitiers ?

If this be so when the parents are in health, we may reasonably expect that it will be so in disease.

The child having come into the world, it continues to grow, though in a different manner to what it did in the uterine state of its existence. Then no food, as such, was required; it gained its nourishment by other means than deglutition, digestion, &c. Now, on the contrary, food of an appropriate character is requisite; and without it, death must ensue. A proper supply being given, this is digested, changed, and converted into the various materials of which the body is composed; growth continues—teeth appear—hair grows strong—the muscles and bones become firm—the first teeth decay, drop out—another set come—growth continues—the reproductive powers are developed—new growths of hair come into view—man's voice and woman's *mammæ* undergo definite changes—the *catamenia* are established in the female, and then she almost ceases to grow. But man does not come to maturity so soon as woman; his growth is rarely complete till the age of thirty-five, about which time the chest becomes covered with a thick growth of hair, and develops itself in breadth, and all further growth ceases. During this time all the organs perform their functions in a definite manner; the eye sees, the ear hears, the stomach digests, and in females a monthly change occurs, and those which are incidental to pregnancy follow a regular course.

The cessation of growth is followed by a period of persistence, of long or short duration, and then there is evidence of decay. In the female the womb becomes unfitted for its duties, and in both sexes the various organs do their work imperfectly: the eye no longer is undimmed and the vision perfect—the hearing is no longer acute—the stomach no longer digests with the same facility as in youth—the weakened heart flags—the circulation becomes languid—the

arteries lose their elasticity, and other changes go on, until death from old age closes the scene.

The duration of life, unchecked by accidents, &c., we believe would be about the same for all, if all were precisely alike and under the best possible circumstances for the full development of the healthy powers. But, practically, we find that death, by sheer failure of the powers of life, occurs in some individuals sooner than in others, and we express this by saying that they have died from "premature old age."

Comparing the human body to a watch, we express the same idea, by saying that the main-spring is much stronger in some than in others, although the mechanism of all is on the same model.

By and by it will be our business to inquire whether the human clock-work runs down in one man sooner than another, because the main-spring is weak, or because the works have been allowed to go too fast, or from both these causes combined ; at present we must pursue a little farther the phenomena of health.

We have as yet seen the man holding along the even tenor of his way, unchecked by accident or disease ; we have now to consider how he comports himself when these have injured his frame. If a dead body be cut, the wound remains unclosed ; in a living one, however, it is not so—for no sooner is the wound made, and the injury accomplished, than there is an almost immediate provision made to repair the damage. The vessels in the vicinity of the cut refuse to allow the blood to pass through them ; the hæmorrhage ceases, a new material is formed, it gradually assumes the character of the part injured, and after a definite lapse of time, the injury is more or less perfectly repaired, bone by bone, skin by skin, and tendon by tendon.

It is, however, to be noted, that the new parts are never equal to the old, either in strength or the power of resisting extraneous forces. The cicatrix of a wound in the skin is not equivalent to healthy skin; muscular fibre is replaced by tendinous; and during scurvy, fractures of the bones once united will re-open, the new parts being absorbed or destroyed, while the old ones remain.

It must be noted still farther, that the process of reparation does not go on equally in all living individuals; some there are whose wounds will continue to bleed until death ensues, unless art interposes to prevent the catastrophe: they, in this respect, resemble a living corpse. In others a wound will not heal. Others, again, there are, who, when wounded, seem to be so deeply hurt, that not only the spot injured, but its contiguous parts, die completely, involving, sometimes, in their death, localities remote from the original wound.

It is clear, then, that there is variety in the *reparative* powers of the body as regards wounds, much in the same way as there is variety of original, conservative, or main-spring power.

The following case illustrates this proposition perfectly:—

Mr. P., æt. 25, came under my care a short time ago. He was a stout, healthy man, but had contracted three chancres, situated round the corona glandis. They were cauterized by the acid nitrate of mercury; but they showed no disposition to heal, and the parts around became much indurated. Mercury was then administered, but not to salivation. The induration somewhat diminished under its use, but the sores remained in the same condition. Black wash, and subsequently a ten-grain solution of nitrate of silver, was applied to them, but still they did not mend. Six weeks had now elapsed, and the patient was as bad as ever. It then occurred to me that it was very unphilosophical to continue to employ

a depressing drug like mercury while I was using a local stimulant to the sore, and I resolved to stop the blue pill and have recourse to steel. The effect was magical: in three days the sores had diminished one half, and they were well in a week, the induration disappearing as the cure progressed.

I told these circumstances to a medical friend who had under his care a very similar case. He had, according to strict routine, been treating it with mercury, and the sores refused to heal, though he stimulated them locally with sulphate of zinc, &c. After hearing the preceding case, he adopted the same plan, and his patient was well in four days.

In both these instances mercury kept down the reparative force of the system. A host of cases in which wounds have shown no disposition to heal until the patient has been "put" upon wine, quinine, or steel, or has been sent into the pure air of the country or the sea-side, will occur to the surgeon's memory. Let us take one reference from Druitt's "Vade Mecum." Speaking of the non-union of bones after fracture, he says:—"Care should be taken to detect and remedy any constitutional disorder to which the want of union can be attributed. Debility must be counteracted by tonics, nutritive food, and stimulants. Mr. Fergusson relates a case of fractured thigh in which no callus was formed for three weeks, until the patient was allowed a reasonable quantity of whiskey, to which he had previously been accustomed; and Sir B. Brodie relates similar instances."

(For an account of the influence of alcohol on the vital, and consequently on the reparative force, see a subsequent chapter.)

What is true of physical injuries is equally true of certain diseases. It does not much signify whether a poniard is introduced into the liver, or arsenic into the stomach—both alike do a certain amount of mischief; and when the injury

has been inflicted, there is in both the same necessity for reparation of damage. Now, as a gun-shot wound differs from a simple cut, and this again from a stab (the weapon remaining in the wound), both in the immediate results and subsequent progress, so the effects of the introduction of one poison into the system differ in many points from the effects of another. As the progress of a dagger wound is much governed by the patient's condition, so is the progress of a disease, originating in a poison or other cause, modified by the same state ; and as an injury may be fatal to one person which will scarcely affect another at all, so a source of disease, *e.g.* small-pox, may become fatal in one individual, though it barely affects another.

Each living man, then, we conclude, has a power which keeps him alive, and enables him to counteract the effects of accident or disease. These powers we may designate conservative and reparative forces—a purely artificial distinction, inasmuch as they are both alike phases of the generally pervading vital power.

The following case is interesting, as it shows the advantage of a close observation of the healthy reparative processes.

John S., æt. 44, labourer, was admitted into the Northern Hospital, Liverpool, with acute rheumatic fever. In the course of the complaint the left hand and wrist became inflamed, and I treated the affection by painting the parts with tincture of the sesquichloride of iron. In two days it was well. Shortly after, the right hand became affected ; but having a suspicion that there was a natural tendency in this form of rheumatic inflammation to subside in a definite time, I resolved to let it alone. In two days' time it was quite well.

If this case stood alone, which it does not, it suffices to show that the treatment which has been hitherto considered

as *necessary* when this complication occurs, is not necessary at all. This being so, it becomes a matter for inquiry how far treatment is advisable in other forms of rheumatic inflammation ; whether, in fact, rheumatic endocarditis and pericarditis has not in an otherwise healthy subject a tendency to spontaneous cure, and which may be interfered with by medicines. I have only had one opportunity hitherto of putting this idea to the test, but in that case the result was quite sufficiently encouraging to induce me to repeat the observation.

We have said that in health all organs perform their functions in a certain and definite manner. By that we mean that each organ is formed with a special intention, and has special duties. As long as those duties are performed, we say that the individual is healthy ; but when those organs do not perform their normal functions, we say they are in a diseased or disordered condition.

Now, it must be self-evident that when disease is present the individual must have departed from health ; still farther it is clear that he cannot be in a better condition than he was before ; he must, therefore, be worse. *Disease, then, implies deterioration, and the presence of disordered function implies a disabled condition of the organ.*

As we speak of the vital power as that which keeps a person in a healthy condition, so when a person is diseased we say that in some way or other his vital power has been impaired or overcome. Deterioration of vital power implies in its turn a direct tendency to premature death, in a part or in the whole of the body. But death does not take place unless the deterioration reaches a certain point ; that point is reached when the conservative or reparative force is weaker than the disturbing or destructive one.

When restoration to health follows disease, it can only be brought about through the powers then inherent in the

individual, by processes purely natural, and which art cannot imitate, and only indirectly promote.

But the word "disease" is not to be confined to a departure from the standard of health in a healthy man ; it may be equally shown in a departure, in an injured individual, from those changes that ought naturally to have occurred after a hurt had been received. Thus, if a bruise is inflicted, and extravasation of blood follows, we say there is "disease;" if suppuration ensues in the place of absorption, and if after a cut the wound is followed by ulceration, sphacelation, or suppuration, instead of adhesive inflammation, we say there is disease.

We say equally, that disease is present if after an attack of measles the patient remains ill, or gets worse at the very period when convalescence should have been established.

Now as we cannot restore a part or the whole body when diseased to a healthy condition, except through the instrumentality of the natural powers, it follows that a study of "vital force," or of the conservative and reparative powers of the system, is pre-eminently necessary ere we can fairly enter upon a study of the Principles and Practice of Medicine.

CHAPTER II.

VITAL FORCE.

Vital force—What is it?—What it is not—Compared with other forces—Chemical, electrical, &c.—The intensity of vital force shown by the amount of resistance to chemical force, &c.—*Force* is as indestructible as *matter*—Illustration—We cannot make force—Dissipation of available force—Expenditure of force analogous to expenditure of matter—Necessity for new supplies—Resemblance between the laws of vital and other forces—Exhaustion of force—Conversion of vital force into motive—Chemical, electrical, luminous, &c.—Is the amount of vital force possessed by each individual essentially the same?—What influences it?—Influence of parentage, of “breed,” of intermarriage, of more or less transient debility, of intoxication—Diseases transmitted to offspring—The disease transmitted is not always a definite one—It may show itself simply as deficient force—Hereditary disease necessarily implies constitutional debility—Maternal influences on offspring, at conception, in utero, in nursing—Examples—Conclusions.

It is now necessary that we investigate the subject of vital force. What is it? Whence comes it? Can its amount be influenced by circumstances? What exhausts it? Can it be augmented beyond a certain point? When exhausted, can it be increased again; and if so, by what means?

By vital force we mean that which makes the living man differ from the corpse. When the active soldier is struck in battle by a fatal bullet, he falls at once, and soon becomes a

putrifying mass. We say he has lost his life. The principle of action which once existed in him exists no longer. During life certain changes went on in his body ; they now go on no more, and in their stead other changes are set on foot of a different character. The processes of life we call *vital* ; the principle which puts them into operation we call a *force*. The words "vital force," therefore, signify the living principle which exists in every organized being. It is the power which enables the eye to see, which a camera obscura cannot do, which converts inanimate matter into combinations that the chemist cannot imitate, which frames out of the same materials various organs, each having a different function. We recognise it alike in the acorn and the oak, in the crawling worm and the stately elephant. Without it the world would be a desert filled with rocks and salts, and clouds of vapour.

It is not simply the result of a fortuitous concourse of atoms, for they may be present and no life be there. It is not nerve force, for that is dependent upon life. It is not organization alone, for organs may be present as in a corpse, where there is no life or vital force.

Of the residence and dimensions of vitality, if such terms are applicable to a "force," we can say little ; it is not in the brain and nervous system, for it exists in animals and plants that have neither brain nor nerves : these organs, too, may be removed, as in the turtle and others, and yet life continue ; it is not in the blood, for the embryo has vital power long ere the blood is formed.

In man it is, as it were, one and indivisible ; but in some of the lower animals, and in vegetables, it seems capable of infinite subdivision. If one of our limbs be amputated, its vitality soon leaves it, and it rots away under the operation of chemical force ; but if we cut a worm or a potato

into a dozen pieces, each may produce a perfect animal or plant.

We cannot isolate it so as to make it perceptible to our senses ; we cannot see it as we can the electric flash, or hear it as we can the explosive force of gunpowder ; we cannot feel it as we can the passage of a galvanic shock, or the effects of chemical force as shown in fire. Allied in many respects to other forces, it is yet identical with none. The philosopher, with his apparatus, may make a muscle contract, while yet its life remains within it, as distinctly as could the nerves ; but to provoke a muscle, absolutely dead, to move, and still more, to make a muscle which will contract, is beyond his power. The chemist, by his art, can find out all the materials of which a stomach is composed—nay, he may even, with the help of a dead stomach, make a fluid which will digest food, but he cannot make a stomach, or make the pepsine on which its solvent powers depend.

The living stomach does not digest itself ; when dead, it is digested in the same way as is the food it contains.

The chemist can analyse an egg, but he cannot make one, nor can he hatch it after its vitality has gone.

Some authors object to the idea of vitality being a simple force, and regard it as a collocation of other forces ; in a succeeding page, a quotation from Mr. Bain shows this to be his view. We do not think it worth while to discuss the point at length, for the difference between one view and another is very small. If it be said that vitality is a collocation of forces, we answer, What collocates those forces ? they did not collocate themselves. The sun's rays never begot a boy, or the lightning-flash a girl ; nor did coal and iron ore ever make a locomotive. We say that it is vital power which collocates the forces, and that every individual collocates and modifies those forces in its own peculiar way. We say that

vital power is to the other forces what man is to inanimate matter : he collects materials, and by the use he makes of them he develops heat, light, magnetism, electricity, motion, and the like. He does not make the force, but he directs or controls it. He can at his will convert soft into magnetic iron. Who says that it is the electricity alone that does it ? The galvanic current which was used had no volition—it remained dormant till man directed it. Man makes the steam-engine, and drives it when made. So it is with life ; it is life which makes the body, and life which keeps it going.

We have already spoken of vitality as being a force acting in a definite direction, and adverted to the amount present in some creatures being greater than that in others.

This is strikingly true of plants : some there are which spring up, flower, bear fruit, and wither in a year ; others which do not bear fruit until the second year, and others again which arrive at a far more advanced age before they flower at all. Some we call annual, others biennial ; while others have, as far as we can learn, an unlimited tenure of life. There is an “Adamsonia” spoken of as having already attained an age of four thousand years. We know of no animal which has existed for a similar period. Stories, it is true there are, of toads having been found enclosed in rocks, to which geologists attribute a greater age than that. If the statements made are reliable, they simply prove that there is *one* animal whose tenure of life would appear to be indefinite, and thus the analogy between plants and animals is completed. Plants like animals are to a great extent under the influence of the inorganismal forces, *e. g.* light, heat, &c. ; and it is sometimes useful to refer to them as affording proof of the controlling power which one force has over another. Thus town air will destroy the health of plants as completely as of men. Excess of heat or cold will have the same effect.

Cold stunts the growth and dwarfs the plant, while heat expands it to a stately tree. A plant that "sleeps" or closes up by night may, by artificial light, be rendered wide awake; and, by dint of careful imitation, grapes may be induced to bear flower and fruit at any period of the year. By much care the "single" cherry, rose, or other flowers may be made "double," and their pistils and stamens be converted into leaves. By excess of manure, a vine may be made sterile, but with leaves equal in size to the rhubarb; while by privation of manure and water, a luxuriant plant can be made poor in leaves, though rich in seed.

Here we have vital force modified to a certain extent, but that extent is limited; for no amount of horticultural skill can make a rose-tree bear potatoes, or a cherry-tree produce gooseberries.

Recent observations tend to show that the analogies between plants and animals are even greater than might at first sight have been supposed, for it has been ascertained that there are such things as hereditary resemblances in plants—the same as in animals: a dwarf pea or bean produces its like; a fine plant producing a fine big seed will be followed by another fine plant, while a pigmy plant bearing a small seed will rarely produce a fine plant. But—and the reservation is important—if the pigmy seed be well nourished from the first, it may attain a growth equal to the finest of its kind, and the growth from a large seed may, by neglect, assume no greater dimensions than if it had been a poor thing to start with.

In plants, as in animals, life is not simply organization. The seed is a seed at the end of ten years, as it was at the end of five; its organization is the same; the chemist can detect no difference in its constituents, or the microscopist in its minute structure; yet the latter will grow, and the former

will not. It possesses a vital force that the other has lost—a certain inherent power shown only by its results. Little difference can be seen, during the winter months, between one tree and another—all may be equally covered with snow, and frozen by icy blasts ; but when warm, genial spring returns, a great difference may be seen between them—the majority begin to bud and blossom, showing signs of renewed life, while others remain dead and leafless, and then begin to decay. All have been subject to the same influences, but only a few have succumbed to them. Surely we may infer that they had a less amount of vitality than their neighbours. Similar remarks may be made respecting trees of different kinds ; some are “hardy,” and can resist such extremes of temperature as will certainly kill others. They equally apply to many animals. In expressing this fact, we endeavour to account for it by saying that some have a greater tenacity of life than others. What is this but the enunciation of the doctrine that the vital force is more capable of resisting injurious influences in some than in others, *i. e.* that the amount of vitality varies in different individuals, and in different species and genera, and this quite independently of their organization.

The application of these remarks to man is readily made ; for we all know that injuries which will kill one man are not fatal to another, and that when a dozen are all exposed to the same poison, many may escape with apparent impunity, while some will suffer little, and others die.

But though vital force *is not identical* with any of the nonorganismal forces, it resembles many of them in certain important points : it resembles chemical force, inasmuch as the products formed under its influence are all more or less definite in their composition ; but it is not simply chemical force, inasmuch as all those compounds become decomposed

and changed into other combinations, under the influence of ordinary chemical force, as soon as they are withdrawn from the influence of vitality. The body becomes amenable to the usual laws of chemical action after death, and the same may be said of all the excreta after they have been passed ; and as vital power prevented this during life, it follows that to a certain extent vital and chemical forces are antagonistic. If this be true, we draw the very important corollary, that the rapidity of decomposition in vital products, after their separation from the body, is in direct proportion to their deficiency of vitality while they remained within, a subject of which we shall have to speak more at length by and by. Vital force is not electricity, yet it is more or less allied to it ; for we have in the "Torpedo" and "gymnotus electricus" nerve force producing electricity ; and in paralysed limbs electricity producing a similar effect to nerve force. Vital force is not heat ; and though a certain amount of heat is necessary for its existence, it is destroyed by too great an exaltation of temperature. It is equally destroyed by deprivation of heat, *e. g.* by frost, &c.

Vital force is not light, yet, under the influence of vitality, light is produced in the firefly, the glowworm, and the medusæ. It is not simply cohesion or adhesion, although by simple contact of freshly wounded parts we know that union will take place.

It is a force completely *sui generis*, but one which, being more or less allied to non-vital forces, has its phenomena more or less modified thereby.

Perhaps the most interesting point connected with vital force is its interdependence upon a certain condition of organization. Life is not water, yet without water neither plants or animals can conserve their life. When once they become dried beyond a certain point, so great a change has

been produced in their organization that vitality has gone. The same result is effected by other causes, *e. g.* the organs may be saturated with opium, strychnine, aconite, scarlatina, small-pox, and other poisons; or they may have been crushed by some physical force, or torn asunder by machinery; or they may have been torrefied by heat or withered by cold: in any case they are unfitted for life, and the vital force has fled or been destroyed.

These considerations have led some to the idea that there is in reality no such thing as a definite vital force, but that what we call by that name is simply an attribute of organization, and has no separate existence.

They assert that integrity of vital force depends upon integrity of organization, and not organization upon vital force.

However plausible this doctrine at first sight appears to be, the following considerations induce us to believe it to be untenable.

Plants, seeds, cuttings, &c., resembling each other in organization, have not all the same tenacity of life; frost and heat alike killing some and sparing others, though all were subjected to the same intensity of each force.

Dr. Carpenter has shown the same to be true as regards certain animalcules.

The same is true of the higher animals: some recover with ease from injuries that destroy their fellows.

There is no difference between the organization of the child in the weakly and in the strong, yet one comes into the world to die, the other exists for the common number of years.

The organization of an adult is not changed by mental emotion, and yet, under the influence of intense fright, an individual may die. We cannot believe that the organization

of a man can be altered by one sexual congress, yet experience shows that the vital powers may be destroyed thereby, as some cases hereafter to be noted will show.

But if these points are insufficient to establish the existence of a "force" superadded to organization, we have only to inquire what is meant by the word "organization," to find that it implies the existence of an organizing power; and the difference between the expressions "vital force" and "organizing power" is too small to encourage discussion upon it.

It has recently been shown, that all our known "forces" are as indestructible as is matter itself—that they disappear in one form only to be reproduced in another; but that, though indestructible, they may be so dissipated as to be lost to us. Let us take an interesting illustration, founded on a saying by the great Stephenson: Thousands of years ago, he says, the force of light emanating from the sun called into active exercise the organismal force of myriads of trees, ferns, grasses, &c.; the organismal force ceased at length, and under the laws of chemistry and gravity, vast tracts of bog and forest became converted into coal; by and by, this, under the influence of heat, produces light, and raises water into steam; by that steam motion is produced, and from that motion we may, by friction, elicit heat, electricity, magnetism, and the like. No matter how we may employ the force, the amount of work done is governed by the original amount of sun force contained in the amount of coal used; we may economise it to the utmost, but we cannot increase it absolutely. From a gas burner of a certain size, and from gas of a certain quality, we can get a certain amount of heat by thorough combustion. By unscientific contrivances we may lose a considerable amount of the heat which is available; but do what we will, we cannot augment it indefinitely.

Now, expenditure of force is practically the same thing as expenditure of matter, and this must end in the exhaustion of the thing expended, unless the source of force is perpetually renewed. Scientific men have concluded, that for this earth, the main source from which inorganic or inorganismal force is renewed, is the sun. The original source of organismal force I do not think we can trace to anything but the Creator and sustainer of the universe, the Ruler of the world, the all-pervading God of nature.*

* The following quotation from Bain on the Senses and the Intellect, expresses in different language the same idea:—"It is nevertheless manifest that the nervous power is generated from the action of the nutriment supplied to the body, and is therefore of the class of forces having a common origin, and capable of being mutually transmitted,—including mechanical momentum, heat, electricity, magnetism, and chemical decomposition. The power that animates the human frame and keeps alive the currents of the brain, has its origin in the grand primal source of reviving power, the Sun; his influence, exerted on vegetation, builds up the structures whose destruction and decay within the animal system give forth all the energy concerned in maintaining the animal processes. What is called vitality is not so much a peculiar force as a collocation of the forces of inorganic matter for the purpose of keeping up a living structure. If our means of observation and measurement were more perfect, we might render account of all the nutriment consumed in any animal or human being; we might calculate the entire amount of energy evolved in the changes that constitute this consumption, and allow one portion for animal heat, another for the processes of secretion, a third for the action of the heart, lungs, and intestines, a fourth for the muscular exertion made within the period, a fifth for the activity of the brain, and so on till we had a strict balancing of receipt and expenditure. The nerve force that is derived from the waste of a given amount of food, is capable of being transmuted into any other force of animal life. Poured into the muscles during violent conscious effort, it increases their activity; passing to the alimentary canal, it aids in the force of digestion; in moments of excitement the power is converted into sensible heat; the same power is found capable of yielding true electrical currents. The evidence that

But whatever the source of vital power may be, it obeys many of the laws which govern other forces. Every time it is called into operation the available quantity is diminished, and the whole amount would soon be dissipated, unless it were kept up by some means or other. Many an anecdote tells us of the willing horse, who converts his vital power into motion, until he has no force remaining ; of individuals, whose vital energies are expended in forming bile, and urine, and sweat, and carbonic acid, and the like, and who, from inability to get food and drink, die from this uncompensated dissipation of their power ; however well it may be hoarded, it cannot, under the circumstances, be reproduced.

All of us are familiar with the word, and many of us, probably, with the sensation of, *exhaustion*—what is it but the dissipation of our available vital force ? We compare ourselves almost involuntarily to a locomotive, whose speed has become reduced from deficient supply of coals ; and we eagerly seek for food and drink to restore our powers—these being the fuel through whose instrumentality our forces are repaired.

Like other forces, vital power may be converted into other forms, or at any rate expend itself in intensifying and changing the action of other forces ; thus, by an active operation on the brain, vital force becomes converted into mental power, into nervous energy, into muscular motion—we see it in the stomach, liver, and elsewhere, converted into chemical force, in the formation of gastric juice, hydrochloric and acetic acid, of sugar, bile, urea, and the like—we see it in the reproductive organs of the male actually expended as the principle of vitality itself, giving life to a new being ;

establishes the common basis of mechanical and chemical force, heat, and electricity, namely, their mutual convertibility and common origin, establishes the nerve force as a member of the same group."

and the fact is worthy of the deepest consideration, that an excessive waste of semen has a more powerfully depressing or exhausting effect upon the system than the loss of ten or twenty times as much blood or any other secretion would effect. Vital force, as we have adverted to before, becomes apparent as "reparative force," when any injury has happened to the body.

In fine, wherever there is *change* going on in the animal economy, there is not only *an expenditure of material*, but there is also *an expenditure of force*—"organic" or "vital" force giving place to inorganic or chemical force—a conversion which is very rarely complete until the secretions, &c., are ejected from the body, or the whole individual dies ; but death does not ensue, speaking generally, so long as appropriate food and drink are taken, and the supply of vital force is thus, to a wonderful degree, kept up to a constant standard.

We may now make some special investigations respecting this force. We have already adverted to the fact, that it is given in some mysterious manner to each individual at the moment of conception ; and in our history of man, we also adverted to the facts that all men did not attain to the same old age ; and that, in most particulars, children closely resembled their parents, each of them giving to the offspring something of their own peculiarities.

We have now to inquire whether the amount of vital, growing, conservative, or reparative force originally given to each individual is the same—whether all men come into the world with the same powers ; and if not, what it is which modifies those powers, and how those modifications are shown ? The smallest appeal to experience at once shows us that many individuals come into the world only to die ; they are carried off in a few hours or a few days, by convulsions,

diarrhœa, total want of digestive power, or a simple failure of the powers of life ; nay, we may go farther still, and find that children actually die *in utero* at the seventh or eighth month, and come into the world as decaying putrid masses—an occurrence by no means uncommon when there is a syphilitic taint in the male parent. As these can scarcely be said to have been subject to external influences, it is clear that the death must have been due to some imperfection in the vital force which the fœtus originally possessed ; and when we find, from experience, that the disease of which a fœtus may die, is one which can be traced to syphilis in the father alone, we must conclude that the condition of the father at the period of conception was such, that he was unable to impart the ordinary amount of vital power to his offspring, and we draw the corollary, that the condition of the father materially influences the condition of the child.

General opinion—founded probably upon Jacob's dream, and the expedients he resorted to for the procurement of ring-straked and speckled cattle ; and on Shakspeare's dictum in "King Lear," that bastards "in the lusty stealth of nature take more composition and fierce quality, than doth within a dull, stale, tired bed, go to the creating of a whole tribe of fops, got 'tween asleep and wake"—has concluded that *active* vigour in the parent, at the time of conception, is necessary for the production of a healthy and vigorous offspring. But the experience of breeders, as far as I can ascertain, goes to negative this idea, and to establish the fact, that if the sire is perfectly sound in wind and limb, and himself of pure breed, a little or even a considerable amount of temporary debility is of small consequence. Thus a stallion, whose pedigree is untainted, and who is a model of his kind, is sought after to serve mares, even when his powers are so exhausted that he has to stand beside her for half an hour ere the impulse to leap

upon her comes ; and time shows that his offspring, generated at the end of his serving time, are inferior in nothing to those begotten in the earlier periods of the spring. The same may be said of bulls and other animals, whose natural history we are able to study. Speaking generally, too, we may say that younger sons in large families are not inferior to the first-born—"the beginning of the strength" of the father ; and that it is not a fact, that illegitimate children are, as a rule, more healthy and vigorous than the legitimate ; on the contrary, the mortality amongst bastard children, from infantile convulsions, is threefold greater than that amongst the offspring of married parents.* Whether there is any truth in the idea generally prevailing, that drunkenness in the father at the time of conception produces mental imbecility or idiocy in the offspring, I am unable to say ; I have only heard of one instance where idiocy has been attributed to this cause. But, on the contrary, we may remember the case of Lot, who, on two successive nights, became the progenitor of Ammon and Moab, being at the time in such a state of intoxication, that he was unconscious of the act ; yet both were lusty and strong, and the heads of important and powerful races. We cannot help remembering, too, that drunkenness abounds in our northern towns, and that many of our artizans habitually go to bed intoxicated ; and we presume, that they must often be in that condition when a fertile intercourse occurs ; yet, as a rule, the children of

* I have only met with one instance in which a decay of the vital powers in the father seemed to exercise an influence over the offspring. A gentleman married at the age of eighty years, and his wife bore him five children. He died at the age of ninety-five. The children, all females, were very delicate. Two died between the age of twenty-five and thirty of pure debility, and it seemed as if the others would shortly follow. I am unable to give further particulars, as my informant has been dead some time.

drunken fathers are not idiotic or imbecile, although they may be, and often are, subject to insanity.

Dr. Copeland, in his Dictionary, gives one instance where sexual weakness, arising from previous abuse in the father, was followed by his first-born being idiotic ; after which he recovered his powers, and had a healthy family. But, on the other hand, I know of instances of a similar nature, in which no such result has happened ; we are therefore justified in considering such cases as Dr. C.'s, when they do occur, as "coincidences" only.

We conclude, then, as a general rule, that a transient state of exhaustion in a father, otherwise perfectly healthy and untainted, will not sensibly affect the vital forces of the offspring.

Experience undoubtedly shows us, that the vital forces of children are affected by diseased conditions of the parent ; and those whose knowledge of breeding horses and cattle is considerable, say that it is almost impossible to get first class offspring from second class sires : the faults of the male are reproduced in the young ; and should the same fault exist coincidently in the dam, it is greatly exaggerated in her foal.

Peculiarity of form in the parents is not more completely reproduced in the offspring than is peculiarity of growth ; and disease is transmitted as certainly as health. In some instances, it would appear that nothing is transmitted beyond deficient power in one organ ; in others, a general deficiency is observable. Thus, a parent apparently in perfect health may beget a son, and then, from constitutional causes, become insane ; the son, having the same natural conformation as the father, may appear in perfect health until he attains the same age as his father was when his lunacy appeared, and then he too may become affected. Another father, extremely

delicate, and himself the offspring of consumptive parents, may have a large family, all of whom may die of diseases in different organs, yet all traceable to the same cause: one dies of convulsions, another of ulceration of the bowels, another of water in the head, another of consumption, another of tubercular peritonitis, another of mesenteric disease, of caries of the spine, white swelling, general decline, aneurism, or simply from the effect of strumous ulcers, abscesses, or the like. The father has not transmitted *a disease* here, but simply *a condition*—he has been unable to implant in his offspring the normal amount of living power; consequently, from one cause or another, his children terminate their existence at an earlier period than would healthy men, and even when in apparent health there is evidence that their conservative and reparative forces are low.

But we find that special conditions may be transmitted as well as general ones, and syphilis and gout descend from parent to child, as clearly as the black skin of the negro, or the large nose of the Jew.

All diseases thus transmitted have a direct tendency to shorten life. The very existence of disease in an individual indicates a departure from the healthy standard, an overpowering of the vital or conservative force. An individual, therefore, who is born with any disease or distinct tendency thereto, must necessarily have a less amount of vital force than one who is born healthy; in other words, the presence of *hereditary disease implies constitutional debility*. We may put this as an aphorism thus:—disease implies debility; hereditary disease implies hereditary debility.

We have hitherto spoken chiefly of the father as influencing the vital force of the child; we now come to speak of the maternal influence. This differs from the former, inasmuch as it is exercised through a longer period, commencing at

conception and lasting till the end of lactation. There are many instances on record, where, amongst the lower animals, the characteristics of some male have been transmitted through succeeding pregnancies, although on the first occasion only the dam had seen the sire which had them. These have been attributed (following the lead given to one's thoughts by Jacob's proceedings) to the effect of *imagination* on the female. Whether this be true or not, a vast number of instances have come to light, which show the very powerful influence of imagination in woman, and how it modifies the growth and subsequent appearance of the offspring;* but as we have specially to do with the influence exercised upon *life* rather than appearance, we must not stay to discuss these more obscure points.

Those who have had much to do with midwifery practice, inform us, that the mental condition of the mother during pregnancy has a most marked influence upon the subsequent vitality of the child.† One case is recorded, where a woman who was always extremely passionate during pregnancy, lost three infants successively from convulsions soon after birth. Churchill remarks, "If the mother, when pregnant, receive a

* The following anecdote may be depended on:—A lady had a portrait of a female friend, who, on going out to India, left it in her care. She hung it in her bedroom, where she could always see it when in bed. She was married, and subsequently to the hanging of the picture bore her only child—a daughter. This child grew up to resemble the picture so closely that it was considered by strangers to be her portrait. No resemblance to her parents could be traced. Instances of withered limbs and "mothers' marks," attributed to imagination, are common enough, though it is difficult to say how far the occurrences are "coincidences," and how far related to each other as cause and effect. I have met with one instance in which the presumption was in favour of the latter.

† Guersent and Blache. Quoted by Churchill. Diseases of Children, p. 99.

great shock, a severe fright, or be the subject of any other strong mental emotion, the child is often attacked with convulsions after birth. It has still farther been remarked, that the children of unmarried females, especially of those who have been seduced, and who feel their shame deeply, are more frequently still-born or affected with convulsions than those of married females ; and that the children of married women, who experience much unhappiness during their pregnancy, share a similar fate." Dr. R. Ferguson made similar remarks in his Lectures on Midwifery at King's College, and gave many strikingly corroborative cases in illustration.

Of the transmission of struma, insanity, syphilis, &c., from the mother to the child, there can be no doubt.

The influence of lactation on the infant, though less decided than that of pregnancy, is still sufficiently marked. Thus Whitehead, in his book on Hereditary Disease, gives many instances in which a syphilitic taint had been given to a mother some weeks *after the birth* of her child, and who, in her turn, affected her offspring. Instances of tainted nurses, affecting healthy children, given them to nurse, are by no means uncommon, and many fatal results have been recorded.

I have myself met with many instances in which, through the influence of lactation, children have suffered severely from diarrhœa, vomiting, indigestion, and convulsions. There is a true saying, heard at times in a noisy dwelling, which points to the same thing, *i. e.* "A weakly mother makes a crying baby," or "A fretful infant implies a sickly nurse." Dr. Christison has related a still more striking fact : a healthy woman, under the influence of sudden and intense horror, followed by as sudden relief, put her baby to her breast, and it instantly shot out its body rigid, and was

dead. Anger, vexation, or mental distress in the nurse, will frequently provoke vomiting, diarrhœa, or convulsions in the infant. And I have known a glass of whiskey toddy taken by the mother to produce sickness and indigestion in the child for twenty-four hours thereafter.

The foregoing considerations necessarily force us to the conclusion that disease on the part of parents very materially diminishes the vital powers of their offspring; and we may add, that that diminution of vitality is in proportion to the severity and duration of the parental disease. Thus, the child of a consumptive couple, born before phthisis has set in, in the parents, has a greater power of life than one born when both are far gone in "decline." By extreme care the one may be reared; the other is nearly certain to die young, in spite of the most careful tending. The same may be said of syphilis; the more severe the disease in the parents, the more certain and formidable is its appearance in the child.

In corroboration of the views here put forward, we must notice the influence that a healthy male or female has in counteracting that of an unhealthy consort. If insanity, gout, struma, consumption, and the like, were inevitably to descend from parent to child, the world would soon be depopulated by the steady and increasing deterioration of its inhabitants; but it is not so. If disease of the nature we have been describing exists in one parent only, the other being perfectly healthy, some children will be perfectly sound in every respect, some will be only moderately delicate, and perhaps only one in five have the weakness of the sickly parent.

Health seems in this respect to follow much the same laws as colour; for there are many shades of colour in the offspring of white and black parents, some being whiter and some darker than the medium.

Some curious observations have been made with the attempt to show in what way the healthy parent's influence may be traced in the child. Thus, it has been said that if a healthy man marries a woman whose brain is weak, and they have a family, those children who resemble their father physically will resemble their mother mentally, and those that resemble the mother in their general configuration will not have the same tendency to mental unsoundness as those which are like their father. This may be true in a few instances ; but, in the vast majority of cases, resemblances in physical conformation and mental peculiarities go together.

CHAPTER III.

VITAL FORCE (*continued*).

Can the vital power be modified after immediate parental influences have ceased?—Modifying influence of climate on Anglo-Saxon race—Of sanitary measures in our island and its towns.

Evidence of improvement after deterioration—Healthy lactation for unhealthy infants—Change of climate in phthisis—How is the improvement effected?—Extent of the influence of inorganic forces upon vital—Vital force necessary for its own conservation—Food does not keep up vital force unless there is sufficient power to digest and assimilate it—Vital force incapable of indefinitely prolonging its existence—Influence of air, warmth, light, drink, &c.

Evidence of deterioration—Consumption in the parent—In the offspring—Struma, gout, insanity, &c.—Malarious influences—Overcrowding—Glanders—Darkness—Arctic experiences—Influence of mental emotions—Despair contrasted with hope—Illustrations—Deaths from fright—If intense depressing emotions will produce death, a less amount of such emotion will produce a bodily condition short of death, yet analogous to *dying*—Corollary.

THE next question we have to solve is—Can the vital power be modified after the individual is separated from its parents, and enjoys an independent existence? I propose to consider, firstly, the evidences of simple modification of growth or vitality; then the evidences of improvement where there has originally been deficiency; and, lastly, the evidences of more or less permanent deterioration.

The most remarkable evidence we have of the influences

of external circumstances upon growth and vitality, is the experience we possess of the alterations undergone by the Anglo-Saxon race in America and Australia. In our own country, the average height of the man is about five feet seven or eight, and of the woman five feet five or six; and the average duration of life is, for those who have reached adult age, about sixty-five. For the most part, men arrive at maturity about twenty-three and women at seventeen, and they remain without appearing aged until fifty and forty-five respectively. In America, on the other hand, and equally in Australia, the offspring of English people shoot up rapidly, and attain an average height of five feet ten or eleven, arrive at maturity at eighteen, and thirteen or fourteen, and begin to appear aged at forty and thirty, while at the same time the average duration of life in adults is diminished about ten years.

Nor shall we have much difficulty in understanding this, when we contrast the present condition of our own island, and specially of our towns, with what it was not much longer than a century ago. About that time, viz. in 1662, John Graunt published some observations about mortality. In 1674, Sir William Petty followed the subject up; and, after many intermediate authors, the "Northampton Table" was formed by Dr. Price from the burial registers at Northampton between 1741 and 1780. "This table was for a long time the only one used by insurance offices. It is now known to give the probabilities of life too low at the younger and middle ages. Some of this (but probably not all) is due to the increased value of life since the middle of the last century." (Quoted from Penny Cyclopædia; article, Mortality.)

As far as I can ascertain, insurance offices not only find the Northampton table inapplicable to the present day, but

they all report, from year to year, that the mortality amongst their assured falls short of expectation—thus showing that the average duration of life in England has been increasing since the last century.

In some towns the difference of mortality now and at a former period is very striking : Mr. McGowan reported at the Social Science Meeting, at Liverpool, in 1858, that the annual mortality in that town was, at that date, nearly four thousand less than it had been fifteen or twenty years ago, all due correction being made for increase of population ; and as we may fairly state that the proportion of cases of illness to actual deaths is about twenty to one, it follows, that the number of diseases requiring medical assistance has been diminished to the extent of eighty thousand per annum, in a population of about three hundred and fifty thousand.

This alteration the report attributed, and very fairly, to the improvement which had been effected in drainage and scavenging. We have ourselves seen many instances in which typhus has left a court, where it had previously held uninterrupted sway, immediately after the soil had been well drained, and where a sickly family have had the roses return to their cheeks, by a simple removal from an undrained and damp house, to one well drained and dry.

Few there are who are not aware how much overcrowding in close rooms stunts the growth and pales the complexion of young children, and how much struma is fostered by a moist, cold air.

The depressing influence of extreme cold is seen in the small stature and feeble health of the Esquimaux, and the Indians of the higher latitudes of North America. We see it, too, in the ill-clad children of our own country, who suffer frequently from a diarrhœa which is at once checked by the use of warmer clothing. This is occasionally met with even

in the children of the wealthy, which are insufficiently clad, to give the fond mamma a constant opportunity of admiring the round limbs of the growing child, or from a strange notion respecting a "hardening" process.

The influence of external circumstances in modifying prejudicially the vital powers, is seen to a marked extent in the children of Europeans of healthy constitutions, born in India, or taken to India when young. The effects of the climate upon them is such, that all die, unless they are removed to some more healthy locality.

The evidence in favour of improvement, after deterioration, is unimpeachable, even where there is the strongest reason for the belief that the deterioration is hereditary. Thus, Mr. Whitehead, of Manchester, records a case, where a mother once infected by her husband with syphilis, habitually produced children who died of some strumous disease at a very early period ; after the loss of many, she was induced to get a healthy wet nurse for the next, and this alone survived ; others were born after this, and the mother herself nursed them, but they all died. At the period when Mr. Whitehead wrote, the child not suckled by the mother was six or seven years old, and in good health. Many similar cases are on record ; and there are few practitioners who have not themselves met with analogous facts.

We see the same broad fact exemplified in the influence produced by change, in children, from a close town air to the pure air of the country, or the stimulating breezes of the sea-shore. As long as they remain in the town, the children are always drooping, and succumb under such ailments as water in the head, diarrhoea, convulsions, and the like ; but when located in a purer atmosphere, they become robust, strong, and hardy. The same remark also applies to adults ; for we see many an individual, whose days appear to be

numbered in his native land from the effect of phthisis, recover with marvellous rapidity, on arriving at such a genial climate as Madeira ; and not only is he subsequently enabled to reside there, but his vital powers are so much increased, that he can, after a while, come back and live in England to mature age, resisting easily all those baneful influences under which, formerly, he was obliged to succumb.

In these cases, we cannot say that the loss of vital power has been made up from increments, drawn simply from the air, the water, the sunshine, the warmth, or the breast-milk of a healthy woman. None of these are of themselves able to give vitality, nor are they forces convertible directly into vital power. It is true, however, that they may have some direct though small effect that way. We can see in plants the withering influence of town air, and the surprising effect of a genial climate, a bright clear sky, and abundance of sunshine, and we recognise in them the conversion of light and heat into "organismal" force ; we infer, therefore, that some such conversion may really take place in animals and our own race. But this does not explain the vast and rapid increase of strength that takes place in man on removal to a pure air ;* and we are constrained to conclude, that

* C. A., æt. 18 months, after suffering from general debility from his birth, and from a threatening of hydrocephalus, was attacked with vomiting and purging, accompanied with great flatulent distension of the bowels. In spite of treatment, and a most carefully regulated diet, he steadily got worse, and was unable to digest even milk and water. As a last resort he was taken to New Brighton, near Liverpool. No alteration was apparent until he had turned the angle between the river-bank and the open sea ; but the *instant* he had done so a change was perceptible in his features—the haggard look of suffering was replaced by the placid look of ordinary repose. As soon as he arrived at the lodging taken, he was ready for a meal, and digested with perfect ease a small basinful of bread and

his vital force is recruited, in a great degree, from the remains of it which is at the time within himself—a conclusion which appears the more probable, as recovery is almost impossible, when the loss of vital power exceeds a certain limit.

This necessarily leads us to inquire how the vital power is recruited during health. We have seen how, by the formation of sweat, urine, bile, fæces, and the like, vital force is perpetually expended, and how it would be dissipated entirely, unless it were perpetually recruited by fresh air and food and drink. We may go further, and say that unless the amount of the latter is sufficient to make up for the loss of the vital force, a deterioration takes place, slow indeed, compared with that of total deprivation, but yet sensible. Food, then, we say, is the means by which our life is kept up; but food put into the stomach of a corpse will not revive it; nor will food in abundance do that individual any good whose stomach is too weak to digest it. Strong food, given to a starving person, may even act as a poison; he has no more power over it to digest it than he would over a stomach full of sand. *For food to recruit the body, therefore, there must be power to digest it, as well as an adequate supply;* and we infer, that amongst the attributes of “vital force” is the power of converting the materials composing food into

milk. The vomiting and purging ceased at once, and the recovery was complete.

A. B. C., æt. 25 months, had convulsions for which all medication had been tried in vain; the child was then sent into the country, and the convulsions ceased immediately. In a few days the child was brought back again to town, and the convulsions returned within twelve hours. He was then taken back again to the country, kept there for some months, and the convulsions never returned.

Stronger proofs of improvement of the vital powers after deterioration, it would be impossible to give.

a living structure endued with vital powers ; that is, vital force is within certain definite limits, possessed of a reproductive power.

Vital force, then, is clearly one of a higher nature than other forces, inasmuch as it has a property possessed by none of them to the same extent.

We are not, however, without some analogies which it will be useful for us to call attention to—between vital and other forces in respect to this, apparently, reproductive power. It is by no means uncommon to find individuals who have been exposed for a long period to intense cold, excessive exertion in swimming, or other exercise requiring great expenditure of strength—or who have been half drowned, or half hanged, or nearly starved to death—or who have been intensely frightened—or who have lost a very large quantity of blood—gradually but steadily lose their powers, in spite of everything done to resuscitate them, and die from simple failure of the vital force.

So it is with many a fire : as long as there is abundance of air and fuel, the heat is kept up which is requisite to convert the coal into various gases—the fire burns brightly as long as the supply lasts ; but cut off the supply for a certain period, and allow the heat to fall below a certain standard, and not only will the addition of new coals not resuscitate the fire, but the load of *cold* coals will absolutely dissipate the remaining heat, sooner than it would otherwise have passed away.

It is almost as necessary to keep up a certain amount of heat in a fire, to enable it to sustain itself with fresh coals, as it is to keep up a certain amount of vital power, to enable life to sustain itself by food and drink.

This analogy cannot, however, be strained beyond a certain point—we know that we can keep up a fire for an indefinite

length of time, provided the supply of air and fuel are illimitable ; but so far as we know, there is not anything which will enable us to sustain the vital force beyond a certain limit—each man must die at last, in spite of plenty of food and drink, and the period of death will be determined greatly by the original amount of vital force inherited from parents—but in a larger degree, by the way that force has been expended or conserved.

Air, warmth, light, comfort, and many other circumstances, are as essentially fuel for the vital force as coal is for the furnace fire.

The evidence in proof that the vital power may be permanently deteriorated, is unfortunately too strong to leave any doubt on the subject. It may be so by causes personal to the individual, or by hereditary transmission.

We have already adverted to the influence of the Indian climate on the children of Europeans. The influence of malarious atmospheres is equally prejudicial upon the inhabitants indigenous to the country. The duration of life amongst the malarious districts of Italy is greatly inferior to what it is in the healthiest parts of the same country ; and in our own island the same fact has been demonstrated,—the present average mortality in Cambridgeshire and Lincolnshire being much less than that which obtained at a period when those counties were almost undrained.

There can be little doubt that sexual excesses in the male do very materially diminish the vital powers. To prove this it will be well to commence with the lower animals. The following is an extract from a private letter from Mr. Lewes, the well-known physiologist :—" You know how energetic is the reflex action in the frog, whose spinal cord has been divided : well ; I find that four or five days after copulation division of the cord destroys all sensibility whatever in the

posterior segment; neither pinchings, prickings, or acids produce the slightest reflex action; copulation has exhausted the cord. Moreover, frogs so operated upon will not live over a fortnight; whereas, before copulation, or during autumn and winter, they live for months with a divided cord. April 27, 1859."—I am informed by breeders that stallions are occasionally affected with paralysis of the hind-quarters after a "severe" season. I have known a similar result in a goat. Of the influence of sexual excess in producing progressive paralysis and softening of the cord in men, there can be no doubt. The following cases show that copulation may even be fatal to life where much debility previously exists.

Hennen, in his "Military Surgery," relates an instance where an officer who had suffered greatly from loss of blood, went to see his wife, and died during the act of connexion.

A medical friend told me of another, in which a man suffering from phthisis found himself so much better that he determined to have intercourse with his wife; this was effected, but in a few minutes after he began to sink, and died in an hour.

The following came under my own notice:—A farmer, æt. about 34, had diabetes mellitus and dull headache; he was much emaciated and very weak. Under the influence of treatment, however, he recovered to such a degree that he considered he was able to fulfil a matrimonial engagement. The wedding took place—against his doctor's advice. He was strictly temperate at the feast, both as regards eating and drinking. They came to Liverpool in the evening. The next morning he complained of feeling very ill; stimulants were freely given, but the patient sank with symptoms of cerebral and general exhaustion in twenty-four hours.

Vitality is equally impaired by any cause vitiating the

atmosphere breathed habitually by the individual. Thus, in the days of slow-sailing transport ships, we know that the mortality amongst a number of horses, closely stowed in a ship's hold, was very considerable. They were compelled to breathe an atmosphere tainted by their own breath, and by the ammonia and other products resulting from the decomposition of their urine, fæces, and sweat. Under such circumstances, a disease called "glanders" was generated; and even those who had not that, were enfeebled and emaciated, and fit only for the knacker. But the experience of the large steamers during the Crimean war has shown us, that if a stream of air is kept constantly circulating through the floating stable, to ensure the expulsion of pulmonary excrements, and a stream of water to carry off the renal and intestinal products, no injury to life results. The experience of emigrant-ships, densely packed with men, of crowded slave-vessels, and of the swarming French hospitals in the Crimea, all point to the same things; but in them *typhus* replaces *glanders*.

A want of due ventilation in the monkey-house of the Zoological Society's gardens gradually undermined the life of all the inmates, and they died prematurely. A careful attention to this subsequently ensured perfect health to their successors.

The influence of darkness in deteriorating vitality it is not easy to demonstrate with certainty. Report says, that cataract is common amongst the horses used in mines, who never see other lights than those given by furnaces or lamps; but the same reports represent those animals as being equally long lived with others. Mr. Simon, in some experiments on cats, found that the formation of fatty and tubercular matter was favoured by darkness; and accounts tell us, that the diseased livers of geese, so much prized by gourmands, are produced

in Strasburgh by feeding those creatures in darkness. On the other hand, we have now the testimony of numerous Arctic voyagers to tell us, that the deprivation of light during the long winter has no definite deteriorating influence upon the vitality of the men; nor does it appear that the duration of life amongst the Esquimaux differs materially from that which obtains amongst savages in general. Report, it is true, states that an attempt to establish an hotel for invalids in the Mammoth Cave in Kentucky, where the temperature is high and equable, signally failed, in consequence of the patients suffering more from the absence of light than they gained advantage from the genial warmth; and if we turn once again to Arctic experience, we find all narrators agreeing in the statement, that the perpetual daylight of the summer was as invigorating to their spirits as they found the darkness dull and depressing. Coupling all these considerations together, we conclude that darkness has a deteriorating effect on vitality, though not to a great extent. The last remark leads us to consider the influence which mental emotions have upon vitality. We are here in the midst of difficulty, for the reaction of the mind upon the body is not more conspicuous than that of the body upon the mind. Thus grief will compel the lachrymal glands to increased secretion, while it will dry up the salivary glands and the muciparous follicles of the stomach. On the contrary, too much alcohol, or privation of food, will produce imaginary sorrows, maudlin griefs, which shall be lamented as much as real ones.

We think, nevertheless, that we can demonstrate, that mental emotions have a very decided effect upon vital force, independent of other causes. Army surgeons report, that during the excitement of successful campaigning, the health of the army is high; while in a retreating army, when

the men are all dispirited, the smallest injuries are fatal, producing gangrene and erysipelas ; and this, as far as can be ascertained, is quite independent of the physical circumstances surrounding them. The same thing is seen in shipwrecks ; and probably no more heart-thrilling narrative will ever be penned, than the simple account of the effects of Pym's presence on the sick patients in M'Clure's "Investigator." Cooped up in their ship, seemingly amongst eternal ice, in the frozen North, and almost hopeless of any aid, they had for four years seen no human faces except those of their companions in misfortune, or of the savage inhabitants of a savage country ; their comforts were few, their luxuries small, their distress considerable ; medical skill did all it could, and yet the sick were daily getting worse. At length they note a stir on the deck above them, and hurried tones of joyous import are heard, indistinct at first, but swelling out at last into a cheer. Help had come from England—they were desolate no more. That roar of human happiness had a thrilling effect on the invalids ; in all respects save one, they were in the same condition as before, but hope had come back to their pillows, and despair had fled away—a change at once came o'er them, all began to mend ; many an one, apparently bound for eternity, came back to enjoy more years of time, and even those too far gone for permanent cure experienced a temporary good.

Poetry and history abound with touching references to the sustaining power of hope and the depressing influence of despair ; nor are individual instances wanting which show the same fact. One healthy peasant was induced by a gentleman, who had bet a thoughtless wager about the credulity of the peasant and his own persuasive power, to believe that he was the subject of a mortal disease, of which he would die in a fortnight ; he sickened accordingly, and

though he was subsequently told it was all a joke, he continued to droop fast, and died at the end of the time named, the victim of despair. I have myself known two cases of similar character, though more happy termination; one, a poor man, had in some way injured himself—the doctor saw him, said that the injury was internal and mortal, that he could do nothing, and that the man would die. He lay in bed, daily expecting his doom, eating nothing, and scarcely venturing to move. As he was missed at his work, his master requested me to see him, and report on his condition. Whatever might have been originally the matter, I could discover nothing wrong; he had long known me, and believed my words when I told him that he was all right. I recommended him some chops and porter, and the next day he was at his work again. The other was more marked still: a strong, burly young seaman had experienced some severe accident, and was brought into the Northern Hospital in a state of collapse. The surgeons in his hearing spoke of it as a hopeless case, that death was inevitable, and would soon take place; he continued in an apparently hopeless condition for thirty-six hours, at which time, from some caprice on the part of his friends, I was requested by them to meet my surgical colleagues. On reaching the hospital they were all engaged at an operation in the theatre, and I went alone to see the man. His general aspect at once gave me reason to hope that the case would not terminate fatally, and every answer I received confirmed me in this view; my face doubtless showed what was operating in my mind, and gave the patient comfort, but I declined giving any decided opinion till I had seen the surgeon under whose care he was, except that I did not consider the case a hopeless one. I then left the ward, and did not return till my colleagues were able to join me. On re-entering, the surgeons at once remarked

the alteration which had taken place in the man's features ; their own assumed the lineaments of hope and encouragement ; the patient's face still farther brightened ; he was told that the worst was over, and he would soon be well. In four days after he could walk about, and came to me to report himself, looking as if nothing had ever ailed him.

Deaths by sheer fright are not numerous, though many, sufficiently well attested, are on record. Now, there can be no reasonable doubt, that if extreme fear, despair, or other depressing emotion will produce such a diminution of vitality as to end in *death*, that a less amount of the same emotions will produce some modification of vitality short of death. If this be true, we draw the corollary, that whenever we can fairly trace any disease or disordered function to fright, prolonged grief, anxiety, and the like, that there must be a deficiency of vital power, and that depressing medicines must be prejudicial. Experience has demonstrated the truth of this proposition in chorea, mania, jaundice, indigestion, sleeplessness, and cancer.

CHAPTER IV.

INFLUENCE OF POISONS UPON VITAL FORCE.

The vital force influenced by chemical agency—Poisons—Their operation on the body—Phenomena attending the introduction of poisons differ with the one employed—If poisons do not destroy life, they modify the vital processes, generally in a definite manner—If the vital force is superior to the poison force, no perceptible result follows—The system being under the influence of a poison is proof that the vital force is deteriorated—Do such unknown poisons as those of scarlatina and small-pox differ essentially in their operations from the known poisons?—Points of resemblance—Presumed identity of many of their laws—Important corollary—Adaptability of system to poisons, &c.—Influence of tonics in promoting this—Treatment of diseases of poison origin—Theory of elimination considered—Its tendencies.

It will be profitable for us now to consider the way in which the vital force, and the natural healthy processes depending upon it, are influenced by other forces of a different kind, such as chemical force and that to which we must give the term "miasmatic." It is clear, that if we apply a powerful chemical agent, such as oil of vitriol, to any part of the body, we destroy its vitality; and we say that such force is antagonistic to life.

Experience tells us that there are poisons, such as arsenic, which may be introduced into the whole body by vital processes, and which will then produce such an alteration in the tissues as is incompatible with life.

But we also know, that the amount of these agents may

be so reduced that they will no longer destroy the vital power. Sulphuric acid may be so diluted with water that it will not only *not* destroy the part to which it is applied, but will act beneficially in restoring health, as in checking diarrhœa; and arsenic may be used in such minute doses as to be apparently innocuous, and even beneficial. What then, we ask, is the nature of that force which is in operation when an individual has had his vital power *modified*, but *not destroyed*, by the presence of some force of an antagonistic nature? Is it a compound force, or is it simply the original force deteriorated?

An answer to this, in the present state of our knowledge, it is difficult to give; we must, therefore, content ourselves by investigating the phenomena which occur when vitality is modified by other forces. We may investigate this subject, firstly, by inquiry into the history of known chemical agents or poisons; secondly, into those whose existence we infer, but cannot demonstrate; thence we may be able to deduce some general law to guide us in our treatment of diseases of poison origin.

In examining the effects of poison on the body, the first thing that strikes is, that all poisons do not operate alike; and the second, that all individuals are not affected similarly by the same poison.

Thus, we see strychnia affecting the muscles almost exclusively in one way, and conium affecting the same parts in another way. Aconite affects sensibility; belladonna produces madness; opium, stupor; and mercury, salivation. Antimony gives rise to nausea, while alcohol staves it off; lead produces colic and constipation, while arsenic causes vomiting and purging. On the other hand, one animal eats with impunity leaves which would poison another; and the sufferer from acute agony can take a dose of opium which

would kill a man in health. Some are poisoned outright by fish, salt pork, or sausages, while their companions can eat the same dishes with impunity. A fig is poisonous to some sensitive people, and honey equally so to others. One infant dies from a drop of laudanum, while another takes it with advantage.

In attempting to explain these phenomena, we naturally turn to those poisons whose presence in any particular tissue the chemists enable us to detect. Their researches have taught us, that the colouring matter of madder has some peculiar affinity for the bones, and that it is to be found there when its presence cannot be demonstrated elsewhere ; that arsenic permeates the whole system, but chooses the liver especially for its localization ; that more lead is to be found in the extensors of the arm in wrist-drop than in other muscles ; that antimony lingers in the kidneys after it has left other organs ; that mercury and some other metals accumulate in the salivary glands ; and that iodide of potassium affects all parts alike.

Hence we infer that some poisons have peculiar affinities for certain organs, and others are general in their operation.

This inference is strengthened by the influence of certain agents whose course we cannot trace with chemical certainty. Thus, ergot of rye acts definitely on the uterus alone, and on no other organ ; the hydrophobic poison acts on the throat and brain ; the syphilitic poison on the inguinal glands, the throat, skin, &c. ; the erysipelatous affects chiefly the face and head ; the rheumatic, the fibrous tissues and heart ; the gouty, the ball of the great toe, &c. ; the dysenteric, the large intestine ; cantharides, the urinary apparatus ; and phosphorus, the lower jaw. Other poisons are more general in their effects, as opium, plague, typhus, influenza, yellow fever, &c.

Still further it is to be noted, that what is poisonous at one time in a certain quantity may ultimately become comparatively innocuous by perseverance. Thus, when alcohol is first taken by a child or a youth, he may become speedily intoxicated by three glasses of wine, and become comatose from half or a whole bottleful ; but when the habit of wine drinking has been formed, that quantity may positively seem to do him good and keep him "up to the mark," and in some instances comatose intoxication cannot be induced by quadruple the quantity originally required. So it is with opium—a small amount at first is sufficient to lull pain or secure sleep ; but after a while the system becomes so much accustomed to its use, that doses are required of comparatively appalling magnitude.

It has for a long time been fashionable to consider that it is *the blood* in these "poison" cases which is chiefly diseased ; but a closer examination will show that *the blood only acts the part of a common carrier* in those cases where a poison has been taken whose locality we can easily demonstrate with the microscope. Thus, if we examine the stomachs and other organs of individuals poisoned by arsenic, we shall, in the majority of instances, find that the drug has been converted into a yellow sulphuret, readily recognisable by the naked eye. I have repeatedly examined this deposit, and have found it invariably to be *in the tissues outside of the blood-vessels*.

The natural inference from this is, that arsenic kills, not from its influence *on the blood*, but from its influence *on the tissues* to which the blood has carried it, and which have retained it when it has been so carried. In other words, arsenic has replaced a certain amount of healthy tissue, and each particle has affinities so different from that of the original, that the neighbouring fleshy atoms can no longer

behave as they would do under the natural state of things. Death occurs when the amount of poison force present exceeds the vital force remaining.

Other poisons act much in the same way ; but as their affinities are not identical with those of arsenic, the parts in contact with or near to them are influenced differently from what they would be by that metal.

If this idea respecting the action of poisons be worth anything, we shall find instances in which the action of a poison is confined to the locality where the poison has been introduced ; we do so. Thus, I have seen a man who had wrist-drop of the left arm only, and I could trace this solely to his business compelling him constantly to have metallic lead (in alloy) in contact with the skin of that hand and forearm. I have heard it stated, that some compositors suffer from palsy of the finger and thumb which handle the "types ;" and I know a man who had palsy of one arm from handling shot. Arsenic produces inflammation equally, whether it is rubbed into and through the skin, or given internally. The external application of turpentine to the abdomen in tympanitis, answers quite as well as its internal use ; and pain in an external part may be relieved quite as effectually by the local use of opium as from its administration by the mouth.

Every part of the tissue is permeated equally ; but being full of blood-vessels, whatever penetrates through their walls must enter the blood current and be taken away. This explains why by the local use of drugs we have general effects following local. I think, then, it may fairly be concluded, that the poisons which we can trace *act directly on the tissues themselves*, and not, in some mysterious manner, through the nervous or vascular or other systems.

Nor are these effects confined to poisons essentially soluble ; for the insoluble carbonate of lead, if freely handled, will

produce colic, &c., as effectually, and, as a general rule, more frequently than the soluble acetate. It does this by combining with the tissues, not simply by entering into the blood. If the blood were the sole medium by which the transmission of the poison was brought about, we should have the effects as general as if the door of admission into the system was the stomach ; but it is not so, for we find the largest quantity in the part to which the substance was applied.

It has long been a dogma in the medical schools that no medicinal or other agent could act upon the body until in some way or other it had been rendered soluble.

The labour expended to prove this point shows how much more apt we are to adopt a theory than examine facts. Experience daily demonstrates that the dogma is untrue. It tells us that orpiment and Scheele's green, both insoluble salts of arsenic, are quite as deadly as the more soluble arsenious acid. Pareira says that powdered gold operates in the same way as the soluble chloride. We all know that the action of calomel, an insoluble salt, differs essentially from that of corrosive sublimate, a very soluble one ; that metallic mercury produces salivation ; that an insoluble black wash cleanses a venereal sore as effectually as a soluble salt ; and Plummer's pill, containing two insoluble forms of antimony and mercury, is by many averred to be far superior to any soluble form of the same metals.

It is argued, without any proof being alleged, that all these insolubles are rendered soluble by certain stomachic juices. If so, how absurd is it for the believers in this dictum not to give the soluble form in preference to the insoluble.

The dogma is supposed to be proved by asking the question, How can any drug get into the system except by the blood,

and how can it get into this without being sufficiently soluble to pass through the walls of the blood-vessels ?

This argument passes for nothing as soon as it is ascertained that insoluble materials *do* enter the system. They mingle mechanically with the tissues, and are passed on from one part to another by molecular interchange rather than by circulation, and as the former is necessarily a slower mode of diffusion than the latter, it follows that insoluble materials are more slow in their operation than the soluble.

We see no more reason to doubt that an atom of calomel undissolved may enter the solid tissues, than that granular carbon can become fixed in the lungs and thoracic lymphatic glands from the inhalation of a smoky atmosphere, and that it can be so experience abundantly proves.

Amongst the insoluble materials constantly used and much lauded by practitioners are—oxysulphuret of antimony—James's powder—oxide of silver—nitrate of bismuth—carbonate and oxide of iron—blue pill, &c.—black and yellow wash—cinnabar, &c.—calomel—iodide and biniodide of mercury—oxide of zinc—iodide of lead, and the acetate of that metal, which the stomach converts into carbonate.

Surely we must conclude either that the dogma is wrong which says these must be necessarily inactive, because insoluble, or the practice must be faulty which adopts them in preference to the soluble salts of the same metals. No ingenuity of reasoning helps us out of this dilemma.

To resume : a part which is permeated by a poison, is, we say, under the influence of two forces, one chemical, the other vital, and the effects produced vary with the relative *amount*, or intensity of the chemical force and the *affinities* of the poison, *e. g.* a little arsenic will do less mischief than a great deal ; and while its salts will produce simple erythematous inflammation when applied to the skin, those of antimony

will produce a pustular, croton oil a vesicular, cantharides a bullous, and the stinging nettle an urticarious, eruption.

But the words "a little will do less than a great deal" are so vague that they require an explanation.

We used them with that intention, as we wished to show that they must always be vague and relative terms. If the two forces, chemical and vital, were definite and unchangeable, precision might be obtained; but as one only is definite—the chemical one—and the vital force is subject to many changes, no certainty is possible.

For example, let us estimate the force of a definite dose of laudanum at 10, and the vital power at 100, a certain result follows, and death does not ensue; but if the vital power is reduced to 50, the effect of the laudanum will be doubled, and death may positively take place.

In other words, we believe that a man, when strong, can bear a dose of poison which would kill him if he were weak.

Anything, therefore, which depresses the vital power, during the time an individual is under the influence of a poison, makes him more susceptible to it.

We shall see the importance of this consideration when we advert to the treatment of diseases of poison origin.

If we now turn to the operation of those poisons whose existence we cannot demonstrate chemically, we shall see that they affect the body much in the same way as those we have already described, *i. e.* each has definite powers and peculiar affinities.

There is good reason to believe that marsh miasms have greater affinity for the spleen, liver, and colon, than for other parts; that small-pox is chiefly concentrated in the skin; scarlatina in the skin, throat, and kidney; measles in the skin and bronchi; gout in the feet and hands; syphilis

in the skin, throat, and bones ; gonorrhœa in the urethra and joints ; cholera in the intestines and liver. The poison of glanders affects chiefly the nasal passages, that of the plague, the axillary and inguinal glands, in preference to others, and the tubercular leprosy selects the skin. If diphtheria and croup are of miasmatic origin, we must presume the poison has peculiar affinities to the mouth, nostrils, and air passages ; while typhus and general erysipelas have but few well-marked affinities.

We conclude, that the poisons producing the diseases in question are as distinct from each other both in force and affinity as are arsenic and antimony.

The small-pox poison, combined with the tissue of the skin, produces, like antimony under similar circumstances, a pustular eruption, but the course of the eruptions shows that they are not identical. Scarlatina poison in the throat produces ulceration ; on the skin erythema simply ; and in the kidneys hæmorrhage. Syphilis in one man gives rise to nodes, in another to sore throat, in another to rupia. Measles produces a specific rash, and the eruption of erysipelas is equally characteristic. The effects of typhus are as definite as those of the influenza, and the symptoms of hydrophobia are as certain, in man, as are the effects of alcohol. But the symptoms of hydrophobia in a dog differ from those presented by man ; we infer, therefore, the poison being a “ constant quantity,” that the vital attributes in a dog differ from those of a man—an almost self-evident proposition.

If we once allow that two powers or forces are concerned in the production of the symptoms in these diseases—viz. the *poison* (as we presume a non-vital) *force* and *vitality*—our next inquiry must be, which is most concerned when the intensity of the disease appears to be great ? We may put the question in the following form—Does small-pox become

confluent because the dose of the poison taken is excessively large? or because the person is excessively weak? or because the two conditions are combined?

I think that we may fairly answer thus—In inoculation for small-pox the dose introduced may be assumed to be a “constant quantity,” but the eruption following is extensive or limited according to the recipient’s bodily health at the time and subsequently.

If for small-pox we substitute the word typhus or ague, we have less hesitation in answering more fully, for experience fully proves—1. That if many individuals are exposed to the same sources of contagion, it is the weakest only who suffer. 2. That if the dose of the poison is excessive, the strongest will succumb. 3. That by using strengthening means or tonic remedies, *e. g.* quinine, the weak may enjoy the immunity of the strong.*

A person becomes affected, then, by the poison force being greater than the resisting or vital power, and this rule holds good during the whole time the former is present.

The subject, however, is not in reality so simple as we have hitherto represented it, for there is an element to be taken into consideration to which we have hitherto barely referred,—viz. *adaptability to altered circumstances*; its exact position in the science of life it is difficult to determine. It is certain that it exists in plants and all animals equally with man. A few illustrations will point out its nature. To begin with plants. It is affirmed that wheat matures much earlier in the northern regions than in the southern, and it has been found that the same wheat, when brought to the temperate or warm zones, adapts itself to the altered circumstances, and takes the same time to mature as the wheat natural to the soil. Again, there are plants

* For further observations on this head, *vide* page 63.

which close during the night, but by the use of strong artificial light the habit is overcome, and the leaves or flowers, as the case may be, continue open in the night. This habit is then continued for a certain period.

Again, in aquatic animals we see the same sort of thing : the salmon at one time is living in fresh water, exclusively, at another in salt ; an instant transition from the one to the other is, I understand, fatal ; but in the gradual change effected by passing up a tidal river, the system has time to adapt itself to the altered circumstances. Whether this fact be reliable or not as respects the salmon, the same observations may be depended upon as regards shrimps, prawns, and other creatures upon which definite experiments have been made.

Adaptability to altered circumstances is still further manifested in the higher animals—carnivora will, under certain circumstances, live on vegetable diet, and graminivora upon an animal regimen. Thus the dog will thrive upon biscuit food, and the horse will be sustained by beefsteaks placed round “the bit” for him to champ at.

But more especially is this to be noticed in man. The tobacco smoker at his first pipe, and sometimes for a long period thereafter, has nausea and intense prostration produced by the luxury ; and the same may be said of the “chewer ;” but after a certain period no such effects occur. On the contrary, tobacco, in some instances of shipwreck, seems to those accustomed to its use, to have a definite power in sustaining the vital force. In the majority of cases, however, if a smoker indulges in the weed when his strength is much reduced, he will experience much the same effects as at first.

Snuff, however, affords a more apt illustration—the first “pinch,” as a general rule, produces sneezing and a copious

secretion of nasal mucus ; but after a time the nostril becomes comparatively insensible to its presence, and no sternutation follows the most copious supply, nor is the nasal mucus much, if at all, increased.

All of us are familiar with the rapidity with which we get accustomed to smells which once annoyed us—how completely the butcher, druggist, tallow-chandler, cheese-factor, and others become insensible to the smell of the shop ; and how, in our student days, the diligent ones became insensible to the once sickening smell of the dissecting room.*

Workmen become accustomed to the fumes of chlorine, and are enabled to endure, after long practice, an atmosphere which would once have been unbearable to them.

The captain of the "Beagle," H.M. surveying ship, informs us, that the native Australians about the gulf of

* It is an interesting subject for inquiry how far nauseous smells are really prejudicial to health. We have long been accustomed to believe they are so, but an investigation I was called upon recently to make leads me to doubt the truth of the doctrine.

Amongst the nasty odours which are rife amongst us, the emanations from pigs is pre-eminent ; yet pig-drivers are a sound lot. To some the smell from sheep is intolerable ; yet shepherds are healthy. In hot climates, the scent from the negro skin is horrible ; yet the Blacks carry neither fever nor pestilence in their train. In all our towns, there are gas works, and around about them the air reeks with nastiness ; yet the inhabitants living within this range are as healthy as their neighbours. The poor wretches who gain a precarious living amongst the sewers, are not consequently the prey to fever—even the scent of diluted sulphuretted hydrogen is not deadly, for the nymphs of the Harrogate and other sulphurous springs have as blooming complexions, and as good health and constitutions, as their neighbours. Recent inquiries in London have demonstrated that the stinking Thames is not so deadly as the newspapers prophesied it would be. Sextons, nightsoilmen, fish-manure makers, glue-boilers, labourers in abattoirs, curriers,

Carpentaria have accustomed themselves to drink salt water, almost habitually, as they have rarely any other supply in that arid region. The native dog has adopted the same habit.

So in like manner negroes and aborigines of various climes live and multiply in an atmosphere sufficiently pestiferous to kill a new comer, or themselves, if they return to it after residence in more salubrious parts.

Some voyagers are enabled to bear the heaving of the sea without nausea, while others can never get over the fearful sickness it produces, however long the voyage is protracted. The healthy and strong always suffer less than the weak, and are the first to tolerate the motion of the ship.

Some accustom themselves to gorge the stomach to an extent which would kill many, and others subsist on a diet close upon starvation. Most of us, by perseverance, can digest food which was at one time nauseous and repugnant ;

dissecting-room porters, and tallow-chandlers—all are daily exposed to nauseous smells, yet their duration of life and general condition is an average one.

Nor are there wanting some instances to show that nasty emanations may be even serviceable to life. Thus, a merchant told me that he had a ship laden, amongst other things, with hides (and the smell from these is horrible), coming from South America. Part of the crew were living in the close proximity of this stuff, and their cabins were filled with the effluvia from it. Fever of a severe type broke out on board ; many died, *but all those who slept in the stinking cabins escaped the disease.*

In all the cases we have referred to, the smell produces, in the first instance, nausea, vomiting, anorexia, &c., but in a short time the nose becomes unconscious of the odour, and the system adapts itself to the condition it is placed in. But even here it is to be remarked that if the constitution of an individual is weak when he is first exposed to these nauseous influences, he does not become insensible to the smell, nor is his constitution adapted to the circumstances.

and I am informed by some patients, who at first have loathed cod-liver oil, or Harrogate water, that they have become insensible to the smell at the end of a week, and then after have enjoyed thoroughly their daily doses.

All medical men are familiar with the "tolerance" shown by most people for large doses of antimony and opium, provided they are begun in small quantities.

We have all remarked the different sensations we experience when we are dressing in our own bedroom in a morning, and when we enter it again after a few minutes' absence, and how, while smoking, we become insensible to an atmosphere of tobacco which at first almost stifled us.

Mr. Lewes, quoting Claude Bernard, records some interesting experiments illustrating this power of adaptability. The experimenter placed a healthy bird under a bell-glass, and, depriving it of fresh air, noted that it died in three hours. He then took another and placed it under similar circumstances, but took it out at the end of two hours (when its expectation of life was still one hour), and replaced it by another bird—this died instantly. He varied these experiments, but the results were the same; and he thus was able to demonstrate, that if an atmosphere were slowly deteriorated, an individual could be brought to bear a condition of things which would have been absolutely fatal had the introduction to it been sudden.

Still further it is shown, that if the bird be taken out at the end of two hours and allowed to respire pure air, so as to revive it perfectly, and be then replaced in the atmosphere it has previously vitiated, it will die at once; although it would have lived for an hour if it had not been taken out of the foul atmosphere. Again, one sparrow is confined in a bell-glass for ninety minutes, and then a second is introduced: this dies in ten minutes, the other remaining lively.

In another observation it is shown that the slower the deterioration of the atmosphere, the longer it can be borne. Thus one bird confined in a bell-glass lives for three hours, but two birds similarly confined only live one hour and a quarter, instead of an hour and a half. (Physiology of Common Life, vol. i. p. 374.)

In this way, we believe, is to be explained how immigrants into an unhealthy district are more liable to be affected with its diseases than those who have become acclimatised or born therein.

The following observation, communicated to me by Mr. Nisbet of Egremont, who was for a long period House Surgeon to the Fever Hospital in Paisley, is of great interest, as illustrating the power of adaptability in the human body.

The nurses, he told me, always had an attack of fever when first they came to the hospital, but after that they continued their duties without again being laid up with it; but if from any cause they left the establishment and came back to it again after a long absence, they were as certain to have the fever as any new comer.

As long as they remained in the house, they were, like C. Bernard's bird, breathing an infected atmosphere with impunity; but when, like it, they had escaped from the cage into the fresh air, a return to the wards was fatal.

As a general rule, however, it must be added, that delicate and feeble individuals have not the same "adaptability" as the healthy—the strumous, for example, who work amongst phosphorous matches, have caries of the lower jaw, while the healthy workpeople escape.

The influence of health upon adaptability is well shown during pregnancy in the female. Some there are who pass through the whole of that trying time without any suffering;

the body adapts itself to the new state of things without any difficulty. But with the majority of townswomen it is not so : they suffer from malaise, sickness, and distressing pains in the back and abdomen ; their system cannot adapt itself to their changed circumstances. Put now, however, these very ladies into a good condition, give them a pure air by removing them to the country, give them rest from fatigue and care, and a good diet ; and we find in the course of a few days, sometimes even in a few hours, that the sickness leaves them, and with it all their pains and aches ; the system can then adapt itself to the growing uterus, with as much ease as it does in a sheep or cow. I have repeatedly seen these effects produced by change of air, but they are unfortunately too often succeeded by a return of the vomiting, &c., as soon as the individual comes again under town influences.

But there are some things to which the system cannot adapt itself. Thus the stomach never becomes tolerant of ipecacuan, belladonna, colchicum, sulphate of copper and zinc, aconite, or arsenic ; some very few tolerate mercury, but the majority, sooner or later, are affected by it ; the same may be said of lead and other poisons.

When we consider the bearing which these facts have upon medicine, we recognise their importance.

We will begin with mercury, respecting which there are plenty of facts at hand. We find that it produces its specific effect more readily in the weak than in the strong ; that weakness promotes the occurrence of salivation ; * that in a strong man the system will adapt itself to, and no visible effect will be produced by, an amount which would cause formidable sloughing in a patient with Bright's disease.

* Emetics and blood-letting are useful (in promoting salivation), as they promote absorption. Tartar emetic is the best vomit, since it is the most powerful nauseant.—*Parreira*, vol. i., page 824.

The same with sea-sickness—the strong “adapt” themselves to the altered physical condition; the weak cannot: but if by champagne or brandy-and-water they can raise themselves for a time to a high standard, they may “adapt” themselves too.

We have seen that persons may imbibe for a long period the pestiferous air of fever wards, and yet be apparently healthy; but if by any chance their strength is materially reduced, other conditions remaining the same, the adaptability ceases, and they become infected. Such people may be compared to the opium-eater or tobacco-smoker. They daily take a poison, but the system is inured to it. But it is *inured* to it, only because health has insured adaptability—diminish the vital power, and the habit is no longer innocuous. In every fever hospital some attendants remain for years exposed to the fever, and never take it, while others succumb at once. The latter are those who are constitutionally weak; the former are the constitutionally strong.

Nor is it uninteresting to note the influence of quinine in these and similar cases. Thus I have known individuals stricken down with typhus—the poison, in ordinary parlance, has taken hold on them; in more learned terms, we might say the poison has overcome the vital force, and has modified its ordinary manifestations. Quinine in large doses has been given, and in twenty-four hours the fever has gone. Within this period I have seen a thick coat of fur completely removed from the tongue, and headache and prostration pass away. The patient was well. Why? Because the vital powers had been improved by the medicine, and being thus reinforced, they could adapt themselves to the presence of the poison beneath which, unaided, they had succumbed. That the poison was not destroyed or eliminated was apparent, because in one instance the patient

relapsed, on giving up the quinine and debilitating himself by overwork.

Take again Dr. T. R. H. Thomson's experience in the Niger Expedition, and that of many other African observers. They remarked that quinine was sufficient to ward off malarious fevers. In the expedition first referred to all hands were exposed to the same malaria, and all who did not take quinine in large doses daily suffered from it severely ; but Dr. T. escaped. Why ? Because the vital powers were enabled to tolerate the poison. That it was not destroyed was clear ; for the Doctor had an attack of ague on his return to England, without any recognisable fresh exposure to malaria.*

Throughout his experience there was no proof that any poison he imbibed was *eliminated* ; nor in cases of healthy individuals attending on typhus, erysipelas, puerperal peritonitis, plague, cholera, scarlatina, measles, small-pox, or other diseases of infectious nature, is there the smallest evidence of an elimination of the poison from their system, and yet they escape the disease. Why ? Not because they drive out or destroy the poison as rapidly as it enters, but because they have vital power enough to tolerate its presence. A yet more striking exemplification of this toleration or adaptability of the system to a poison, may be seen in those remarkable cases recorded in Williams's "Morbid Poisons," in which mothers have been delivered of infants affected with small-pox, themselves being free from any symptom of the disease.

This being so, it is evident that when we desire to prevent the spread of infection or to cure the victim of it, we must

* Dr. Clarke, late of Cape Coast, tells me that he has always found that the addition of tincture of sesquichloride of iron greatly augments the value of quinine in malarious districts.

fix our attention on the vital powers, and seek to bring about *tolerance* of the poison, rather than bring those powers low by attempts to evacuate the poison by aperients, diuretics, and diaphoretics, under the idea that by that plan we encourage *elimination*.

The doctrine of *elimination* is, however, so popular and generally received, that it is necessary for us to enter into it fully ; we shall best do so by considering the method in which the known poisons are removed from the body, by inquiring how far this process can be copied, encouraged, or adopted ; and, on the other hand, how far it is deprecated. We shall positively find, in prosecuting this subject, that it involves the principles of homœopathy and allopathy, and that, under another name, many of our distinguished physicians have been advocating the former, *i. e.* under the idea of imitating nature, they have administered medicines which produce the same effects as the disease ; *e. g.* diaphoretics in rheumatism, aperients in cholera and diarrhœa, and rube-faciants in measles and irregular gout.

How do the known poisons leave the body when they have been introduced ? In answering this question, the first thing that strikes us is, that all poisons do *not* leave the body : some are fugacious, others permanent ; and those which are the latter, produce effects precisely analogous to those produced by the former.

Thus syphilis, a force or poison which never leaves the body, and which even descends to the next generation, produces ulceration of the throat, just as scarlatina does, and eruptions of the skin, of a roseolar, papular, vesicular, pustular, or squamous character, just in the same way as erysipelas, measles, chicken-pox, small-pox, or iodide of potassium would. When these phenomena occur in the one case, they are attributed to the simple influence of the poison force modi-

fying the healthy state ; but when they occur in the other, they are spoken of as *efforts of nature* to remove the poison !

As this style of reasoning is clearly inconclusive, we must seek after some other which will be more tenable.

We have already stated our opinion, that poisons do not operate while they remain within the walls of the blood-vessels ; that the blood acts simply as a common carrier ; and that the poisons operate when they come in contact, or rather mingle with the solid tissues. (In using this term, I speak of the blood as a "fluid," the parts nourished as "solids.") Now, supposing that the amount of poison introduced into the solids is not sufficiently large to overcome their vitality, there is *à priori* reason to believe that it will be expelled in the same way the "effete" parts of the natural tissues are. We have strong reasons for the belief that the ordinary course of nutrition is this : the arteries convey renovating blood, consequently the solids in their vicinity are the newest ; as they are gradually pushed forward towards the veins and lymphatics they become "effete," and pass away either as secretions or excretions, or as carbonic acid, fibrine or other material, into the venous blood, in that to be again changed in the lungs. But if a poison incapable of change, *e. g.* iodide of potassium or arsenic, be introduced into the blood, circulation through the lungs does not diminish its quantity (unless the poison be aëriform) ; the material therefore, whatever it may be, passes necessarily through the following course :—it is taken into the blood ; it permeates the solids ; a portion passes away from certain organs with their usual secretions ; the rest reaches the veins, passes through the lungs, and again pursues the old course in the arteries ; another modicum is then given off as secretion ; the rest reaches the veins, and so the circuit continues until the whole of the foreign matter is expelled.

This view, though incapable of physical demonstration, may be taken as the basis of our illustrations.

Assuming it to be true, we say that all poisons do not operate in the same way : some never leave the organism, some leave it readily, and others leave it very slowly ; thus we believe that lead, when once it enters the solids, remains in them for an indefinite length of time, just as the "tattoo" marks are permanent on a sailor's arm under ordinary circumstances ; but even these may be removed by vesication, &c., promoting a rapid *ab intra ad extra* development ; and so may lead be removed by an analogous plan, or by rendering the lead sufficiently fluid to permeate the tissues, and thus to reach secreting surfaces. Other poisons of a very soluble nature, such as iodide of potassium, when once in the solids, exercise a stimulating influence over them ; and while they attract a larger quantity of blood to various parts, they provoke or encourage an unusual amount of secretion, and thus it happens that a great quantity of the poison is removed. A considerable residuum, however, reaches the veins, and ultimately the arteries ; but the blood current is so rapid (the whole blood traversing the heart, &c., about 1000 times a day) that the poison gets soon expelled by the activity of secretion.

In other instances, as in small-pox, the poison force is not so readily expelled, even though it "stimulates" many organs more actively than does iodide of potassium ; and in the present state of our knowledge, it is difficult to say whether it is ultimately "eliminated" from or "destroyed in" the system.

The phenomena witnessed in all these cases are the *direct effects* of the poison, and they can never with philological propriety be designated as "efforts of nature ;" they are the

results of non-vital force modifying vitality, and nothing more. The sequel sometimes leads to the belief that these effects are salutary, and in consequence we find many persons holding as a rule for guidance in all diseases of poison origin—that the excretions are to be cultivated, so that as large an amount of poison shall be taken from the system as is possible.

We do not deny, that by encouraging or forcing secretion, we may in some few instances diminish the amount of poison in the system ; but it is very doubtful whether, by the process, the individual is not rendered more susceptible to the amount which remains behind.

It is, however, to be borne in mind, that we cannot diminish the amount of poison present, unless it is of that class which passes readily away from the tissues. No amount of purging, sweating, or urination will convey from the body the poison of hydrophobia or syphilis ; nor can we reasonably expect to get rid of gout by diuretics, of acute rheumatism by diaphoretics, or cholera by purgatives. No method yet adopted has enabled the system to rid itself of the ague poison, or that which gives rise to dysentery.

In like manner experience has shown us, that we cannot force the expulsion of arsenic, opium, or typhus ; nor can we in any manner promote the discharge of the small-pox or scarlatina poison : a certain definite time is required for each separate poison, and this we cannot accelerate, unless the substance is very soluble in water.

In the absence then of all proof that we can promote the discharge of an animal miasm from the system, reason would dictate, that we should as far as possible enable the vital power to accommodate itself to the new state of things, *i. e.* to tolerate the presence of the poison.

Practically, this view is taken even by the stanchest sup-

porters of the eliminant theory, and they recognise the importance of supporting the strength.

It is alleged, in answer to the foregoing considerations, that it admits of proof that a certain amount of poison is evolved from certain surfaces during disease, and that the system is relieved thereby.

To support the former statement, scarlatina, typhus, measles, and other diseases are named, in which the secretions contain a sufficient amount of the poison to produce in others a similar disease.

To support the latter, small-pox is pointed to, in which the fever remits when the eruption occurs ; and this, it is said, is proof that the poison is eliminated in or with the pustules.

A few considerations show how untenable this argument is. A marsh like a typhus patient evolves a poison ; but none would speak of this as an active and salutary effort of nature for the health of the ground. We think that a sufficient distinction has not been drawn between the words evolution or emanation and elimination. The first implies the simple fact of a miasm passing off, and involves no particular theory. The second implies not only that a poison is passing off from the body, but that it is doing so in consequence of a definite process, which is set up with the distinct intention of diminishing the quantity remaining behind.

A single example will make the distinction apparent. A patient has small-pox, and a near approach to him produces the disease in another person. This is held to be a proof of *elimination* by many. We hold that it is a proof of *emanation* only, because experience shows that the corpse is as dangerous to approach as is the living man.

Ague miasm emanates from the marsh, and a stink from a dead dog, without benefiting the reeking mass from which they

come, or diminishing its amount. In like manner the urethra of man, and the vagina of woman, may evolve a vast amount of gonorrhœal poison, yet as much as ever remains behind. So also, a chancre emits a contagious virus without the smallest benefit to itself; and I have seen a patient with secondary syphilis have a fearful eruption of rupia, which of itself contained a syphilitic virus, without the smallest appreciable diminution of the poison left behind. On the contrary, the sore throat, co-existent with the eruption, became perceptibly worse.

With respect to the value of the argument drawn from the remission of the fever on the appearance of the eruption, we have to remark—1st. That small-pox is the only eruptive disease in which the phenomena occurs. 2nd. That the explanation is faulty—(a) because the remission is more or less marked according to the sparseness of the eruption rather than its abundance; (b) that encouraging the eruption aggravates the symptoms; (c) that the fever becomes intensified again at the period of maturation without any proofs of fresh absorption; (d) that there is a total absence of evidence that the body contains a less poison after the eruption than before.

Compare this with the case of rupia above, and the force of this objection will be seen.*

* Another argument in favour of the doctrine of "elimination" is that many diseases, *e. g.* measles, gout, &c., are the most dangerous when the eruption on the surface is faint, or recedes after being fairly out on the skin; and that internal diseases, such as jaundice, apoplexy, purgation, dyspepsia, alternate with such cutaneous affections as eczema, or ecthyma, that hæmaturia will follow the application of cold to the skin in scarlatina.

It is averred that improvement in constitutional symptoms is invariably associated in these cases with a reappearance of the rash; consequently it is argued that revulsives are certain to do good.

But there is yet another argument which remains to be noticed, which is urged strongly by the supporters of the eliminant plan, viz. that fevers and other diseases of poison origin often pass off with some critical discharge. The fact is certain: the explanation, however, is doubtful; for pneumonia frequently passes off in the same way, and symptoms of grave import pass off in women as soon as the catamenial discharge is established or restored, and in men severe headache and prostration, resembling the incubation of fevers, will instantly disappear when epistaxis occurs. A fit of hysteria often passes away with profuse secretion of peculiar urine, and an ague fit with copious perspiration.

In none of these instances, however, can we say that any poison has been eliminated; consequently, we believe that the

To a great extent these statements are correct; but a close examination of details shows that they form no support for the plan of endeavouring to restore elimination—*e. g.* an eruption fades because from some cause or other there is failure of constitutional power; consequently, organs which could previously tolerate the presence of the poison can do so no longer. *It is not that more poison is thrown on them*; it is that they have less vital force *to resist what is there*. Then, if the rash is brought out again by the use of general stimulants, the rash reappears, and the internal symptoms diminish from the opposite cause—*i. e.* an increase of propulsive vigour in the heart, and increased tolerance in all organs.

If revulsion is attempted by cutaneous irritants solely, more harm than good ensues.

A close attention to the course of scarlatina will demonstrate—
1. That the skin after the occurrence of dropsy is in the same condition as it was before that came on; 2. That dropsy will come on entirely irrespective of cold to the surface—*i. e.* when children are confined to bed; 3. That when children are exposed to cold, a very small per centage only suffer from dropsy; 4. That swelling of the cervical glands is quite as common a sequel of scarlatina as dropsy. There is no proof of a transference of poison in either one case or another.

occurrences have been contemporary with some vital change whose nature we do not yet fully understand.

In the same light we are bound to consider similar phenomena which occur in fever, &c., unless we can demonstrate that in the critical discharges there is a greater amount of the fever poison than was eliminated before. Thus a typhus patient evolves a certain amount of poison day by day, but gets worse nevertheless ; when at his worst, he contains and evolves more than at any subsequent time. He suddenly perspires profusely and is convalescent. Now if that sweat carried away all the poison left behind, there would be in it a far greater amount of infection than ever existed before ; whereas we find that such perspiration, if not absolutely innocuous, is less a source of contagion than the previous dry skin.

Nor have we any greater right to say, that a critical discharge of lithates is a proof of the elimination of the gouty poison, inasmuch as a similar discharge occurs in recovery from disease of the liver, from typhus, bronchitis, rheumatism, and many other complaints, and is even common in health.

Taking all these things into consideration, we conclude that the homœopathic treatment of the diseases of poison origin is radically wrong ; we believe that acute rheumatism is not to be alleviated by increasing the perspiration, or gout in one foot to be improved by inflaming a second toe ; diabetes insipidus is not to be cured by diuretics, diarrhœa or dysentery by purgatives, nor vomiting by emetics ; and if urea produces irritation of the bowels and purging, do we consider it ought to be encouraged by the use of aperients. In a subsequent chapter it is shown that *excessive* secretions are evidence of deficient vital force.

Nor are we without practical proofs, that the treatment

founded on the eliminant theory is prejudicial. In days gone by, it is to be hoped for ever, physicians believed that the eruption of small-pox was a proof of the elimination of the poison; and they carried those views out to their natural termination, viz. that the greater the elimination the more probable would be the cure. With this view they encouraged the eruption by warmth, and we believe made many a case of "discrete" prove one of confluent small-pox.

So also in bilious, yellow, or remittent fevers, the existence of a poison was naturally assumed; the bilious discharges were supposed to be proofs of its being eliminated by the liver, &c., and calomel was ordered in heroic doses to promote this discharge. Experience, however, has shown, that quina, which enables the system to tolerate the miasm, does far more good.

Another consideration still more strongly and practically points to the same conclusion. Patients in small-pox, typhus, erysipelas, gout, acute rheumatism, and other diseases of poison origin, have systematically been bled, purged, sweated, and the like; a certain amount of the poison has thus been removed, but the patients have had their condition fatally deteriorated; while those not so treated recover in large proportion and in a short time. I have myself seen a girl with renal dropsy of eight months' standing, and who had, during that time, been treated with purgatives, improve in every way as soon as the purging was arrested, and a tonic plan adopted in lieu of an eliminant.

Again, it is to be noted, that if a fit of gout is an eliminative effort, we ought to be able to draw the corollary—the longer the fit the more complete the elimination, yet the very contrary is the fact.

Still farther, we have tolerably distinct proofs to those who read nature closely, that the average duration of an

attack of acute rheumatism is in proportion to the intensity of the inflammation and the activity with which such eliminants are used, as mercury, purgatives, venesection, diaphoretics, &c.

I have long been accustomed to treat this disease with lime-juice and nothing else (save an occasional dose of opium to insure a good night's rest) ; no perceptible effects are produced by the medicine, nor is there any proof either that the "poison" is destroyed or eliminated, yet the patients thus treated get well far more rapidly and with fewer accidents than those treated upon the older plans.

In all instances we consider it more judicious to counteract the effect of a poison, and to enable the system to tolerate its presence, rather than to encourage its expulsion by imitating its effects ; and we are surprised that a profession so intolerant of the followers of Hahnemann should, for so long a period, have promoted the dogma he sought to establish—*similia similibus curantur*.

We consider that the effects of a poison are due to its force, modifying the healthy natural or vital powers. They are, so to speak, passive results, and we cannot see how it is possible for us to believe that they are "efforts of nature," or that health is to be restored by imitating or exaggerating the force which produced the disease ; we may sum up the subject in the following words :—

We hold—

1. That the processes by which poisons are expelled from the body are passive rather than active.
2. That evacuations, emanations, or eliminations are not to be considered as "salutary efforts of nature" to cure, but as symptoms of the normal nutrition being modified by a new force.
3. That it is dangerous in diseases of a humoral origin to act upon an eliminant plan of treatment principally.

4. That the correct plan of treating diseases depending on the presence of poison, is to enable the system in general, or any organ in particular, to resist its action or tolerate its presence.

5. That anything which depresses the vital powers makes an individual more susceptible of foreign influences.

It is not simply a pure condition of the blood that is necessary to health ; for a man may have the most healthy blood possible, and yet die of cold ; while those whose blood is vitiated by tuberculosis, cancer, the paludal or gouty poison, may appear to enjoy perfect health for a lengthened period, if not for the ordinary duration of life. No medicine, therefore, whose sole aim is to purify the blood, and no plan of treatment simply eliminative, can be expected to have more than temporary or accidental success.

There is, however, one plan for the elimination of all poisons with which we feel bound to concur. It is that which places the patient in the midst of pure air and lovely scenery ; which takes him from the turmoil and wearing activity of business, and gives him mental repose ; which supplies him with nutritious diet and abundance of the finest water ; which procures sound rest at night, without any other opiate than healthful exercise ; and which does not scour out the bowels by a daily purge.

In this way, we believe, health may be regained, and most poisons be expelled ; for there is in every living being a necessity for a constant renovation ; old materials are daily being replaced by new ; and when the increments are all healthy, and all foreign materials are being expelled, it is a necessary consequence that the body should have as sound a constitution as it is possible to attain.

CHAPTER V.

DURATION OF VITAL FORCE.

What becomes of the vital force at death?—Renewed inquiry into the laws governing its duration—Reasons for believing it a transitory force—Vital force compared to the mainspring of a watch—Comparison between death and a watch stopping—Fast life—Death from mainspring running down—from the machinery going wrong—If death is threatened by injury to any organ, advisable to put that right—Comparison between individual in illness and a trader on the verge of bankruptcy—Bearing of this on practice—Illustrations.

IN our endeavour to gain some insight into the nature of vital force, we must take into consideration what becomes of it at, or after death. We have hitherto compared man to some flower which blooms, blossoms, matures, produces seed, and dies ; to a fire which continues to burn as long as fuel is given to feed it, but which at last dies out, in spite of all combustibles. At one time we compare him to a watch, which may stop, either because the machinery is disordered, or the mainspring has been broken, or has simply run down. At another time to a peg-top, spun by a schoolboy, whose duration of spinning is modified by the strength of the arm that launched it, by the nature of the ground, and the accidents which befall it. Similar ideas pervade society : in our intercourse with each other we speak of one man being so fragile that a breath almost suffices to kill him ; of another as having an iron constitution which seems to resist all the

accidents of life. One dies from the prick of a needle : another survives who has a crowbar driven through his brain. All, however, die at last ; and what then becomes of the vital force they possessed ?

Force is, as we have said, as indestructible as matter ; we can neither make nor destroy it ; but as one form of matter may be converted into another, so may one form of force be changed into another. Is vital force so changed ? Does it become converted into chemical or any other force, or is it simply expended, gone, run down ? A question so difficult as this it is impossible to answer categorically ; this, however, we may say, that it is quite consonant with our knowledge to affirm that any part of our bodies may be given up to the laws of chemistry by disease or accident, and yet the individual retain his vital power ; that the whole body is constantly undergoing change ; and consequently, that all which our bodies contain to-day will be entirely removed in the course of months or years, without our vital force being destroyed ; and that when death ensues, no change occurs as far as we can tell, beyond what takes place in all animal products when separated from the body. If a limb be amputated, its vitality is soon gone, and then certain chemical changes ensue ; now, as we do not consider here that vital force was simply converted into chemical, so we do not consider, when the whole body dies, that there is simply a conversion of vital into non-vital force.

If not a conversion, there must then, we conclude, be an expenditure of such force as was available ; and death, we infer, is produced by the vital mainspring having snapped asunder, or run down.

This necessarily involves the belief adverted to in an earlier chapter, that vital force is a distinct power, having definite tendencies dependent on certain conditions, and having a

definite duration. To this belief the specific duration of life in each genus irresistibly tends. There is no reason why the life of the silkworm shall not extend beyond a few months, the dog a few years; and if we are to believe oft told tales, the toad a few centuries; and why one plant shall be annual, another biennial, and another perennial, beyond the will of the Creator. He who gave the power of living, fixed the duration of that power. With all our knowledge, we are not in advance of Solomon in this matter, who said of death—"Then shall the dust return to the earth as it was, and the spirit shall return unto the God who gave it." (Ecclesiastes xii. 7.) We do not wish, of course, to enter into theology in this place; but it is advisable to state our belief that there is a very wide distinction between the vital power possessed alike by man and beast, and that higher attribute of man—the soul, which we all believe to be imperishable.

Now, if the vital force under ordinary circumstances must be regarded as one having definite powers and duration, it becomes necessary for us to consider in what way and how far its expenditure may become accelerated, &c.

To return to our comparison of the mainspring: it is clear that a watch will run down, under any circumstances, within a definite period. By the interposition of a balance-wheel of longer or shorter swing, that period may be increased or diminished within certain limits; by disconnecting that wheel, the spring runs down at once. But the watch may be equally stopped by accidents to the machinery preventing the mainspring driving it on, and the future usefulness of the time-piece then depends upon the possibility of the damage being repaired or otherwise.

Such is life: one man husband his strength in every possible way—he lives "slowly;" another goes along at an

ordinary rate ; while a third throws off the balance-wheel, and lives a life so "fast" that it is soon expended. Another, with all his powers of life strong within him, dies from some accident to the vital machine : he dies for want of air, of drink, of food, from loss of blood, from pestilence or poison. Vitality cannot exist without a certain condition of the body and its organs ; life may therefore be prematurely cut short from accidental causes.

The physician turns this knowledge to practical account, by distinguishing, in severe illness, between the tendency to death from one or other of these causes.

If there is a tendency to death from deficient vital force principally, he does everything his knowledge teaches him to keep up those vital powers to the "life point." If, on the other hand, there is danger simply from the requisite machinery going wrong, he tries to set it right. In doing this he often appears to violate the principles we have before laid down. He takes blood, gives calomel, antimony, and the like, all of which have a direct tendency to diminish the vital force ; but he uses them for a short time only—and if by the use of them he is enabled to restore the normal condition of any organ, the disease of which threatened to cut short life, they become converted into direct conservators. We may in this respect compare the body to a merchant who has become embarrassed in his circumstances ; he may be so from reckless trading, or from steady loss of capital, or by accidental circumstances, such as a money panic, &c. If from the first cause, bankruptcy is inevitable without fresh funds ; in the last case, there are funds, but these are not available without a sacrifice. To save himself from commercial ruin, the trader sacrifices a portion of his capital, and thereby saves the remainder and his credit. So it is with life.

But—and the qualification is an important one—no trader

would continue to sacrifice capital after his difficulties were over. He would, after that, husband all the resources he had left, and try to augment them.

In like manner, the physician who enjoins the sacrifice of one part of vital capital to save his client from bankruptcy, must ever remember that such sacrifice ought to be arrested at the earliest possible moment, and that as soon the desired end is attained, everything must be done to encourage the powers which remain.

One or two illustrations will enable us readily to understand the truth of these propositions. Thus, a man may be suddenly affected with a pneumonia, so intense as to threaten instant dissolution ; or he may have such symptoms as lead us to the belief that he is suffering from congestive apoplexy. In these cases we recognise the fact that the danger of death arises, not from a "running down" of the vital mainspring, but by an injury to the works ; and although we are fully aware that venesection and copious bleeding will reduce the powers, we do not scruple to employ them, under the hope that by reducing the local injury the general danger will be averted.

Again, an individual may be threatened with death by coma, arising from one cause or another ; to obviate that, the physician prescribes blisters, local bleeding, &c., and if an injury has caused the symptom, the surgeon resorts to operation ; all of these are in themselves prejudicial to vital force, yet, under the circumstances, are the best means for averting death and prolonging life.

Again, it is occasionally though rarely found, that venesection will arrest pulmonary hæmorrhage, and many authorities concur in stating, that hard purging is the best remedy for melæna.

With the same view calomel and antimony have been

administered in fevers and certain inflammations, and in many instances with marked advantage in the early stages; but the continuance beyond a certain time of these remedies is directly prejudicial, as they tend to deteriorate the reparative forces of the system.

We shall have to return again to this subject in a subsequent chapter.

CHAPTER VI.

DEFICIENCY OF VITAL FORCE.

How is deficiency of vital power to be recognised?—Debility of an organ produces impairment of function—As each organ has a special function, so debility in any organ has special manifestations—Physiological knowledge must precede medical—Incipient death—Digression upon the phenomena of dying and death—Phenomena attending death of the man—Phenomena attending the death of an isolated portion of the body—Death by hunger and thirst—Sufferings severe—Mortification from various causes—Early symptoms—Deductions—Illustrations.

THE next inquiry we undertake is of considerable importance to the physician, viz. How or by what signs can we recognise deficiency of vital power in the body or any one of its organs? The answer is both simple and complex—simple generically, extremely complex in detail.

As in health there is no disease, so the presence of disease indicates deficient health, and deficient health necessarily implies deterioration of vital power. We answer, therefore, that we can recognise deficient vital force in every disorder of the body.

But such a truism as this would be of little service to us; we must therefore expand it and put the same consideration in a different way.

In health every organ of the body has a definite or peculiar

physical condition and a distinct function to perform, and it does this in a definite manner.

In health every part of the body is undergoing *change*; but new material takes the place of old with such steady regularity, that no alteration whatever is apparent in the shape, colour, consistency, or composition of any part, beyond such as is proper to growth and decay, such as the development of the testes in birds during spring, and their diminution during autumn and winter, and the same in man at puberty, and the development of the uterus and mammæ during pregnancy, &c.

In other words, every organ is perpetually renovated during health, and a certain, definite, standard condition habitually sustained.

But when an individual is out of health, and the vital power is impaired, we cannot expect that the functions will be performed normally, or the renovation keep up to the standard. The departure from the healthy standard may be so small as to be inappreciable, or so great as to be incompatible with life. Between these extremes we may have an infinity of degrees.

Shortly, then, we say, deficient vital power manifests itself by *disorder of function* and *altered nutrition* in all our organs.

Theoretically, it is difficult to believe that either of these can exist without the other; practically, however, we recognise the fact, that disorder of function may be far more prominent than alteration of structure; and, on the contrary, that there may be great alteration of structure without marked alteration of function. This last no doubt arises from that arrangement of Providence, which has given to every part of the body a larger amount of material than is absolutely necessary to conserve life. Thus we can do with

one eye if the other is lost, one ear, one hand, one testis, &c.; we may even lose one lung, and yet keep in apparent health. So, in like manner, a portion of the liver may be rendered useless by abscess, &c., without the secretion of the bile being materially interfered with; or an ulcer, or even a cancer, may exist in one portion of the stomach, and yet digestion will go on in the other parts.

Now it must be noted that every part of the body has a structure more or less peculiar to itself, and a function almost absolutely definite; we must, therefore, necessarily anticipate that disorders, whether of nutrition or of function, in different parts, will have different manifestations. Thus, as the eye is a peculiar organ, we shall have changes in it which cannot occur in others, such as cataract, opacity of cornea, &c., and an alteration of function inimitable elsewhere. A diseased eye involves some diminution of visual power—a diseased lung some diminution of respiratory power.

Each organ has diseases peculiar to itself—that is to say, when any organ is diseased, the disease manifests itself by symptoms which can only be produced by that organ.

Whether any organ can be affected without the whole system suffering is another question, as is also whether the system can be affected without every organ being affected too. Theoretically, we are obliged to look upon the body as a whole, but practically we may consider its component parts separately; just as we can describe either the general features of any country, or the produce of each of its fields.

The division between general diseases, such as fevers, scurvy, and the like, and local diseases, such as pneumonia, has been long recognised.

The former we must for a time pass by, and examine into the latter.

We say that deficient vital power shows itself in any organ by disorder of function or alteration of structure, or both.

It is therefore necessary to have a clear and accurate knowledge of the function and natural healthy condition of each organ, before we can thoroughly understand its diseases.

Correct physiological knowledge and accurate pathological information are therefore necessary for the accomplished physician, and a review of the functions of any organ ought always to precede an account of its diseases.

It would swell our subject to an unnecessary length, were we to take for illustration all the organs of the body ; we shall therefore confine ourselves to some of the most important, viz. the brain and nervous system, the lungs, the heart, and arteries, &c., the stomach, &c. Our business will be to inquire, 1. How does deficient vital power affect (*a*) the functions of the nervous system—(*b*) the structure of the brain ? 2. How does deficient vital power affect the respiratory organs (*a*) functionally—(*b*) organically or structurally ? 3. How does deficient vital power affect the heart (*a*) functionally—(*b*) structurally ? 4. How does deficient vital power affect the stomach (*a*) functionally—(*b*) structurally ? How does deficient vital power affect the muscles ?

Ere we enter upon these special points it is desirable to discuss the subject of *incipient death*. It is one of such importance that it would demand a chapter to itself if it were not so entirely digressional.

But we must say a few words upon the meaning of the term, "incipient death of a part." It is used to signify a state in which a part is in a dying condition, yet not absolutely dead. A frost-bitten hand is in such a condition, and a man dying with hunger is the same ; the part is not

entirely withdrawn from vital influences in the first case, although it soon may be—and in the second the man, though certainly in a dying state, may be restored to perfect health by appropriate food. So we may consider a portion of the brain as beginning to die, yet being within the influence of the vital powers and capable of restoration. In fine, we mean by the term that state of things which intervenes between perfect health and absolute death, and which may terminate either in one or the other according to circumstances. This state may be described in other ways, as by the words, deficiency of vital power, debility, exhaustion, and others allied to them in meaning.

DIGRESSION.

What are the phenomena of dying? What the phenomena of death? special reference being made to the four chief organs of the body.

As a general rule, we have failing mental powers: (*a*) weakness simply, *i. e.* diminished power to think; (*b*) thinking wrongly, or delirium; (*c*) total loss of all thinking power; (*d*) disorders of sensations, special and common, *e. g.* ocular spectra, aural delusions, increased sensibility, or complete anæsthesia; (*e*) disorders of the muscles, twitching spasm, cramp or paralysis; (*f*) disorders of nutrition, generation of flatus, black or otherwise depraved bile, stinking urine. All these, and many other symptoms of a similar kind, we attribute to the brain being in a dying condition; with them is associated diminished respiratory power, the chest is not so fully inflated, the blood is not so completely aërated as usual, and as a consequence the body becomes cool, then cold, the lips purple, the face livid; at the same time, a tolerably copious secretion takes place from the

bronchi, which seems to be the analogue of the cold sweat, which is so commonly noticed on the skin ; and this, as a mechanical impediment, prevents still more the access of air, already diminished by failure of the power of the respiratory muscles. Simultaneously with this state of things, the heart performs its duties in an irregular and enfeebled manner ; warm blood now no longer courses through the vessels in every part, a cooler fluid is now passing and in a much diminished stream. The distant arteries are barely distended at every pulsation, the radial artery can scarcely be detected, or it is only recognised when the failing heart makes a spasmodic effort to do its duty well ; or if there be not weak pulsation, there is an irregular or intermittent beat, until at last the heart ceases to propel the blood at all. The stomach during this period, as it is scarcely wanted for the habitual sustentation of life, does not give rise to any peculiar symptom beyond total want of digestive power, and the occasional generation of flatus, or some curious secretion of a deep brown colour, vomiting, &c. &c. All these phenomena continue for a period of greater or less duration, and terminate at last in death. But during the same period a physical change has been taking place in the body and all its organs, which consists essentially in a loss of vital power ; that is to say, every part is becoming less and less under the influence of vital or organic force, and more and more under that of inorganic and non-vital force. This may be readily recognised in the secretions of urine and fæces, which decompose rapidly or otherwise according to the nearness of dissolution. Still more clearly may it be recognised in the occurrence of mortification from pressure, or after very trifling violence, as well as in the half putrid odour which emanates from the body and is perceptible in the breath.

After death has taken place, the ulterior changes depend on the suddenness of the decease. When a man has been struck down in the midst of health, we know that vitality lingers in the corpse for a long period: the muscles remain contractile and the brain firm, until the anatomist has time to examine their condition. But if the individual has been dying slowly, vitality departs almost at the moment of death, and the flesh and brain have lost many of their attributes ere their condition can with decency be investigated. On making "post-mortems" in such cases, we find the heart flabby, the lungs friable, and generally engorged, posteriorly, with blood, the brain soft, pulpy, or even diffuent, the stomach distended with gas and fluid, and its mucous membrane excessively soft.

Such being the condition of things immediately after death, is it not a fair deduction to draw that there must have been a somewhat analogous condition shortly before death ensued? If the brain, the lungs, the heart, the liver, the spleen, &c., of patients who have been long ill are found habitually, twelve hours after death, to be softer than those who have been killed suddenly in the midst of rude health, every other circumstance being equal, are we not justified in the belief, that even during life the brain, &c., of the former has less firmness and consistency than that of the latter? And if this deduction be correct, are we not justified in drawing a corollary from it, that *softening of healthy tissue is an indication that it is nearer death than it is in health?* We shall recognise the importance of this corollary when we investigate the subject of Ramollissement of the brain. It is well known that the first sign of failing health in young children is a want of firmness in their limbs, muscles, &c.

But there are other phenomena connected with dying and death upon which we have not touched as yet, *i. e.* the death

of some isolated part, the rest of the body remaining entire, or the death of the whole from privation of food and drink.

Respecting the fearful sufferings produced by hunger and thirst, we have many narratives ; but each individual dwells so much more upon general suffering, than the particular forms it assumes, that there is some difficulty in arriving at certitude. On turning over a book of shipwrecks and disasters at sea, we find the following :—

Captain Bligh, speaking of his crew during their wonderful open-boat voyage, when all were upon a miserably small allowance of food and drink, says—"The general complaints of disease amongst us were giddiness of the head, great weakness of the joints, and violent constipation, which in some had continued for thirty days. I had constantly a severe *pain* in my stomach." Later on he speaks of extreme weakness, swelled legs, with debility of understanding ; and when at last relieved, he writes, "Our bodies are skin and bone, our limbs full of sores." In the account of the loss of the "*Pandora*," we read of "parching thirst producing excruciating tortures, and one man went mad and died. Old people suffered more than young." In a similar account of the wreck of the "*Juno*," the reporter says, "Though my sensations, particularly of thirst, were exquisitely painful, they were not so violent as what I had read of in similar cases. Two persons died of want : one went off suddenly, the other languished for some hours in great agony, having been seized with violent retchings and convulsions." The captain became delirious. The reporter refrained from drinking salt water, until he was unable to endure the parching *heat* of his stomach and bowels ; he then drank two quarts, and was revived both in strength and spirit. (We have before stated that the natives about the gulf of Carpentaria are commonly obliged to use salt water largely, for want of fresh, and that

they do so with apparent impunity.) He slept soundly, but was subsequently purged and griped. Many of his companions subsequently died delirious—one broke out in ulcers. His sensation of hunger became lost in weakness. Some struggled hard and died in great agony, but it was not always those whose strength was most impaired that died the easiest, though in some cases it might be so.

Another writer, reporting an escape from a burning ship, says—"We were never hungry, though our thirst was extreme. On the seventh day our throats and tongues were swelled to such a degree that we conveyed our meaning by signs. Sixteen died on that day, and almost the whole people became silly and began to die laughing. Twenty persons died the next day all mad." He was the sole survivor on the ninth day, when he reached land.

In another tale of hardship we read, "Want of water made them suffer severely ; the glands of their throats and mouths were swollen, the torments of thirst became dreadful, and their faculties were impaired in such a manner that they could hardly hear or see. Some were blind and nearly reduced to idiocy."

In almost all accounts of shipwrecks, there are notices of many of the crews, &c., dying lunatic ; while others, as poor Captain Gardiner, famishing at Patagonia, retained their senses to the last.

Longet (quoted by Lewes in *Hunger and Thirst*. Blackwood, January, 1858) remarks, "The bodies of those who have perished by thirst show a general dryness of the tissues, a thickening of the humours, a certain degree of coagulation of the blood, and numberless indications of *inflammation* and sometimes of gangrene of the principal viscera."

In the same paper from which I have extracted the above,

it is remarked that hunger, after a time, produces positive pain in the stomach, which speedily becomes acute, the sensation being as if that organ were being torn with pincers : a state, he adds, of general exhaustion, feverishness, headache, light-headedness, often flaming into madness, follows, &c. &c. It has been ascertained, that in fasting horses, the blood contains nearly double its ordinary quantity of fibrine. The same author subsequently remarks, and the observation seems to me to be one of extreme practical importance, "Tobacco, opium, and even inorganic substances, introduced into the stomach, will remove the sensation of hunger"—a fact the full significance of which we shall advert to hereafter.

The symptoms of scurvy, the swelled gums, racking cramps, ecchymoses, diarrhœa, debility, ulcerations, are too well-known to need prolonged notice.

The following description of the effects of defective nutrition are extracted from Dr. Williams's Principles of Medicine :—"In the extreme case of absolute privation of food, the cravings of hunger alternate with nausea and a sense of sinking ; then follow extreme depression, transient fever, delirium, general disorder, both of body and mind, increased feebleness, and an inability to maintain animal heat. It is a curious fact, that in this state the stomach becomes inflamed. Even in the slighter degrees of abstinence, enjoined by the physician in the treatment of disease, symptoms of vascular and nervous irritation often arise in the midst of general weakness. Deficiency of food causes waste of all the tissues, but least of those of the nervous system. The blood becomes thin and easily extravasated, the gums spongy and bleeding, the legs become œdematous, diarrhœa often occurs, ulcers appear in the cornea, there is a fetid breath, and a fetid effluvium exhales from the body. The lowered vitality of the tissues renders them little able to resist the tendency to

decomposition, and hence there is ready decay and interstitial absorption."

There is another sensation to which we must allude, which, in many instances, appears to be the precursor of pain, and often runs into it if the cause be prolonged, viz. *heat*.

We can experience this for ourselves if we hold one of our hands high above the head for a long period, so as to blanch it completely; when thus deprived of blood it begins to feel hot to our ideas; and a sensation of coolness is produced by a return of the blood.

In a limb whose main artery has been tied, a sensation of heat precedes the pain of approaching gangrene.

The sensation of heat is fallacious, for it is accompanied usually by an actual diminution of temperature.

This is conspicuously the case in death by cholera, in which complaints of intolerable heat are very common, and demands for ice and cold water urgent, even though the body is as cold as in death, and the breath is like the chill current from a freshly-opened vault.

I have seen similar phenomena in death from consumption and other exhausting diseases: and when all healthy bystanders have been shivering in the icy blasts of a Provençal mistral in spite of their warmest wraps, I have seen a lady, apparently dying with phthisis, beg for abundance of air to cool her heated blood, her skin at the time being as cold as the air.

This sensation of heat is not always general; it may be local. What, for example, is more common than for weakly and delicate females or men, to complain of flushings of heat in the face, head, or palms of the hands, although the thermometer shows that the actual temperature is lower than usual?

As far as my observation goes, this symptom is so charac-

teristic of debility that its occurrence at once leads to the investigation of the cause of weakness.

The sensation is quite distinct from "rushings of blood," as a sudden local distension of the vessels in any one part is called.

From the preceding observations it will be apparent that in a great number of instances the gradual death of the individual is a very painful process. The amount of suffering and the symptoms generally are by no means perfectly uniform, yet in all there are sensations spoken of as pangs, and torments, or tortures—words only used to betoken an extremity of distress. We next inquire whether the process of dying in an isolated spot, the rest of the body remaining comparatively sound, is as painful as death by hunger, *i. e.* whether the death of a part is similar to the death of the whole body.

By the words "process of dying," we wish to describe that state of things which immediately precedes absolute death—the intermediate condition between the period when a part is living and in health, and when it is dead and a foreign body, and which we have before spoken of as incipient death.

Under what circumstances is any isolated portion of the body destroyed? We will enumerate a few.

It may be destroyed by direct pressure, whether acting gradually, as by the pad of a tourniquet, or suddenly, as in severe contusion, or by the influence of intense or prolonged heat, intense or prolonged cold; by chemical agents, acting as caustics; or by sudden and excessive stretching, or by incision, or by laceration. It may be destroyed as a result of such natural processes as inflammation, &c., or it may be destroyed simply by want of blood.

If we specially inquire into the sensations complained of

by individuals suffering under any of these causes, we are struck with the fact, that almost all complain of pain of one kind or another. The patient who has a pad applied to an artery for the cure of aneurism, soon finds the pressure so intolerably painful, that he cannot bear its continuance; and should any one with Stoic firmness endure the agony beyond a certain period, the pain will cease, for the part affected has mortified. Another, who from constant pressure upon the sacrum has a bed-sore, experiences little pain, perhaps, yet he has, as Druitt remarks, "a sense of pricking, as if there were crumbs of salt in the bed." With the severe pain attending sudden contusion all are more or less familiar. Of the pain and even agony of stretching the fibrous tissues suddenly we have ample evidence. Many are personally acquainted with the acute suffering produced by a sprained or even a twisted ankle, involving as it does a sudden stretching, both of skin and tendon, sometimes even so bad as to produce actual death in either one or both structures.

The description given us of the "rack" as an instrument of torture, and the still more terrible torture of strappado, indicate the same facts. In the former the victim was tied by the wrists and ankles to two windlasses, fixed in a strong frame, and the ropes were tightened by the use of long capstan bars, the effect being to stretch all the joints of the limbs with terrific force. In strappado the individual had his hands tied behind him, and a hook being inserted between the cords, he was raised to a considerable height, and heavy weights attached to his feet; severe as was the strain upon the strong ligament of the shoulder-joint thus produced, it was scarcely cruel enough for the purpose. The torture was therefore increased in intensity, by allowing the victim to drop through some space, and then arresting suddenly his descent; and the agony of this is spoken of as being fearful.

The pain produced by heat is well-known, and many are cognisant of all the grades of suffering, from that which may be called temporary roasting, that is, holding the hand for a short period over a candle or close to a hot fire, to actual scalding, scorching, and destruction ; and we may note, that the pain is proportionate to the incompleteness of the death of the part. Thus, the pain from a scald exceeds that from a red hot iron, and that again the pain arising from white hot iron or molten lead ; the pain ceases when the destruction is complete.

The same may be said of cold : we can all of us probably remember the time when the painful coldness of our hands forced unwilling tears from our eyes ; we are often reminded of the fact, during cold winters, by seeing the suffering of the poor in our streets, and remembering the penance we endure when driving in an open vehicle against a cutting north-east wind. Our reading has made us familiar with the pains of frostbite, and we may have occasionally wondered how it was that when a part had become almost absolutely dead, that the individual was unconscious of the fact, and why there was then no pain felt. All of us, too, are probably acquainted with the hot-ache ; the pain, that is, which accompanies the return of circulation through the benumbed part, and may have speculated upon its cause.

If we examine the effects of caustics, we see essentially the same phenomena : a pain is produced by their use which continues with increasing severity until the part affected is absolutely dead, after which all pain ceases.

The same may be said of mortification, arising from other causes. In all, sensations of heat, pricking, or tingling pains are complained of, in varying intensity, and they continue from the period of incipient death up to the moment of absolute mortification.

These considerations suggest to us the very important deduction, that *pain is in very many instances due to a condition of a part which can only be considered as one of incipient death.*

This deduction is amply borne out by experience. It tells us that the weakly suffer far more severely from pain than the strong; that a carious tooth will be borne without discomfort while an individual is in health, but that it will be the seat of pain when debility is present, and it will become painless once again under the influence of tonic medicines, &c. It tells us that abundance of alcohol or chloroform will diminish the sense of suffering. "They have beaten me, but I felt it not," are the words Solomon puts into the mouth of the man overcome by drink. We know that "tic" is more common in the delicate than in the strong; that it is best cured by tonics; and a prolonged observation of myalgia has convinced me that the pain and soreness arising from muscular exertion carried beyond the patient's power is intense or otherwise according to the debility or strength of the sufferer. The ache which is produced in a strong man by such exertion will pass away in a day or two; whereas, in another reduced by weakness, the same exertion will produce severe and long-continued suffering.

The following case illustrates this:—Mary S., æt. 20, a delicate girl, a housemaid, never eating flesh meat, and one who had recently grown very tall, complained one morning of most exquisite pain in the lower part of the abdomen. The slightest touch was agonizing; she lay in bed with the thighs semiflexed, and she dare not move them. The other symptoms were insignificant. My informant was much puzzled with the case, for though he felt sure that the pain was myalgic, there was nothing to account for it. After the girl had been upwards of a week in bed, he heard acci-

dentally that, being out beyond her time, she had run about two or three miles home on the evening prior to her attack, and that the pain began after she had been sitting down a few minutes.

It is tolerably certain that such a run would not affect strong men or women in this severe manner, and it is a fair inference to draw that the pain was severe in her case because she was weak.

This subject is treated at full length in my book on "Spinal Irritation," and it will be unprofitable to continue it here.

Experience has shown, that opium relieves the pains of hunger; it also tells us that the same drug diminishes the pain preceding mortification. We may, therefore, fairly put the question—Have those diseases, characterised by pain relieved by the use of opium, any analogy to approaching dissolution? Do the patients suffer because the part has begun to die?

The question suggests a long train of thought, but we cannot follow it out here.

It is, however, to be noted, that in the instances we have brought forward, the part of the body affected has been more or less independent of the central vital organs, and, as a general rule, these organs are not liable to be the seats of pain. Yet they may be occasionally. Anæmia, for example, gives rise sometimes to intense headache; and when the vital force of the brain is being overcome by such poison force as typhus or other miasm, the pain is equally intense. Intense pain is also experienced in the stomach, when oil of vitriol has been taken.

But gangrene will affect the brain, the lungs, the liver, and bowels, and yet there may be no *pain* experienced. If this sensation be absent, is there any other symptom to be noted?

Progress into this inquiry is checked almost *in limine*, on account of the great difficulty attending upon the demonstration that such and such signs denote impending death of a whole or any part of an organ, and that certain others are proof that actual mortification has ensued. We have no difficulty in believing that pain preceding gangrene is produced during the process of dying, and that the intense itching that precedes a phlegmon has a similar origin ; but we cannot therefore deduce the conclusion, that all pain has the same cause. We can well believe that the giddiness, pain, swimming of the head, &c., which precede softening, *i. e.* death of a portion of the brain, indicate that the portion was in a dying or very feeble condition ; but we cannot therefore assume, that such signs necessarily indicate such a state of things. All we can do, is to point out the close connexion existing between certain signs during life and certain phenomena after death ; and to show that whenever there is reason to believe that the body is in a dying or a very enfeebled condition, symptoms occur precisely similar to those which occur prior to mortification elsewhere ; and if we can show that these symptoms occur *chiefly* when the vitality of a part is very low, there is, at least, a fair ground for the inference, that whenever they are present they indicate a great want of power, locally or generally, or both.

What these signs and symptoms are it will now be our business to show.

CHAPTER VII.

DEFICIENCY OF VITAL POWER IN THE NERVOUS SYSTEM.

Deficiency of vital power in the nervous system—Functions during health—Mental, motor, sensitive, organic—Insanity, paralysis, convulsions, neuralgia, sleep—Physical changes occurring in the nervous masses — Softening, its significance — Explanations — Illustrations.

WE now proceed to investigate the manner in which the *Nervous System* is affected by a deficiency of vital power, —first, as regards its functions; secondly, as regards its structure.

Ere we can answer this question satisfactorily, we must ascertain the circumstances under which we may be certain that this deficiency exists.

We have already alluded to the fact, that the vital force in any part of the body is always being diminished through the common processes of life, but that it is, under ordinary circumstances, almost as incessantly repaired by food, and drink, and rest; that the expenditure of vital power is greater or less, according to the work or exercise an individual goes through; and that increased exertion of any organ requires increased nutrition for the healthy standard to be kept up. We know, too, that there must be a departure from the healthy standard, in all cases of fever or other diseases, where a steady waste or *consumption* of tissue is going on without a corresponding reparation; and we have

no difficulty in understanding that there must be a considerable reduction in vital power, when an individual is dying a lingering death.

We may then fairly conclude, that anything which debilitates the body generally, diminishes the vital power of the nervous system, and with that deterioration there is impairment of function. A similar impairment may also be produced by excessive expenditure of nerve power, as in intense mental application or exhausting emotion, as anxiety and fright. But the functions of the nervous system are not simple—they are, at least, *quadruple*; and using the word “brain” for the whole system, we may say that its duties are divisible under four heads—*mental, sensitive, muscular, and organic*. That is to say, one of the functions of the brain is to originate, superintend, or in some way or other suggest and control thought, perception, the intellect, &c.; it has to receive those impressions made upon the various senses, and to interpret them to the intelligence as sensations; it has to originate and direct the management of that mysterious something, which directs the muscles to act in obedience to the will, or in some instances, as in respiration, independent of it; and it has still farther to prepare and direct the distribution of that power, which helps to keep every organ in a proper condition. It is a difficult question to decide, whether *sleep* is to be regarded as one of the *functions* of the brain; but it is perfectly clear, that it is as necessary for the brain to have rest in sleep, as it is for a man to have rest from muscular exertion; and it is equally certain, that an individual may be *too weak to sleep*.

Although in the present state of our knowledge it is impossible to locate these functions in any part of the brain, there is reason to believe that each has a definite seat; and it is certain that one function may be affected without the

others participating ; and that sometimes two, sometimes three, and sometimes all may be affected simultaneously or successively.

The *mental nervous system* is affected by deficient vital power in the brain in a great variety of ways. There may be simply an inability to think at all, a perfect apathy, a complete indifference to everything, or there may be an inability to think rightly, as we have seen in accounts of shipwrecks, where some die quietly, and others as maniacs ; and as we may daily see in disease, some die with the mind simply prostrated, others with more or less active delirium. *The presence, then, of insanity IN ANY FORM, implies a deterioration of vital power in the brain.**

If we pursue this subject by inquiring into the most common causes of insanity, we find strong corroboration of this important deduction. They may be thus enumerated : privation of food, misery, and starvation ; hereditary predis-

* It is foreign to my present purpose to enter into dissertations upon particular diseases. I cannot, however, allow the above paragraph to pass without recording my belief that "hysteria" is in reality a disease of the brain more closely allied to insanity than to any other disorder. By this I do not mean to imply that an hysterical man or woman are, in the ordinary acceptation of the word, "lunatic." By no means : an individual may have a cough and not be consumptive, and so may a person be of disordered mind, and yet not insane.

I believe that many other medical men look upon hysteria in a similar manner ; at any rate, experience has amply convinced me that this disease may be most successfully treated by a modification of the plans most generally successful in the treatment of lunacy. Negatively, hysteria is no more "fancy," "depraved imagination," and the like, than is suicidal mania, epilepsy or chorea. It is a disease of the nervous system, not of the mind ; the result of deficient vital power, not the effect of disordered fancy. The uterus (speaking generally) has no more to do with hysteria in the female, than the testes have to do with gout in the man.

position ; excessive anxiety, fright, or intense head-work ; overpowering emotions and the abuse of toxic agents, such as alcohol, and probably opium, &c. ; exhausting discharges, excessive venery, and the like, to which we may add actual cerebral disease.

Now the word *insanity* has a very wide signification in medicine, though not in law ; it includes not only those flagrant departures from reason, which compel society to shut up its victims, but all those mental manifestations which show that the mind is not in its healthy condition.

Using the word in this wide sense, we affirm, that insanity can never be regarded as a proof of increased cerebral vigour.

It is somewhat difficult to understand this. When we see in mania proofs of great mental excitement, surely it is argued, *that* must involve increased action—the proposition seems self-evident. But in reply we ask—What is excitement, what is increased action ? Is it not a more than usually rapid expenditure of tissue and of power ? Is it not expending in *one* day the material which would otherwise last *two* ? and with this excess of expenditure over supply, can there be anything else than impairment of vitality and loss of power ?

The importance of this consideration in the management of lunatics has only been recognised within the last few years ; but since it has been, the success attending treatment has been greatly augmented.

The following case is illustrative of the value of the principles we are contending for. Mrs. —, æt. about 40, came under my care under the following circumstances. When young, she was said to have had phthisis, but she had had a family of children, and of this there was now no trace ; after each confinement with boys she had a severe mental dis-

order. She had, however, been free from such illness during the last six or seven years. At the time I saw her she was pregnant, as she thought, for about seven months, and her husband feared that an attack was imminent. She had been capricious in manner for four or five months, and after a few weeks of great and overpowering drowsiness, she began to suffer from total want of sleep. She was apparently in a state of good bodily health, for the functions of all the organs seemed to be properly performed except that of the brain. The treatment adopted was the following :—Opium and Indian hemp were used the first night to procure sleep, but, proving useless, narcotics were abandoned. The patient was directed to have a warm bath daily, and during the time of immersion to keep the head cold by a large sponge. Half drachm doses of tincture of the sesquichloride of iron were given three times a day. An hour's walk was prescribed as well as carriage exercise, a good diet, and as complete mental repose as possible. In less than a fortnight she was perfectly well, far better indeed than she had been for years. After the confinement she continued well, though the infant was a boy ; and she had no return of the mental disorder for two or three years. It then came on in consequence of prolonged lactation, but with returning bodily health came a restoration of mental vigour.

Mr. M., æt. 25, a surgeon to a dispensary, whose duties were very heavy, came to consult me for some symptoms which had long preyed upon his mind ; they turned out to be purely myalgic, and this knowledge gave him mental relief. But with this relief no repose came : on the contrary, he was now threatened with insanity. The mind chiefly gave way after the day's work was over, and the evenings were miserable, the nights sleepless, and fearful thoughts, propensities, or horrible dreams harassed him per-

petually. I recommended as generous a diet as his purse could buy, steel and cod oil for tonics, and an opiate at night.

In six weeks he recovered perfectly.*

The influence of debility on the mental nervous system may readily be recognised in old age, in chorea, in typhus, and other fevers, and, we may add, in hysteria.

The way in which the *sensitive nervous system* is affected by diminished vital power in the brain is extremely interesting. We will take a few examples.

From over-lactation, the sight becomes impaired, and in some instances completely lost. A similar result occasionally follows from loss of blood, excessive venery or other exhausting discharges, and penury.

* In cases of mania, it astonishes us to see what an amount of food is required to prevent the patient dying of exhaustion, and to note the calming effect produced by abundance of generous food. Though Dr. Conolly has already called attention to this, I venture to give the substance of a conversation I had lately with a non-medical proprietor of a Lunatic Asylum, whose memory carries him nearly fifty years back. "When first we had these cases" (mania), said he, "the medical plan used to be, to prescribe venesection, tartar emetic, and low diet, to calm the excitement; but the patients got worse instead of better, and died suddenly from exhaustion. Then opium alone was tried in large doses, but it did more harm than good. We now treat our maniacal cases with abundance of food, six or seven meals a day of mutton chops, beefsteaks, porter, wine, &c., and it generally sends them to sleep in thirty-six hours or two days. They can't stand out against the food; it regularly knocks them down, it calms them completely, and we rarely now lose a case."

I was at the time attending a patient in the establishment, and noticed that the symptoms were aggravated whenever the intermission between meals was of two hours' duration instead of one, or the stomach rejected the supply. In spite of the amount of food administered (it was all liquid), the patient became thinner and weaker; and when he died, at the end of a fortnight, he was emaciated to an extreme degree.

From simple debility an individual has other affections of the sight, less severe than total blindness, such as *muscæ volitantes*, or the idea of a bar across the visual organ, cutting off the upper or lower, right or left half of everything looked at. One patient of mine, who had been much exhausted by nursing a dying brother, used to have this symptom whenever she was faint and low, and it was immediately dissipated by a glass of wine.

Sometimes the seeing power is entirely depraved, the patient being unable to see what is really before his eyes, and thinking that he sees something entirely different. This phenomenon is evidently present in those cases where ocular spectra are seen ; and it is to be noted, that ocular spectra are very frequently attended with aural delusions.

Sometimes, though rarely, the sense of smell is affected, and that of taste in the same way. The hearing is affected more frequently than the preceding, and the patient complains of ringing, buzzing, singing, or other noises in the ears ; or it may be, that he is simply deaf ; or as very commonly happens, the hearing is preternaturally acute, and sounds which once were pleasant to the ears become painful in the extreme.

Common sensation also comes in for variation, as well as the special senses. The patient has sensations rarely felt before, and these are spoken of as being itching, stinging, tearing, stabbing, creeping, or they are described as numbness, weakness, heat, fidgets, uncomfortableness, or even pain. In some individuals in whom the vital powers are very low, as in coma, common sensation and all the special senses seem to be absolutely gone. The patient is unconscious, not only of what takes place around him, but of those calls of nature, which, under ordinary circumstances, are too imperative to be neglected. The urine accumulates in the

bladder without provoking it to contract upon its contents, and the fæces pass through the sphincter ani without the smallest opposition.

The influence of weakness on the *muscular nervous system* is one of vast importance; the more so, inasmuch as what are in reality marks of debility have been regarded in a very different manner.

Without recapitulating what we have said about the circumstances under which debility is certain to be present, we may shortly say, that it shows itself in infants and young children by false croup, convulsions, or infantile paralysis; in elder children by chorea, twitching, muscular rigidity; in adults by epilepsy or epileptiform attacks; in women by globus hystericus, hemiplegia, paraplegia, local palsies, &c.; in the wounded by tetanus; in the aged by paralysis agitans; in the dying by subsultus tendinum, irregular pulse, and frequently by general convulsions.

Convulsions commonly attend sudden losses of blood, and tetanoid spasm is seen where there is softening of the brain.

The *organic nervous system* is also influenced by debility; but we cannot so well demonstrate the fact, as we do not know accurately how far any organ can act in a living man independent entirely of the nerves. Thus we say that the brain influences the heart's action; daily experience proves that it is so, and yet the heart will go on beating in the lower animals for a long period after it is separated from the body. Without then daring to speak in any other way than suggestively, we say that organic nervous debility is shown in excessive and uncontrollable lachrymation; in enfeebled respiration, palpitation of the heart irrespective of exercise; in a vitiated condition of secretions of milk, gastric juice, bile, and urine; in the ready sloughing so common in typhus;

in the production of jaundice, hæmaturia, enuresis, abortion, impotency, palpitation, and the formation of poisonous milk under the influence of anxiety of mind, fright, and the like. We may also adduce the frequency with which disease of the brain induces vomiting in children, and how giddiness from revolving, or from the tossing of the sea, will produce the same effect.

But as we stated at the commencement of this chapter, these divisions of the nervous system are only arbitrary ones, and we may therefore reasonably expect to have more than one division affected at the same time. We see this well exemplified in insanity—a disease in which all the nervous functions are affected more or less, in which with impaired mental power we have ocular spectra, aural delusions, vitiations of taste and smell, epilepsy, convulsions, palsy, secretion of ropy saliva, fetid breath, curious port-wine-coloured urine, peculiar bile or fæces, and the like.

The same is seen to a more limited extent in hysteria. The mind is weak, wayward, and even diseased; there are disorders of common and special sensations; there are disorders of motion; and the skin, the throat, the salivary glands, liver, kidneys, and uterus, are all more or less deranged.

In epilepsy continued for many years, we have indications of disordered intellect and sensation. In chorea we have at times a mental prostration, amounting almost to idiocy; while in hydrophobia, it is difficult to say whether the mental, motor, sensitive, or organic nervous systems are most conspicuously diseased.

Respecting the influence which debility has over sleep, we need only say that it has long been a recognised fact, that exhaustion prevents sleep, but that it may, in some instances, especially with children, be attended with excessive drowsiness, even, as Dr. Gooch has remarked, amounting to coma.

This remarkable difference in effects, produced by the same causes, should never be lost sight of in medicine. We are far too apt to reason that phenomena which are essentially opposite in their character, must necessarily have an opposite cause—an argument the fallacy of which it only requires a careful attention to nature to refute. Thus, under the influence of hunger and privation, we have seen some individuals die quietly, as lime breaks down in water; while others die with a fierce storm of madness, which may be compared to the cooling of a red-hot cannon ball in the same liquid. Four persons in one ward may have mania, intense dyspnœa, fainting, and drowsiness, respectively, and yet all be suffering simply from pericarditis. In another ward one individual may be wandering about, muttering strange words or vague threats; another lying in bed, muttering words of unintelligible import; another may complain of intense headache; while another lies supine, heedless of everything, too weak even to speak aloud. How different their symptoms; yet all are alike suffering from typhus. We need not multiply examples.

2. What are the physical alterations which take place in the brain from deficient vitality?

In answering this question, we naturally turn first to the condition of the brain after death, or under other circumstances, when there can be no doubt that the vitality of this organ is gone, or is in a very low state.

If an individual has died suddenly in the midst of rude good health, his brain, as far as we can find, undergoes no physical change for at least twelve hours; with the exception of the circulation through it being gone, it has the same appearance as when, after an accident which has bared it, it is seen during life. This firm, healthy condition, however, does not remain long, for the mass soon *softens*, and at last becomes almost *diffluent*. When from any cause the brain

becomes gangrenous, it is equally softened. Case—A lad, 12 years of age, was struck on the head by one of the sails of a windmill; the parietal bones were smashed, but not driven in; the fragments were removed, and the lad lived about a week. At his death the whole of one hemisphere was in a green, fetid, gangrenous condition, and so soft as to be all washed away by a stream of water. The other hemisphere was very soft too.

Post-mortem softening, as is well known to anatomists, comes on much earlier in summer than in winter, a phenomenon accounted for by saying that general decomposition of the body is promoted by hot weather. In persons dying from accident, or in the midst of comparative health, [the time when the *post-mortem* softening begins is pretty constant. We will, for the sake of our argument, assume that the period when the softening begins is twenty-four hours, when the weather is cool and temperate. But we sometimes find in an individual examined twelve hours after death, that the brain is already in a very soft condition, and in some the same occurrence is noted even after a lapse of eight hours. Can we draw any other conclusion in these cases, than that the brain was from some cause or other in an *enfeebled* condition prior to death, and consequently it could not resist decomposition for so long a period? If this conclusion be true, we shall find this condition of brain common in those intense African and other fevers, where the vital powers seem to be completely prostrate. Practically we do so: we read in Dr. Robert Williams's account of the paludal poison—"The substance of the brain, especially in the dropsical cases, is so soft as hardly to bear the knife." Another observer, quoted by him, notices—"Some have found the brain and spinal marrow more soft than natural."

Similar observations apply equally to the plague, to putrid and adynamic fevers generally. Such simple softening is

common in strumous children, in whom the brain is to a certain degree dropsical; also in those dying with general dropsy, phthisis, diabetes, bronchitis, or any other exhausting illness.

In speaking of this, Dr. Copland remarks—"In pulmonary consumption and in chronic bronchitis, the brain is very commonly found softer than natural throughout, and this softness is the more marked, the more chronic the pulmonary affection has been, and the more complete the emaciation. May not this state be considered as analogous to emaciation of other parts, the molecules of matter removed by interstitial absorption of the texture of this organ being replaced by a serous effusion? In such a case, the density of the brain is actually diminished. Meckel states that he found a cube of six lines taken from the brain of a man dead of phthisis, one and a quarter grain lighter than the same bulk of a sound brain."

Nor is it uninteresting, in connexion with what has gone before, to find him quoting six different authorities, to show that the brain is unusually soft in fatuous persons, epileptics, and epileptic maniacs, and remarking that the brains of condemned felons are extremely soft, owing to inactivity, confinement, low diet, and possibly mental depression.

If, then, we find that the brain is unusually soft in those dying of exhausting diseases, and the softness is proportionate to the duration and gravity of the illness, have we not *primâ facie* reason for asserting that the disease called *ramollissement* is, in reality, analogous to a dying or dead condition of that part of the brain affected by it?

We shall see by inquiry into the circumstances which produce this disease that this assumption is borne out by experience.

It is clear that the vitality of the brain may be impaired by other causes than those operating upon the whole of

the body. Thus, for example, we know that the brain, like any other organ, will have its vitality impaired if the quantity of blood reaching it is materially diminished, *e. g.* by ligature of a large artery, such as the common carotid or the arteria innominata. A similar result would follow if any artery became plugged up by a clot of fibrine, dislodged by an aneurism, by an atheromatous fragment, dislodged from the aorta, or by some vegetations torn from diseased cardiac valves.

All these accidents have occurred repeatedly; and observers note as one of the most prominent of the results, a complete softening of that portion of the brain supplied by the injured vessel.

But there is another way in which any portion of the body or of the brain can be deprived of its vitality, viz.—by a change in the minute vessels, which may so modify their permeability as to prevent the due nutrition of the parts through which those capillaries run.

This change has only arrested attention during the last few years. Its essential nature consists in a degeneration and thickening of the wall of the capillaries, and at the same time a diminution of their calibre, so that the quantity of blood flowing through them is necessarily diminished, at the same time that the liquor sanguinis has greater difficulty in permeating their walls.

This change is not confined to the brain, but is common in the lower extremities, where it is occasionally the cause of senile gangrene. This diseased condition of the capillary vessels is generally associated with weak or fatty heart, atheroma in the aorta, and more or less calcification and brittleness in the cerebral arteries generally.

As this state of things is one generally attending upon advanced age, so we shall find that softening of the brain is far more common in the old than in the young. It is a

matter, however, of considerable interest to know, that a similar condition of the capillaries of the brain is not unusual in phthisis, and consequently that "*ramollissement*" is very common in that complaint.

These things being taken into consideration, there is no difficulty in concluding that softening of the brain is an evidence of diminished vitality, of incipient, approaching, or even present death of the portion affected.

It has, however, been objected to this view of the case, that *ramollissement* is of two kinds, red and grey, or white, and that while the latter indicates loss of power, the former indicates the reverse. It is well to examine the point.

At one time a general belief seems to have been entertained, that the presence of inflammation indicated an *excess of power*. Of late years, however, a new idea has gained ground, *i. e.* that inflammation is a process of unusually rapid nutrition without commensurate supply, and consequently that any part affected by it must necessarily be in an *enfeebled condition*. If this be true, and we have no doubt that it is, the presence of softening of the brain as a result of inflammation is at once accounted for, inasmuch as inflammation may deteriorate its vitality, quite as much as ligature of one of its principal arteries. The effect is practically the same, though brought about by divers means.

Whatever be the amount of the softening, whether small or so great that the portion resembles cream, it is to be noted that the softened portion consists of true brain tissue without the admixture of pus, and that the tubes of neurine have their walls so soft and distensible, that they will bear an unlimited amount of distension without rupture.

We have now arrived at the conclusion that softening of the brain indicates a deficient amount of vitality. In other words, we cannot have softening without there being impaired vital force generally or locally, or both.

The question next arises—and it is one of the utmost importance—Can the vitality be *restored* to the softened brain? and if so, by what means can it be effected? We answer the first question in the affirmative for the following reasons:—If it be true that *ramollissement* attends severe fevers and exhausting diseases, as a general rule, and if it be true that individuals with these complaints do frequently get perfectly well, surely we can come to no other conclusion than that the brain, although dying, may yet survive and regain its ordinary condition. When, however, the death of the cerebral matter is complete, we can no more hope for its recovery than we can hope to resuscitate a dead man, or restore vitality to a “slough.” There is a period within which the use of appropriate means may restore life and animation to a man apparently dead by drowning; but when once that period has passed, nothing avails.

But if the brain is to recover itself, in what way is it to do so? The means at our disposal are few; they consist solely in the administration of such things as we know are stimulating or exhilarating in their effects, such as alcohol, ammonia, and the like, and the attempt to stimulate locally by the application of large cantharidine blisters to the shaved scalp. It is by these means that the most hopeless cases of fever are frequently brought round.

There is, however, one point in the treatment of the earliest stages of softening to which we must call attention, and which necessitates some preface.

We have already remarked, that excessive use of any organ debilitates it, unless its nutrition is constantly equal to its expenditure.

Excessive mental emotion, then, or any other excess of brain work, has a distinct tendency to produce softening whenever the cerebral nutrition fails. Nutrition is noto-

riously impaired in the aged and the ill-fed, in those who are phthisical, in those under the influence of mercury, in those suffering from loss of blood, from privation, or loss of rest. We conclude, therefore, that excessive mental emotion, &c., will in certain individuals have a direct tendency to produce softening, and, if so, *mental repose* must form a necessary part of the treatment of *ramollissement*, whenever it is presumed to exist.

But simple softening is not the only condition of the brain arising from deficient vitality. The same state of things which, when operating on the *tissues* principally, brings about their softening, when it operates chiefly upon the *walls of the vessels* themselves, brings on loss of elasticity, brittleness, or softness ; and thus there is tendency to rupture from trifling causes and consequent effusion of blood. The intimate connexion between cerebral hæmorrhage and softening has long been surmised, but their mutual dependence upon the same set of causes has only been recently demonstrated. One may precede the other, or either may occur alone.

There are other evidences of deficient vital power in the brain besides those we have enumerated, such as the existence of tubercles in some form or other, the replacement of healthy brain by serum, either internally or on the outside.

Now we have already called attention to the very interesting fact, that the process of dying is in many instances a very *painful* one, and we have been attempting to show that softening of the brain, &c., was an evidence of its death ; we naturally, therefore, inquire, Whether *ramollissement* and other marks of a dying condition of the brain are preceded by *pain* ? There is great difficulty in answering the question absolutely, on account of our limited knowledge ; but this we do know from experience, that those fevers in which the

brain is found much softened after death are commonly ushered in with intense headache ; that headache, in a very severe form, is a common accompaniment of great debility and loss of blood ; that severe headache often precedes both cerebral hæmorrhage and softening ; that *fasting* will produce a headache which *food* will cure ; that intense mental exertion is commonly followed by pain in the head ; and I may add, that the most violent and long-continued attacks of headache which I have met with, were, (1) In a case of simple softening of portions of grey matter on symmetrical spots on each side of the brain ; (2 and 3) In two cases of phthisis, in which after death the brain was found much shrunken, and the cerebral matter was replaced by serum. These considerations lead us to believe, that *headache may arise from incipient death of the brain*, and so be analogous to the pain following the use of caustic. That headache has many other causes there is no reason to doubt.

At any rate, may we not draw the conclusion, that headache, with symptoms of softening, or as they are sometimes designated, premonitory signs of apoplexy, do not necessarily imply the presence of unusual or dangerous quantity of blood in the brain, or the existence of inflammation, and that they may, and we may add generally do, imply only that a part is beginning to die and is not yet dead ; a result, however, which may happen should the supply of blood continue to be inadequate, and its vitality continue to be low ?

CHAPTER VIII.

DEGENERATION OF CEREBRAL VESSELS.

Degeneration of cerebral vessels—Its significance—It implies debility—Effects of degeneration—Deductions—Cases in point—Water in head—Its victims—Deductions—Cases in point.

It cannot fail to have been noticed that the word *degeneration* has been used by us; the same word is equally used by other authors who have spoken of the changes in the blood-vessels of the brain and of the brain itself in cases of cerebral hæmorrhage and softening. Few can doubt that the word has been selected because it expresses distinctly the fact, that the alteration is attended with decay of physical attributes and physiological functions. The quality of the new material is in every way *inferior* to that which it replaces. *Degeneration, then, necessarily implies diminution of constitutional or systemic vigour*; for it is clear that imperfect vital products cannot proceed from perfect vital power. *Degeneration is the result of constitutional, local, or acquired debility.* Assuming, as we have every right to do, that this proposition is unassailable, flanked as it is by the whole history of struma, tubercle, Bright's disease of the kidney, fatty liver, fatty heart, &c., let us examine the influence it would have upon practice.

It is clear that if degeneration is the result of debility, it will be accelerated in its march by anything which reduces

still farther the vital power. It is equally clear that if the progress of degeneration in cerebral softening is to be arrested, it can only be done by sustaining the constitution; and that if anything can be effected in cerebral hæmorrhage to promote a return to a healthy state, it can be effected solely through the instrumentality of the systemic forces. These points once established, it follows that the plan of treatment often resorted to with a curative intention, is the one of all others the most calculated to increase the gravity of cerebral disease. If we look over the once standard work of Dr. Abercrombie on the diseases of the brain, we can find out many a case in which the threatenings of apoplexy have been converted into the real disease by blood-letting. A case is recorded by Dr. Watson, in his Practice of Medicine, to illustrate how a *clot* may be the precursor of cerebral softening, but he makes no note of the possibility that the latter was produced or accelerated by the profuse bleeding which had been adopted for the cure of original apoplectic attack.

The following case, communicated by a medical friend, will, in addition to those I give subsequently, well illustrate the difference between a philosophical and routine treatment. An elderly lady had an attack which she feared indicated an impending fit of apoplexy. The signs were unmistakeable to the surgeon who saw her for the first time. But she was pale, weak, and badly nourished. He argued—"If I am to do any good here, it will be by giving the patient strength, not by abstracting it." He gave a mild alterative at night, and tonics the next day, and recommended a generous diet. His plan was eminently successful; the patient was perfectly well in a week. On a subsequent occasion she had a similar attack, and an old practitioner was called in, whose talents and experience were considered first-rate. He, too, read the symptoms as threatening an attack of apoplexy, and,

in accordance with established rule, he abstracted blood by leeches, and administered purgatives. In two days his patient was dead of the very disease his treatment was intended to avert !

Dr. Watson's lecture on this subject gives an instance in which apoplexy was supposed to be induced by cupping ; but though he does not agree with the deduction, any one who reads his remarks with due reference to the foregoing observations, will see that the conclusions of the patient were, in reality, more logical than those of the physician.

If the ideas we have started be true, we should anticipate finding a close relationship between debility, phthisis, cerebral hæmorrhage and softening, atheroma, and other cachectic diseases. Practically we do so.

If we turn to Andral's "*Clinique Médicale*," we find twenty-seven cases recorded of softening of the brain. Six of them appear to have been simple cases of debility, with head symptoms, consequent on a deficient circulation. They were treated with general and local bleeding, blisters, and purging, and the rapid result was paralysis and death. In nine cases no history is given. In four there were tubercles elsewhere, in ten extreme debility, in four disease of the heart. Seven cases out of the twenty-seven were in persons over seventy years of age,—in which the occurrence of atheroma is pretty constant.

In five fatal cases of cerebral congestion, three had phthisis, two atheroma and disease of the heart. In two instances the fatal result seems to have been brought about by bleeding, leeches, and purging.

In sixteen fatal cases of cerebral hæmorrhage there was no history with two ; in eight cases there was disease of the heart and strong analogical proofs of atheroma ; in the other

six there was great debility, anthrax, carcinoma, &c. ; five of the cases were bled profusely : and *in all the bleeding seemed to accelerate the fatal result.*

On referring to the notes I have of twenty-five fatal cases taken some years ago, I find that seven had phthisis, five cachexia, three disease of the heart or arteries ; the rest had had gout, rheumatism, flooding, Bright's disease, and bronchitis ; two had delirium tremens, one gangrene, one typhus treated by bleeding and mercury, and one excessive venery.

The following is a good illustration of the influence of the depressing effect of purgatives in diminishing the vitality of the brain, and augmenting the degeneration of which we have spoken :—

Case I.—Mrs. N., æt. 45, occasionally addicted to spirituous potations, and of a stout but bloated appearance, suffered occasionally from attacks of giddiness and confusion of the head. This was attributed either to the liver or the stomach, and she was in the habit of taking freely of aperient medicines. She frequently suffered from flatulence. One day her bowels had been unusually purged ; she had had a considerable amount of exertion ; had taken a somewhat flatulent dinner ; after tea she went out to walk, and was seized suddenly with all the signs of profound apoplexy. Her husband, who was with her, administered brandy and water, and she soon revived. I saw her in consultation the next day ; she was free from paralysis, from headache, or any other remains of the attack than an indefinite dread of another. There were abundant proofs of a fatty or otherwise debilitated heart. I strongly urged the necessity for a tonic plan of treatment, but was assured that the patient was so fidgety about the bowels, that if aperients did not form part of the treatment, they would certainly be privately adopted, and our advice be slighted. I reluctantly

consented to the plan, and compound infusion of senna was given, with a large proportion of infusion and tincture of gentian. I did not see the patient again; but I was told that the medicine operated every day five or six times, and that about a fortnight afterwards the patient had another and a fatal attack of her disease. There can be little reasonable doubt that the depressing effect of the purgatives hastened materially the degeneration of the cerebral vessels, and brought about the very disease they had been employed to ward off.

The first few of the following cases show the importance of a tonic plan of treatment, both in warding off apoplexy and encouraging the cure of hemiplegia when present:—

Case II.—Mrs. J., aged 45, stout and florid, and a tolerably large feeder, complained of pain in the head, confusion, temporary loss of sight and power, and frequent attacks of vertigo. These came on from walking uphill, or upstairs, from suddenly turning the head, or moving round a corner. She had never fainted. The bowels were costive; the tongue clean; pulse 80, natural. Quiet and tonics were recommended, and nothing more. Twenty years have since elapsed, and she has had a great many repetitions of the same set of symptoms; but experience has shown that the attacks result from mental agitation only, favoured by debility. She is now in perfect health.

Case III.—Mr. B., aged 40, of short, stout build, and florid complexion, consulted me respecting threatenings of apoplexy, from which he had suffered some months. I ascertained that both his father and grandfather had died of that disease at an early age—45 and 50; that he himself was subject to vertigo, confusion of the head, and double vision; and that occasionally the room in which he was lying appeared to be turning round always in the same direction. He fre-

quently had headache, bilious vomiting, and transient loss of memory. His pulse was regular, 70, but rather feeble. The tongue was curiously chapped, and its mucous membrane thickened. The bowels were regular; the appetite was indifferent; and digestion imperfect. I ascertained that he was in an exciting business; that he was unable to eat much at breakfast, but was in the habit of taking stimulants from time to time subsequently to enable him to get through the day till dinner. He then ate sparingly, and took very little wine. His attacks came on usually in the afternoon, but were commonly relieved by lying down, by vomiting of bile, or by brandy and water. At the time of my visit he had had a more severe one than usual; he was unable to sit up without vertigo, and even when lying down the room seemed to be turning. The pupils of the eye were large; and a close attention detected both eyeballs in constant circular motion on their axis—a movement of which the patient was unconscious. The sounds of the heart were natural, but very feeble. I considered the case to be one of mental agitation and worry, combined with a weak and possibly a fatty heart. I recommended tonics and a generous diet, and had the satisfaction of soon recognising a great improvement. A week or two afterwards, a relative of his informed me that he had suspended payment, which fully accounted for the symptoms which I had attributed to mental emotion.

Case IV.—Miss B., aged 30, came under my care for extremely disagreeable symptoms, which led her to anticipate a more serious attack. She suffered from distressing vertigo, and had on several occasions nearly fallen down stairs; she had, when mounting them, frequently to stay and rest for support on the banisters. She had singing noises in her ears, confusion of head, and loss of memory occasionally; but what gave her most trouble was, that when reading, writing,

or drawing, she would suddenly lose her vision. She could see the first half of a word, but not the last; half a picture, but not the whole. This would last for an hour, and then go away. The animal functions were all correct. She was extremely active, and of strong good sense; but she had exhausted herself by nursing for five weeks with unremitting attention, both by day and night, her mother, to whom she was devotedly attached. Her rest had been of course greatly curtailed, and her appetite had failed entirely. Fortunately, her charge had now improved in health, and her anxieties diminished. I readily induced her to take some quinine, and at least three glasses of wine daily; and was soon gratified to find that all her troublesome symptoms had left her. But it was not without interest that I learned that on one occasion she had gone shopping without taking wine or other refreshment. She was out for a long time, and when she returned home, and mounted the stairs to her own room, she had the sensation of an opaque bar placed right across the eye. This went away as soon as she had lunched and had her wine. Singularly enough, her mother, whom she had been nursing so long, complained of a similar symptom the first day she ventured out for a drive—the exertion proving to be beyond her strength. It soon went off, however.

Case V.—Mr. C., aged 47, of red, bloated countenance, and weighing nearly twenty stone, with harsh, husky voice, was supposed to be threatened with apoplexy. He was very drowsy, slept heavily, and snored almost as if comatose. There was mental confusion and headache. For the last week he had been on low diet, and had taken aperients, but was steadily getting worse. The pulse was feeble; the heart's action weak. He was ordered a generous diet and full doses of liquor potassæ. He felt relief in half an hour after the medicine, and was as well as usual in four days.

Case VI.—Mrs. B., aged 65, of pallid complexion and spare frame, consulted me for confusion and dizziness in the head, which had come on suddenly, and such an amount of thickness of speech that it was with difficulty I could understand her. She could not protrude the tongue, but there was no other sign of paralysis; the pulse was quiet, about 80; and the bowels were regular. She was strictly temperate. As this was her first attack, and she had a great dread of apoplexy, it unnerved her considerably. I prescribed quiet and a stimulating tonic. She soon recovered. Since then she has had many similar seizures, but is always able to trace them to mental emotion or bodily fatigue. She has recently borne a severe illness, in which she has taken large quantities of brandy, opium, and wine, without any recurrence of the cerebral symptoms.

Case VII.—Mr. I., aged 56, complained of pain and confusion in the head, pain in the right forearm, and inability to read or write more than a few lines without all the letters appearing to run into one. He had previously had two attacks of regular gout, the last of which had been very severe and protracted. He was of stout build and great activity, and lived freely, but the complexion was pallid. The pulse was 60; the appetite indifferent; the bowels were regular; his sleep was disturbed. I ascertained that he was much harassed by business, peculiarly distressing to his feelings, and that he was depressed in consequence. I found out accidentally that the confusion in reading or writing was due to the want of spectacles. The pain in the right arm I could not explain. The treatment was as strengthening as possible; and, as the mental emotion diminished, the symptoms subsided too. Ten years elapsed without any return. He then died from pure debility.

Case VIII.—John S., aged 45, a seaman, of robust ap-

pearance, was admitted into the Liverpool Northern Hospital with hemiplegia. He was unable to articulate more than one or two words, but seemed to understand what was said to him. The face was drawn slightly ; but the loss of power in the arm and leg was complete. He was treated simply by a solution of chloric ether as a gentle stimulant, and full diet. No other medicine was given. He rapidly and steadily recovered ; in a week he was able to converse and move the leg ; in a month he could walk and move the finger ; and at the end of six months he could raise his arm above his head, and walk with an almost imperceptible limp. He told us that prior to his attack he had had pain in the head for six weeks ; that he had been taken suddenly by the fit, and had been perfectly unconscious for nearly two days. There was no disease of the heart. From the first day after his admission, improvement was perceptible and continuous. Nor have I ever seen a bad case in which it was so rapid and complete. He subsequently left the Hospital for the workhouse : the diet there being less generous, he lost power in the arm to a great extent in less than a month.

Case IX.—James S., aged 35, a seaman, was admitted into the hospital with hemiplegia and loss of speech. We got no history with him, beyond that he had just come from sea and had been ill some time. He looked very much “out of condition.” He was ordered aperients every three or four days, and five grains of quinine three times a day, with a generous diet and wine. In four days he was able to tell us that he had been much exposed to cold and wet, and had had very insufficient food. The attack had come on suddenly ; but he had not been insensible at any time. In ten days the paralysis had left him, and he was able to walk about the wards. In a few days more he went away of his own accord. There was no cardiac disease.

Case X.—A German seaman was brought into the hospital, with whom I was unable to converse. The junior house surgeon, who spoke German, informed me that the man could only say a few words, with which he answered all questions. He seemed a strong, burly man, with a coarse deep red face, aged about 45 or 50. He was hemiplegic, but his face was not drawn. The pulse was natural. He looked, however, as if he had met with much hard usage, and I ordered him quinine and occasional aperients, as in the former case, and full diet, with wine. In a few days he spoke intelligibly ; and at the end of the week was able to walk about the ward. In three weeks from his admission he was discharged cured.

Case XI.—William J., aged 35, an engineer, was admitted with incomplete hemiplegia. He was a strong-built, large-boned man, but had a pallid complexion and dilated pupil. His account of himself was, that he had been working much amongst machinery, and had been exposed for hours together to cold wind, chiefly on the affected side—the left. The attack had commenced a fortnight ago, with a feeling of numbness running up the arm ; and when he awoke the next day, he found himself unable to stand, or to move the left hand. The heart was healthy, and the pulse natural. From deference to “authorities,” I commenced the treatment with mercury, but with strict directions to the house surgeon to administer quinine if the medicine should seem to have a depressing effect. In two days I found the first indications of improvement. The mercury (a grain of calomel) had acted strongly on the bowels and depressed him considerably, and the dose administered was then reduced to half a grain twice a day ; quinine had at once been adopted. The mercurial was still further diminished the next day ; the quinine continued and wine prescribed ; in two days more the mouth

was faintly sore, and motion had returned to the hand. Up to this time, about five grains only of calomel, combined with opium, had been taken. It was now entirely suspended, and in three days more the gripe of the left hand was nearly as strong as that of the right. The tonics were continued, and in a few days more he was able to leave the house.

Case XII.—John C., aged 40, labourer, addicted much to intoxication, was admitted into the Northern Hospital, on November 1st, under the care of one of my colleagues, with a stab-wound at the outer angle of the scapula. It had penetrated through the bone and wounded the lung. There was considerable external bleeding, and a little hæmoptysis. Next day he was found to have lost the use of the arm on the same side. As it was clear that the wound could not have injured any nerves supplying the arm, the paralysis was attributed to loss of blood. No treatment was adopted specially directed to the loss of power, as there was no indication to point out the condition of the nervous system on which the phenomena depended. In two days sufficient strength had returned to the arm to enable him to move the fingers close to the hand and flex the arm. At this period he began to perspire freely, and to have other appearances common to men who have drunk hard and lost their usual stimulus. There were no signs of delirium tremens from the first. Alcoholic stimulants were now used, and the patient has steadily recovered up to the present time.

Case XIII.—Mrs. Y., a hale old lady, with a rubicund countenance, applied to me for advice, five years ago, under the following circumstances :—She had had a paralytic attack six months previously, which had left her right side weak. She had ever after suffered from headache after excitement, confusion of ideas, vertigo, occasionally loss of the articulating power, transient blindness, &c. The heart's sounds

were healthy but feeble, and the circulation, as tested by the pulse, was languid ; the bowels were regular ; the digestion good. She had recently been travelling, and was then on a visit to some relatives ; and I learned incidentally that she was as young in energy and spirits as she was old in years. She was perfectly temperate. Her symptoms had been aggravated since her journey, and she felt obliged to be accompanied by an attendant lest she should fall in the streets. She naturally feared another apoplectic seizure. A careful inquiry elicited that she was always better after dinner than before ; that a glass of wine revived her ; that the recumbent posture relieved her ; and that she was always worse after fasting, low diet, and purgatives. I recommended quiet as far as possible ; quinine for a few days, and as generous a diet as was compatible with comfort. She followed my directions closely, and I had the satisfaction of ascertaining, a few weeks ago, that the anticipated fit had not come on. She was, however, liable to a threatening whenever she was unusually tired—after diarrhœa—after any anxiety of mind, or any other depressing agency.

Case XIV.—C. R., aged 48, seaman, who had led a very dissipated life, was admitted into the Northern Hospital with phthisis. He was emaciated, pale, and exsanguine, and had a considerable cavity at the apex of the right lung. Shortly after his admission he complained of headache, referred to the left parietal region, and a curious sensation down the left arm. He slept indifferently, and had no appetite for food. The pulse was 80, and very weak. He appeared to benefit for a time under the use of tonics ; but the headache gradually increased in severity and precluded sleep entirely. At the end of a fortnight paralysis of the left side of the face was noticed, and next day of the arm ; but as the man was very deaf, we had great difficulty in ascer-

taining the extent of the mischief. Two days after a moaning coma set in, and terminated fatally in a few hours. *Post mortem*.—Head alone allowed to be examined. Brain contained less blood than usual. A considerable amount of serum existed on the surface of the brain, lying between the convolutions. The ventricles were large, full of serum, and their floors marked by large veins, which were full of blood. A small cyst, about the size of a kidney bean, was attached to the posterior part of the falx. It was found to be of a fibrous structure, and contained many small fragments of a bony matter, which were formed in honeycomb-like cells on the inner surface of the cyst. The arteries were almost universally degenerate; the brittle degeneration being more common than the atheromatous. On turning the cerebrum so as to examine the base, we saw at a glance that one crus cerebri, the right, was softened. The softening extended to the upper surface of the locus niger. The left crus cerebri was very firm, and the rest of the brain, though soft, was healthy.

Case XV.—John T., æt. 45, had phthisis; became delirious at an early stage, and died comatose on the fourth or fifth day of the cerebral attack. The optic thalami and corpora striata were found softened.

Case XVI.—Mary S., æt. 20, had signs of incipient phthisis; she died after a few days' illness from cerebral symptoms. The lungs were everywhere studded with miliary tubercles. The corpus striatum on one side was diffuent, and the optic thalamus softened.

Case XVII.—Mr. J., æt. 30, a clerk in an office, of consumptive parentage, had syphilis; took much mercury, and was obliged by his pecuniary circumstances to live low; he had an attack of imperfect hemiplegia. Everything was now done to improve his health, and in about three months the

side was well. He then returned to his abstemious mode of living, and the other side became partially hemiplegic, sensation being chiefly affected as at first; a return to his tonics brought him round again.

Case XVIII.—Mr. B., æt. 58, merchant, short, stout, florid, and very healthy-looking, complained of weakness in one leg and thigh, numbness in the arm, confusion in the head, with loss of memory, and thickness of speech. He had had an apoplectic attack twelve years before. His apparent fulness of blood at first suggested the propriety of taking away blood, and using low diet; but on ascertaining that he had been “worried,” and anxious in business, had lost his appetite, and been purged, I recommended, instead of the antiphlogistic regimen, steel, quiet and generous diet. He got no worse,—soon improved,—but six weeks elapsed ere the weakness left the side. He remained perfectly well for nine months; then had diarrhœa, which was speedily followed by an attack of apoplexy, fatal in four hours.

Case XIX.—Mr. G., æt. 58, always temperate, and constantly out of doors, began one winter to complain of cramps in the legs, cold feet, languor, loss of appetite, and debility. After a day's exposure to cold he became suddenly hemiplegic. For this he was purged every two days, and kept low, as his appearance and pulse seemed to indicate fulness of blood. He seemed better on the second day, but then got steadily worse; I then saw him for the first time. Considering that the vital powers were at a very low ebb, the most vigorous efforts were made to restore it, by administering as much tonic medicine and stimulants as could be borne. The improvement was rapid at first, and has steadily gone on, though he can scarcely yet, eighteen months after the attack, move the arm freely.

Case XX.—Joshua B., æt. 56, coachman, a large burly

man, and strictly temperate, almost a teetotaller, had a sudden attack of apoplexy, in which he remained insensible for some hours. He was seen by two surgeons in succession : the first cupped him without any advantage, the second bled him from the arm ; and while the blood was flowing, the senses returned. He then found that he had totally lost the power of the right side, and of speech. In this condition he remained for six weeks without a shadow of improvement. I was then requested to see him. I recommended steel, and other tonics, and gave him alcoholic and other stimuli ; the man began to mend in a week, and in three months could walk, talk, and use his hand and arm.

Case XXI.—Mary S., housemaid, æt. 28, of consumptive parents, and always delicate, had an attack of small-pox, which left her unusually weak, and her pecuniary means being low, she lived very indifferently, and became very feeble. Six weeks after the small-pox, she had an attack of hemiplegia, involving the face and the whole of the left side of the body. She now came into the Liverpool Northern Hospital. She was treated with tonics, and immediately began to improve ; but no medicine had a perceptibly good effect for longer than ten days, and a constant change was therefore requisite. I used in succession steel, quina, cod oil, bitter tincture, aromatic tincture, and carbonate of ammonia. She went out well at the end of three months.

Case XXII.—Miss K., æt. 45, short, of very florid complexion, inclined to stoutness, but strictly temperate, and of very active habits, consulted me for singing in the ears, giddiness, a strange fulness about the upper part of the throat, and numbness and loss of power down the right side. She was afraid of apoplexy, as an elder brother had had an attack, and still suffered from fits ; there was occasional headache, and sleep was irregular, and there was occasionally mental

excitability. The animal functions were all correct. The propensity to cerebral hæmorrhage or softening was tolerably well marked in this case, and the countenance might well have seemed to warrant bleeding or aperients. But the lady's sisters were all delicate; she herself was conscious of debility, and was always comfortable when on the sofa. A tonic plan was adopted, but for a long period no improvement was visible. Change of air was resorted to with immediate benefit, and in three months the patient had recovered perfectly.

But the observations we have hitherto made do not apply solely to cerebral hæmorrhage or softening—they are equally applicable to “water in the head;” a disease in which, from the history of the sufferer, there can be no doubt respecting the deterioration of his vital power.

When this was looked upon as indicating inflammation, and increased action, the plan of treatment was necessarily depressing, and antiphlogistics formed the staple resource. A very short experience, and reasoning from analogy, led me to believe this treatment was totally wrong, and I was led to adopt a plan entirely of an invigorating character. The result has been well marked: instead of finding hydrocephalus now to be a fearfully formidable disease, I find it quite as tractable as any other strumous affection, and the mortality to be not more than about ten per cent.

This has been brought about, first, by recognising threatenings of brain disease at an earlier stage of the complaint than was formerly considered possible; secondly, by paying strict attention to the smallest departure from health; thirdly, by avoidance of all depressing remedies, especially purgatives; and, fourthly, by using steel, change of air, and other tonics.

The importance of these points may best be manifested by

the history of a family that has come under my immediate care. The eldest boy had an attack of water in the head when about 3 years old ; he was then extremely delicate, and change of air was prescribed. He greatly improved in consequence, and the cerebral symptoms left, but diarrhœa came on after a time, and he had in succession tabes mesenterica, abscess in the metacarpal bones, and strumous ulcers of the skin. The second, æt. 2 years, a handsome lad, with a large head, died of water in the head, which came on so insidiously that it was not recognised till too late. The third, a fine girl, æt. 18 months, had the first signs in July, and continued slowly to get worse in spite of treatment and change of air, until November, when the case was considered hopeless. She then was taken to London : no medicine was used ; improvement began at once, and in six days she was well. On the seventh day, however, two glandular swellings appeared on each side of the neck ; they suppurated, and other abscesses have followed, but head symptoms have not returned. The fourth and fifth children escaped the disease, but were very delicate.

By a careful attention to the preliminary signs, now readily recognised by the friends, when the sixth child, æt. 2 years, was affected, not a day was lost ; previous experience had decided which was the best locality for the child to go to, and it was taken at once. In a week the symptoms disappeared, and a continuance at the sea-side seemed to re-establish her health.

On her return to town, however, she began to droop again ; and while suffering from smart diarrhœa, she was attacked in succession with vomiting, insensibility, and convulsions.

I found her with the head extremely hot, and the face and body quite cold ; she was insensible to external impressions, and in faint general convulsions. Taking the previous

history into consideration, I simply applied cold water to the head and administered a "whiff" of chloroform every few minutes. In an hour she was able to swallow, and took wine and water with a relish—this was continued every hour. In twelve hours all the symptoms had left her, and she slept naturally. Next morning she appeared well but languid. Change of air was again resorted to, and she went to New Brighton. But she became worse during her stay, and began to scream with sudden headache; she was then sent into another part of Cheshire in an almost hopeless condition. The air, however, suited her, and she rapidly and steadily improved. Six weeks have elapsed since the last change, and she has become much heavier in weight, firmer in flesh, and buoyant in spirits, and the head seems quite well. In this and all the other cases occurring in the family, dentition has had no connexion with the manifestation of the disease.

In another family, where the mother died of phthisis, one child, *æt.* 7, died after a few days' illness; and both the others, now *æt.* 5 and 9, were affected slightly when about two or three years old; attention, however, having been aroused to the first symptoms, they were speedily cured.

Though not strictly within the limits I proposed to myself, this subject is sufficiently interesting to justify its expansion; I will therefore shortly sum up my experience of the complaint. The preliminary signs have first to be ascertained; they are these:—causeless (apparently) sickness, occasional nausea, *sudden* drowsiness, and as sudden awakening; flashes of feverishness, loss of appetite, and such *malaise* as would lead a parent or doctor to say, 'I can't make out what ails the child,' fretfulness, and frequent tripping when walking or running. The head is occasionally hot and burning, and generally large. The parents, one or both, have

some strumous or consumptive taint, or the child has had some depressing disease.

Analogy led me to consider the large head to be of similar origin to the large lip in struma. To test this, I measured the circumference of the heads of many patients at the commencement of the treatment : I found the head diminish in size as the child got well. The amount of the decrease in one case was one inch.

Amongst the poor, the plan of treatment was, at first, aperients and tonics, as I had been told that their combination ensured a good appetite and fair digestion ; but I soon found that purgatives,* even the mildest, lowered the patient's strength, and did harm, and the following, therefore, became the routine plan. For the hot head, and hot skin, cold or tepid sponging was adopted till the feverish heat left, full doses of tincture of the sesquichloride of iron were given, a great deal of rest in bed was ordered, with bread-and-milk and cream for diet. Amongst the better classes, change of air was recommended, with inunction of oil through the skin, an opiate to relieve excessive irritability, and beef tea, etc., in addition to milk—wine, ale, porter, or sweetened spirits and water if the child would take them. Since adopting this plan, I have only lost two cases, both of whom were far advanced in the disease before they came under my care; and I have had very many under treatment whose brothers and sisters have had the complaint, and succumbed under it.

* The fact that an acute attack of the disease is often determined by the occurrence of *diarrhœa*, ought of itself to indicate that it is unphilosophical to commence the treatment of hydrocephalus by calomel purges ; yet this is commonly done.

CHAPTER IX.

DEFICIENCY OF VITAL POWER IN THE LUNGS.

Deficiency of vital power in the lungs, &c.—Functions during health — Respiration—Its mechanism—Rhythm—Spirometer—Effect of debility upon muscles of respiration—Upon lungs, physically; physiologically—Increased secretion.

OUR next subject for inquiry is—How does deficient vital force affect the lungs, or rather the organs of respiration generally?

1. Functionally; 2. Organically.

As it is difficult and almost impossible to take the lungs alone and ignore the mechanism by which respiration takes place, we must include the effects produced on the latter as well as on the former in our inquiry.

Inspiration is, as we know, effected by means of certain muscles, whose business it is to increase the size of the thorax in various ways. The idea of *muscular action* implies the idea of *exertion*; but few of us ever think that *exertion* is required to perform a movement of which we are almost unconscious, one which takes place habitually in our sleeping as well as in our waking hours; and it is not until we see some poor sufferer fighting for breath in asthma, pneumonia, croup, and other diseases, that we give any attention to the subject.

A short clinical experience will enable us to gain some notion of the exertion put forth in ordinary respiration. Thus, if we place a man (or better still, a woman, because in the latter respiration is chiefly thoracic), who has had one lung destroyed by pleuritic effusion, on his sound side, we shall see that he raises his whole body at every inspiration, and this with little consciousness of discomfort, until the experiment has lasted some time. Taking the weight of the body thus moved at one hundred pounds only, it is tolerably clear, that the inspiratory effort is equal to raising one hundred pounds about the eighth part of an inch ; and as twenty-four inspirations commonly take place in a minute, the exertion per minute is equal to that put forward in raising one hundred pounds three inches ; and in twelve hours this exertion would equal that required to carry one hundred pounds up a tower sixty yards high.

This is the power required for ordinary quiet inspiration. When we come to consider the force expended in a very full inspiration, we find it estimated thus by Mr. Hutchinson, the inventor of the Spirometer :—"The introduction of seventy cubic inches of air into a chest of moderate capacity requires a force of 104 lbs. ; when one hundred and ninety cubic inches are forced in, the elastic pressure to be overcome is 326 lbs. ; when two hundred cubic inches are made to enter, the pressure rises to 452 lbs."—*Carpenter's Manual of Physiology*, 3rd edition, page 422.

So great an exertion of muscular power being necessary for inspiration, it is tolerably certain that deficient power in the muscles of respiration would show itself in some diminution in inspiratory power. Practically it does so. Thus, if any individual possessed of a spirometer will make a series of experiments upon his own person, and upon others whose habits he knows thoroughly, he will find that this instru-

ment will give a most sensible indication of the state of the general health. T. I., æt. 40, *after* an early dinner, could drive the index to two hundred and sixty cubic inches ; while, *before* the meal, he could not reach above two hundred and forty-five or fifty. The same man, after an attack of diarrhœa, could not reach above two hundred and thirty ; and, after an attack of influenza, with complete anorexia, he could not reach above two hundred and twenty. Another individual—female—could reach one hundred and thirty easily in the morning after breakfast, but only one hundred and twenty at night after the day's fatigue ; while during and after the catamenial period the index only reached one hundred and ten.

Mr. Hutchinson has himself called attention to the very low point attained by individuals in an early stage of phthisis, and he considers this an indication of an alteration in the physical condition of the lung ; but as it can readily be ascertained that an almost equal reduction takes place in cases of *simple debility*, we are justified in attributing the low figure *to want of inflating power*, quite as much as to diminished capacity in the part to be inflated. Nor is it uninteresting to see the grades of departure from the healthy standard : taking one table, consisting of fourteen cases, we have the following in cubic inches :—14, 16, 32, 40, 44, 50, 52, 66, 70, 78, 114, 145, 150, less than the normal standard.

That the spirometer proves the amount of inflating power rather than the capacity of the lung simply, is a proposition that admits of easy proof. We have already adverted to the varying quantity of cubic inches expired by the same person under varying circumstances ; we see the same result if an individual continues to exercise himself at the instrument for many minutes. At first the muscles are in good condition, it may be, and the inspiratory effort and the expiratory

one are prolonged to the utmost ; but if the individual continues to try to blow up the receiver higher and higher, he will find that, instead of doing so, the standard reached is lower at every effort. Why ? Not because his lungs are not as distensible and healthy as they were before, but because the muscles, whose strength he has been taxing, have become exhausted.

Of the weakness of the muscular system generally, in people of consumptive tendencies, a close attention to the subject of myalgia has long convinced me.

Again, it must be borne in mind, that the action of the respiratory muscles is more or less *rhythmical*, and consequently we should anticipate that there would be some marked alteration in rhythm when their powers were failing. That it really is so is seen in the common phenomena of sighing and yawning. The first attends all diseases of debility to a greater or less degree. It is a marked symptom in those who have suffered from loss of blood, and almost invariably attends severe uterine or other hæmorrhage. Yawning is a phenomenon of a similar kind : it is produced by simple fatigue, by loss of blood, by want of food, by the use of such medicines as emetics, nauseants, and sometimes by mercurials.

Another marked deviation from the natural rhythm of respiration, is that known as hiccough—a phenomenon depending upon irregular spasm of the diaphragm ; but as this is due frequently to some derangement of the stomach alone, we will not consider it here.

These are not, however, the sole deviations from the natural rhythm. The number of respirations in a minute may be unusually augmented or reduced. Thus, in cases of low fever, some have the respirations as high as fifty in a minute ; while in others they are as low as ten.

Nor is it without interest to stand by the bed of some dying patient, and watch how, as dissolution approaches, the breathing becomes more and more hurried, until it reaches a climax; how its rapidity then reduces, giving way to respirations long and deep, but occurring at irregular intervals; how these intervals slowly are extended, until the vital flame is kept alive perhaps by one inspiration per minute; and how, perhaps when all signs of life seem gone, one faint breath is taken after a long interval of quiescence—and then all is over.

Irregular breathing is, then, as much a sign of deficient vitality, as is sighing, yawning, and hiccoughing.

We have already adverted to the fact that inspiration is performed by the exercise of muscles of great associate power: this necessarily implies that they have a force to overcome. The physiologists tell us that a large portion of that force is made up of the elasticity of the substance of the lungs, and of the cartilages of the ribs; and practically we know that as soon as the inspiratory effort is over, all muscular action ceases, and we infer thence that expiration is not the result of muscular contraction, but is, so to speak, an entirely passive phenomenon. Now, as there is strong reason to believe that it is the elasticity of the lung which is the main agent in expiration, we assume at once that any departure from the healthy standard of expiration is due to some change in the elastic condition of the lung. We find this is really the case: for in phthisis, where the lung is being replaced by tubercular matter, there is "prolonged expiration" as an early sign; and in vesicular emphysema, where we find after death that the ordinary elasticity of the lungs is gone (as indicated by the non-collapse and sometimes even by the protrusion of the pulmonary organs when the thorax is opened), we have the patient often obliged to expire by a voluntary

effort ; and in this we can readily see one of the causes for the distressing respiration in cases of confirmed asthma.

In diseases of the lungs, it must be borne in mind, that efforts of coughing are necessary to keep them clear of the mucus, which would otherwise accumulate, and that deficient vitality in the muscles of expiration necessarily results in diminution of expulsive power, and consequent accumulation of secretion ; and we draw as a corollary from this, that it is quite as important to pay attention in croup, pneumonia, and bronchitis, to the "coughing power," as to the condition of the lungs themselves.*

In a future chapter, we shall show that deficient vitality favours increased secretion in the lungs, as elsewhere ; consequently, we have, in many instances, deficient cough power

* This observation seems to me to be of vast importance. In all the fatal cases of croup I have witnessed the children have died of debility, and a want of adequate respiratory power. The trachea was pervious, but its calibre was diminished, and an unusual inspiratory force was required to get the necessary amount of air through it ; but the lowering treatment adopted in the earlier stage of the disease had seriously diminished the power of the respiratory muscles, and when the demand came for increased exertion it could not be met. To speak metaphorically, the steam had been first "blown off," and when it was required to keep the machinery going, there was none available. In the same way patients with bronchitis die from deficient breathing and coughing power. Thus, A. B., æt. 45, a seaman, applied for admission into hospital for bronchitis. He had walked a mile up a gentle hill to the house. On his arrival he was sent up stairs. When he reached his ward, exhausted nature could do no more ; he was too weak to breathe, and he died in two minutes.

I have seen many instances similar to this, some in phthisical patients, others in elderly people, and others in individuals treated by antimony.

This can be the more readily understood when we consider that with diminished respiratory power there must be decreased circulating force in the heart, &c.

simultaneously with increased necessity for it. This is very apparent in the bronchitis of the aged.

The influence of deficient vitality upon the lungs themselves it is difficult to measure accurately. The first step in the inquiry is to ascertain the changes that take place in the majority of instances prior to dissolution, and the changes that are found after death ; then to compare these with what evidence we can procure from the stethoscope during the lifetime of those who are slowly dying by asthenia, or are suffering from any debilitating disease.

In standing by the deathbed of a dying individual, no one can fail to be struck with the secretion of mucus which takes place in the larynx and trachea, and which continues to increase until death ensues. This secretion appears to be entirely independent of previous pulmonary disease, and may be aptly compared to the cold and clammy perspiration which is commonly noticed at the same time. The secretion takes place in death by asphyxia, as well as in death by asthenia ; but it is rarely noticed when death follows syncope.

In examining bodies after death, in cases where that has been preceded by some very debilitating disease, and in cases where death has been produced by sudden or accidental causes, and comparing the lungs under these different circumstances together, we find in the former class that the pulmonary tissue is softer and much more permeated by fluid than in the latter, and that the quantity of blood contained in the posterior half is much greater than in the anterior half : and we infer, not only that the blood gravitates far sooner in the corpses of the weakly than in those of the strong, but that in the former case it is attended with an exudation of its watery parts into the air cells and small bronchi. We conclude, then, that in a dying lung there is an accumulation of blood in its most depending parts, and

an effusion of blood, or serum, into its air cells, and that the substance of the lungs is softer than natural.

Now as percussion and auscultation enable us to ascertain with considerable accuracy the presence of such a condition during life, we next inquire whether there is evidence of such a state of things in diseases attended with great diminution of the vital powers. We find that there is such evidence in fatal cases of croup and diphtheria, where the change can be noted from its first invasion up to dissolution, and similar evidence is met with in cases of typhus, erysipelas, Bright's disease, dropsy, scurvy, in severe cases of salivation by mercury, and the like.

If, then, there is evidence that deficient vitality evidences itself in the lungs by an increased secretion or formation of fluid in the air cells and passages, and in diminished circulation through the whole lung, and in accumulation in its most depending parts, are we not justified in considering that the chronic bronchitis of old age or of weakly individuals is essentially non-inflammatory in its cause?

Another alteration to which we must refer is its degeneration into tubercular matter. This is so essentially due to deficient vital force that no proofs are required to prove the position. The same remarks apply to cancerous or other analogous degenerations, and in a limited degree to the change which occurs in vesicular emphysema.

From these considerations we may draw a deduction of the utmost importance—viz., whenever in diseases of the chest the debility is great and the secretion excessive, there is “*prima facie*” reason to believe that there is impaired vitality, and that the remedies indicated for the cure are those of a roborant, stimulating, or tonic character.

The beneficial influence of ammonia and other stimulants upon “*bronchorrhœa*,” has long been recognised, and this

forms another interesting and valuable example of a fact being ascertained long before any adequate explanation of it could be discovered.

As long as that observation stood alone, it was simply as an isolated boulder on the vast plain of truth ; but when, after long investigation, others of a similar kind are found, they lead the philosopher to detect not only whence they came, but the powers that brought them there ; and now, when we recognise the principle above enunciated, we can recal hundreds of instances to our memory in which excessive lung or other secretions have been controlled within natural boundaries by medicinal, dietetic or climatic stimulation.

CHAPTER X.

DEFICIENCY OF VITAL POWER IN THE HEART.

Deficiency of vital power in the heart—Functions during health—Debility produces impairment of function, in rhythm, in forcing power, and physical change—Case—Deductions.

OUR next inquiry is—In what manner is the heart affected by deficient vitality ; or, in other words, what is the influence upon the heart of those debilitating diseases which terminate in death by asthenia, unless they are counteracted by medicinal or other remedies ?

We commence the investigation by ascertaining what the heart is during life and after death : what is its structure, and what are its functions.

During life the heart is a force-pump, whose strokes are steady and regular both in their power and frequency. It is composed of striped muscular fibre, as are the voluntary muscles : but it differs from them, inasmuch as its action is rhythmical and independent of the will. Its function consists in propelling the blood in an equable current through the pulmonary and systemic channels ; and, whenever any unusual exertion requires an unusual circulation of blood, its function is to carry on the extra circulation with the least possible discomfort.

After death the heart ceases to act at all, and is simply a

fleshy bag. But it is to be noted, that if an animal is killed in the midst of perfect health, and the heart is immediately separated from the body, it will continue to pulsate for a considerable period. We infer that it is the same in man. Now, if we examine a heart so circumstanced, and watch the gradual diminution of its beats, we shall find them *irregular* before they cease finally, and that, when they have apparently ceased entirely, they may be reproduced by direct irritation or stimulation. Hence we infer, that one of the phenomena attending the process of dying in the heart, is irregularity of its action ; and as we know that a dead heart cannot propel blood at all, so we have reason to believe that, during the gradual loss of its vitality, there must be a diminution in the force of its contraction.

The duration of time between the period when the heart is in full health, and when it is entirely dead, probably varies in different animals or individuals ; but, in the majority of instances, it is sufficiently long to enable us to prove that *loss of power* generally, if not universally, *precedes* irregularity of action ; and there is reason to believe, in many instances, that, when there is deficiency of cardiac power, the amount of the first irregularity is such as to be incompatible with continued life. Hence, in our own species, we not unfrequently have diminished circulating power, as the only sign showed by a dying or debilitated heart.

When irregularity of the heart's action is present, it manifests itself in a variety of forms. There may be simply an alteration in the force of certain beats ; the second, third, or tenth may be so feeble as to be imperceptible ; or there may be complete intermission of the fourth or other pulsation. These are occasionally found to be natural to the individual, and are not then to be considered as irregular.

Irregularity also shows itself by sudden and violent palpi-

tation, by unusual rapidity of action, by the cardiac contractions being accompanied by pain, as if cramp were present ; and sometimes the irregularity is fatally shown by so complete a cessation of the heart's action, that death ensues ere the pulsations begin again. All are more or less familiar with these signs as indicating debility ; we have often prognosticated the near approach of death from an intermittent pulse, or have augured a restoration to health from a returning regularity. We have met with individuals whose pulse becomes irregular whenever they have catarrh, or other debilitating disease, and to whom the natural rhythm is restored by a glass or two of wine, or a few doses of quina.

In my work on Spinal Irritation, I have shown that the heart resembles other voluntary muscles in many respects ; consequently, that like them it may become spasmodically affected by its work being greater than its power ; hence, whenever general debility is present, the utmost attention must be paid to the heart, so that it may never be called upon for a sudden increase of exertion. The erect posture will kill a man just convalescing from typhus ; a run will destroy an aged person, and a walk up-hill will produce breast-pang in the confirmed dyspeptic.

We have hitherto been considering the heart when dying, in the ordinary acceptation of the term—we may now consider it when “dying” in another acceptation. We have said that the heart consists of striped muscular tissue, that upon this its powers mainly depend : if, therefore, these muscles become gradually replaced by fat or other non-contractile material, until so large a change has been effected that the remainder is unable to carry on the circulation, the organ, during such a process, is dying as essentially as if it were dying on a plate, when separated from the body. In the one case contractions cease, because vitality has departed

from the contractile substance ; in the other, because the contractile substance has itself departed.

We shall, therefore, by closely observing the symptoms during life produced by a fatty or otherwise degenerate or atrophied heart, approximate to those referrible to a dying or extremely feeble one.

Now the symptoms attending degeneration of the heart are by no means so uniform that we could draw from them, alone, any satisfactory corollary ; but they are at times so well-marked, and their significance is so unmistakeable, that they afford us most valuable assistance, as in the following case, which came under my care some years ago, and is still under notice :—

Miss C., æt. 28, of medium height, but of a weight approaching to fourteen stone, and of delicate constitution, began to complain of extreme fatigue after a walk of two or three miles. This was quite unusual, for, notwithstanding her size, she had been able to take a considerable amount of exercise. With the desire to keep down her bulk, she persevered in taking daily walks, until it was evident that she would be obliged to discontinue them, in consequence of the extreme faintness and dyspnœa which they produced ; and in about three months from the period when the symptoms were first noticed, she was totally unable to ascend a flight of a dozen stairs without an attack of dyspnœa and faintness of extreme severity ; and in a few days more she was even unable to walk across the room. The complaint increased in severity, in spite of treatment by steel, quina, potash, wine, and other tonics and stimulants, and at last reached such a pitch that even conversation was enough to bring on the paroxysms. At that time the following was her condition. As long as she lay quietly in bed, she was as comfortable, cheerful, and lively as in health : the breath-

ing was easy, but the pulse small and feeble; the heart's action regular, but feeble; the appetite was moderate, the bowels regular, the catamenial functions sluggish; the urine natural, and the sleep sound. To any casual observer she seemed to be perfectly well. But if she merely turned round in bed twice together—or adjusted the bed-clothes twice in five minutes—or if she indulged for more than half an hour in conversation, she was seized with dyspnœa, the pulse could scarcely be felt, and she seemed to be in a state half way between syncope and orthopnœa—every moment seemed as if it would be the last. After all other means had failed to give her relief, cod-liver oil was resorted to, under which she immediately improved, and the improvement went on until she was able to take even more exercise than before.

The natural conclusion drawn was, that there had been deficient vitality in the heart, and consequently that it was unable to keep up the circulation whenever any increased demand was made upon its powers. This diagnosis has been confirmed by the farther history of the case. Any depressing complaint is always attended with a return of the cardiac symptoms, and so unequivocal is the connexion between them and exhaustion, that on more than one occasion I have been able to trace the attacks to fatigue; and I noticed once, with no small interest, that a very severe paroxysm had been brought on *in the town*, by an amount of exercise she had been able to take with impunity *in the country*. In that attack she lay for nearly twenty-four hours, unable to speak or move, without a perceptible pulse at the wrist, and breathing in such a manner as to be unable even to swallow a draught of fluid. She recovered again when she returned to the country, and was able to walk four miles, and perform laborious household duties, without any distress. It was clear that the power of the heart to do its duty varied accord-

ing to the patient's general health, and that a diminution of vital power was attended with diminution of the circulation through the lungs and body.

This case leads us to the suspicion that it is quite possible that the symptoms characteristic of disease of the heart may have their origin in deficient vitality of that organ. But we are not justified in founding any theory upon a single case, and we therefore turn to those principles which are generally known and almost universally acknowledged.

Let us confine our attention principally to such physical diseases of the heart as can be recognised after death, and may commonly be diagnosed during life—viz., regurgitation through the mitral and aortic valves, with hypertrophy and dilatation, &c.

Experience has taught us that individuals having any of these diseases may live for years without even knowing that they have anything amiss with them. Many such cases have fallen under my own notice.* It has still further taught us that individuals suffering from such complaints may be so far cured of them as to live for years in comfort; and we

* Mr. M., æt. 45.—Had a cardiac disease, occasioned (I infer) from an accident about fifteen years before I saw him. He was quite unconscious of it till I examined him for life assurance.

Mr. R., æt. 50, a civil engineer.—Had a very loud and rasping diastolic bellows sound, best heard at the base of the heart, yet was apparently so well, that he had been passed by one physician as a healthy life, cardiac auscultation not being resorted to.

Mr. C., æt. 42.—Came to me, with a medical friend, in great indignation, because his life had been rejected at a certain office. He never had been ill, he said, and he looked in perfect health. Yet he had all the auscultatory signs of deficiency in the aortic valves.

Mr. D., æt. 45.—Had a continuous rasping sound, so loud that it could be heard at a little distance from him, yet he had never had an ailment, and seemed to be in perfect health.

know that some persons will have many recurrent attacks, from each of which they may recover. Now, as we cannot conceive that the ossified mitral valve or adherent pericardium can materially change their condition, we are driven to conclude that the varying condition of the patient depends upon the integrity or healthfulness of the propelling power of the heart. If there be any truth in this idea, we shall expect to find that "cardiac symptoms" are far more common in the weak than in the strong, and that the most efficacious means for their relief are those which have a tendency to restore the vital power of the body generally, and of the heart in particular. Practically it is so. Angina pectoris is best treated by ferruginous or other tonics, and the best palliatives for cardiac asthma are ether, assafoetida, and other stimulants; while, on the other hand, it is well understood that purgatives and hydragogues cannot be pushed beyond a certain point for the relief of dropsy, unless they are associated with stimulants; and that those diuretics are the most efficient which are in themselves of a roborant nature; while digitalis, for long one of the most popular remedies in cardiac disease, requires to be most carefully watched lest the depression it produces should bring about sudden and fatal fainting.

We are then justified in drawing these conclusions:—1. That very rapid or irregular action of the heart, as a general rule, is indicative of its failing powers. 2. That languor of the natural circulation, and an incapacity to carry on a sudden acceleration, is indicative of the same. 3. That these points have to be closely attended to, in all cases of valvular disease.

After a close attention to the subject of disease of the heart, with especial reference to the cause of dropsy, of dyspnœa, of palpitation, of irregularity, and of sudden death,

the following aphorisms are suggested as of the utmost importance in the management of a cardiac disease.

1. A man may have diseased heart, and yet seemingly enjoy good health.

2. Anything which debilitates such an one, will produce "heart symptoms." These may equally be produced by anything which obstructs the circulation through the pulmonary or systemic systems, *e. g.* bronchitis, renal disease, &c.

3. Anything which overworks a weak heart *suddenly*, will give rise to instant death.

4. The severity of cardiac symptoms is in proportion to a patient's exhaustion.

5. In the treatment of diseases of the heart, bodily repose is more essential than tonic medicines, &c.

6. There is little chance of curing a labouring man of cardiac disease unless he gives up work for a time.

7. In the same hospital, and in individuals apparently in similar conditions of heart disease, a plan of treatment seems successful in some cases, and useless in others, according as the patients are confined to their wards, or are allowed to take unlimited exercise, and to go up and down stairs.

8. In many cases treated for morbus cordis, results have been attributed to medicines, *e. g.*, digitalis, which are due to the complete rest in bed, which is enforced upon them.

9. Antimony, low diet, calomel, drastic purges, abundant venesection, however much present relief they may give, are ultimately prejudicial in cardiac complaints.

10. Tonic medicines are very valuable in heart disease.

Here, again, we light upon the fact, which we have so often before alluded to—viz., that health is best restored to any part of the system by attending to the body as a whole ; and that any treatment which ignores the constitutional power, however scientific it may appear, is based upon a

wrong foundation. Of what avail, for example, would it be to cure a cardiac dropsy by elaterium or diuretics, as long as nothing is done to increase the heart's power, and thus prevent re-accumulation of fluid? How far, even, is an active antiphlogistic treatment advisable in rheumatic or other endocarditis, when we find that depressing agencies are the most fruitful source of all the most distressing of the cardiac symptoms?

Case.—John C., clerk, æt. 28, married, had an attack of acute rheumatic fever, for which he was treated on the antiphlogistic plan; after about three weeks the heart became affected, and there was a systolic bellows sound, best heard at the apex. He was now treated with large doses of mercury; salivation was not produced, but he had alarming faintnesses, attended with distressing irregularity of the heart's action. I now saw him for the first time, and recommended stimulants and the discontinuance of the mercury. The improvement in all the symptoms was immediate, and at the end of three days I ceased to attend in consultation. A few nights afterwards, however, I was called up with the intelligence that the man was dying, and that his ordinary attendant was out of town. I found the man perspiring profusely, the breathing was short and oppressed, he was so faint that he could scarcely speak or move, the heart's action was excessively irregular and intermittent, the bellows sound as before. Not being able to trace this to anything else, I hazarded the question whether the mercurial pills had been resumed. I was told that they had been begun again the very day I left him (under the impression, as I subsequently learned, that the drug under whose influence endocarditis commonly came on, was the best remedy for obviating its effects). In a few hours he began to be worse, and continued to be so till I saw him. The drug was once more suspended, and stimulants used, and with the happiest results;

the plan was never again changed, and the patient ultimately recovered so completely that no bruit was heard at the end of six months.

That very formidable lesions may be perfectly cured by attention to the general health, the following case will show.

Mr. J. J. C., when a lad, had an attack of acute rheumatism, which was treated antiphlogistically. Endocarditis came on, and the same plan of treatment was still further developed; no appreciable change took place, however: the cardiac symptoms remained, and the gloomy prognosis was given, that there was regurgitation through the mitral valve, and this would ultimately destroy life. The rheumatic fever left at the end of six weeks, and the friends were told that the only hope lay in care and attention to the general health. The most sedulous attention was paid to these, and at the end of six years not a single abnormal sound could be heard, or a "cardiac symptom" detected. The patient is now a fine young man. As I heard the abnormal sounds shortly after his illness, and have since satisfied myself that all is now healthy, I can only draw one of two conclusions, viz., that rheumatic valvular endocarditis may be recovered from—or that the bellows sound in rheumatism may be produced by some other cause than fibrinous effusions or vegetations. Having had under my own care, in the Northern Hospital, some instances in which signs of valvular disease had come on in the course of acute rheumatism: first, after the rheumatic symptoms had gone away entirely,—secondly, during the course of a mild attack, the patient being under treatment by lime-juice only,—I treated them with mercury and local bleeding, in accordance with routine, and I found the symptoms give way, or (if I saw the case after thirty hours' duration) remain stationary in less than two days.

But as the time, and the quantity of mercury, did not

warrant the belief that the improvement was due to that drug alone, I determined to watch the course of the next case, if left alone. The opportunity soon came.

John S., æt. 35, had acute rheumatic fever, and was treated with eight ounces of lime-juice per day. The case was a bad one, attended with profuse sweating, and great debility. On the twelfth day of the complaint, he had slight cough, dyspnœa, sighing, faintness, and palpitation, and a physical examination detected a distinct bellows sound, best heard at the apex of the heart. With a somewhat hesitating feeling, yet with the certainty that I was acting upon a fair and legitimate deduction, no treatment was adopted save the use of liquor ammoniæ acetatis as a placebo, and the attention of the students was specially called to the case, that they might correct my own impressions if they were wrong.

The result was that the patient's symptoms gave way in twenty-four hours, and the bruit never increased in intensity. He remained under treatment for about two months longer, as his strength was much reduced by the disease; but he went out at last in as good a condition as I ever knew a patient with cardiac disease leave any hospital which I have had the privilege of attending.

We cannot enlarge more upon this point here, but we would call attention to the following considerations:—1. Those who have been treated most actively by bleeding and mercury, for rheumatic fever, rarely escape endocarditis, which occasionally comes on even while they are under "salivation." 2. Those cases of rheumatic fever which are treated mildly from the first are rarely complicated with heart affections. 3. That those cases of cardiac disease which are ultimately the most severe and protracted are those which have been treated the most energetically at the

first. 4. That those cases are ultimately the most comfortable which have been treated gently throughout, and with especial reference to the patient's general condition.

We may put the same facts into a more striking form, thus :—

1. In acute rheumatism the amount of fibrine in the blood is unusually large.

2. The same is true in almost all cachexies.

3. Venesection, salivation, and fasting increase the fibrine in the blood.

4. Venesection and mercury in acute rheumatism favour the occurrence of pericarditis and endocarditis.

5. The duration of acute rheumatism, and the peril of the patient are increased by a debilitating treatment.

6. Such an acute inflammation as pericarditis, ending with the rapid formation of lymph, may be compared with diphtheria, where the same thing occurs.

7. Diphtheria is a disease of debility, and is best treated with general and local stimuli.

8. It is better to leave a diphtheritic patient alone than to reduce his strength.

Consequently, if rheumatic pericarditis resemble diphtheria, it is positively a more philosophical plan of treatment to leave it alone, than to treat it by bleeding and mercury, the very means which favour its invasion.

As far as my own experience in acute rheumatism has gone, I should say that what is called the "old woman" plan answers far better than the "ardent young doctor" style; and, comparing the present with the past, nothing has surprised me more than to see acute cardiac inflammation subside rapidly and almost completely in two or three days, under such mild remedies as leeching and a few doses of nitrate of potash—a plan which would have been considered as culpably inert a

few years ago. Verily we may say, that as the surgeons in by-gone days never learned the true meaning of the words "*vis medicatrix naturæ*," until they were fairly driven to such knowledge by empirics who used "weapon salve" and clean linen only, for the cure of wounds—so the physicians of the present century are gaining their knowledge of the same power, by the frequent success of those who administer potent drugs in impotent quantities.*

* We hear now, as in days gone by, a great deal about the difference between true and pseudo-medicine. None who use the expressions bestow a thought upon what *true medicine* is. As a general rule, the majority of the profession believe that their doxy is "orthodoxy," and other people's doxy is "heterodoxy." But for one hundred years the healing of wounds by the first intention was "heterodoxy," and curing them by balsams, lint, charpie, vulneraries, etc.—was "orthodoxy." Since then "*nous avons changé tout cela*." At present the curing of all diseases by drugs, the lancet, blisters, leeches, etc., is "orthodox;" but a time is coming—the sooner the better—when this will be considered as "heterodox" as we think the ancient meddling surgical practice was.

When once rational medicine is established in our schools, all the present "pathies" (and their name is legion) will be only cherished by those who are unable to appreciate jewels of gold or the pearl when it is cast before them.

CHAPTER XI.

DEFICIENCY OF VITAL POWER IN BLOOD-VESSELS.

Deficiency of vital power in blood-vessels—Arteries—Capillaries and veins—Alteration in structure and function—Elasticity destroyed or impaired—Veins varicose.

WE may profitably pass from the central organ of the circulation to the channels through which the blood passes, and inquire how deficient vitality affects the arteries, the capillaries, and the veins. Ere we can enter upon this, we must say a few words about the functions of these vessels respectively, and the circumstances under which it is self-evident that their vitality must be low.

It will be most convenient to take the different class of vessels *seriatim*: we commence with

The arteries, and inquire into their natural functions, and physical condition.

Their function, we shall find, depends mainly on their physical condition, as they appear to be nothing more than elastic cylinders capable of adapting themselves to distension, and again contracting. They do this regularly, whatever may be the quantity of blood contained in the system.

Physically they are made up of a peculiar fibrous tissue, which might fairly be designated animal caoutchouc. Any change, therefore, that takes place in them must be in physical condition, and accompanied by loss of elasticity.

We can have little difficulty in allowing that we may have deficient vitality in the strumous or phthisical, and in those who are dying of old age.

To study the subject fairly, the best plan is to take the aorta of a very old man. This is to be separated at the heart, near to which it is generally the most changed, and pursued till we arrive at a part which appears perfectly healthy. We propose to commence our examination at the healthy part, and continue it till we reach the termination of the disease. As our naked eye will not tell us everything, we must aid it with the microscope. After having made a few sections in a healthy part to familiarise our eye with the normal structure, we take a few delicate slices from the part immediately above this, and we now find a few scattered oil globules which we did not see before. These are most numerous just below the serous or epithelial coat. As we near the heart we find the globules increasing in number, and having a definite linear arrangement. They resemble a double wedge made of beads, and are parallel to the length of the artery. Higher up we find the numbers of the oil globules materially increased, and the linear arrangement has become a circular one. We find, too, in addition to the sub-serous patches, that a larger amount of scattered fat globules are to be met with in the substance of the elastic coat. A careful examination now will enable us to detect with the naked eye, especially after maceration in water, minute opaque white dots studding the apparently healthy artery, beneath the serous coat. We next find that the patches have increased in size, by the addition of oil globules to their circumference, and we see that those in their centre have been replaced by granular matter. Making now a series of transverse sections, we find that the matter has increased deeply as well as superficially, and that the deposition of fatty globules

extends to the cellular coat of the artery, decreasing, however, in quantity from within outwards. Passing upwards we find this fatty degeneration, as we may term it, increasing. The patches are much larger, more perceptible to the naked eye, and they evidently raise the serous coat above the surrounding level. As they increase in size they become less fatty and more granular, and a little manipulation shows that they increase in size at the expense of the elastic tissue. The amount of fatty matters scattered "promiscuously" through the rest of the artery is also commensurately augmented. We next find the accumulation so great, that it has completely taken the place of the arterial coat for an extent probably about the size of a horse bean; the serous coat has become thickened, harsh, and opaque. With the back of our scalpel we can readily, however, break through it and dislodge the yellow mass below; when thus scraped out it leaves a hole through the yellow coat, and we can readily see how this might become the commencement of an aneurism.

There is indeed no reasonable doubt that aneurisms are in reality thus formed: the elastic coat of the artery being entirely replaced, in any spot, by morbid fat, can no longer resist the distending power of the heart; it gives way, and the cellular coat, having once begun to distend, continues to do so. We conclude that aneurisms are thus formed:— First, because it is a very rare thing, if indeed it ever happens, to have an aneurism without our being able to detect fatty degeneration (or what we shall subsequently see under the name of brittle degeneration) in some other part of the same vessel. Second, because when aneurism occurs in one part it is very likely to occur in others. Third, because on no other hypothesis can we explain satisfactorily the size and rotundity of the openings into the aneurismal sac. I once met with the case of a very old man whose aorta was extra

ordinarily diseased. It was studded with bony concretions in the upper part, with firm atheromatous or cheesy matter lower down, and at its termination in the iliacs with soft material, as easily removed as butter. One of these had given way from an accidental bodily shock, and death resulted from aneurism in six weeks. I do not of course deny that the brittle degeneration, of which we shall subsequently treat, as it occurs in the capillaries, may not be present in the large arteries, and that the rupture may be due to that. I can only say that I have not yet met with it.

Fortunately for the patient, however, the degeneration is principally confined to the inner half of the elastic coat, leaving a sufficient amount of healthy tissue to prevent the formation of an aneurism. The degeneration, however, advances, and we have at length a distinct yellow cheesy-looking mass, which does not, as far as I can make out, differ, microscopically, in the smallest respect from yellow tubercle. At this period the serous coat very often gives way, and it is possible that fragments of the atheromatous mass may be separated from the rest and carried onwards by the circulation, ultimately to be arrested by the diminishing calibre of some artery, which they will thus completely block up.

With increased deposit on the interior surface, there is increased degeneration of the rest of the elastic coat, and it is impossible to make a section in which abundance of oil globules are not seen in the field, giving a totally altered appearance to the ordinary one presented by the yellow coat.

If the individual survive this stage, we next find the deposit becoming denser; a calcareous formation is to be recognised under the serous coat, which is now greatly thickened. The plate of bone (so called) is at first thin and cribriform, and of the shape of that segment of the cylinder where it is

situated. It gradually replaces the yellow deposit, and then begins to contract from the circumference towards the centre. The result of this is, that the osseous plate assumes the form of a shallow bowl. It separates at the edges from the parts below, breaks through the serous coat, and presents a rough obstacle to the circulation of the blood. I am unable to pursue the change farther, as I have never seen an instance in which the plate has *become dislodged*.

I have pursued the alteration of physical condition thus far without making more than one digression upon the results following from the change. We must now examine in what way the degeneration deteriorates the artery. This need not detain us long, for it is clear that if the elastic coat is replaced by a fatty, or other non-elastic material, to any extent, it must, *pro tanto*, be weakened. It is just the same as if so much India-rubber were removed from the thickness of a caoutchouc tube, and replaced by butter. The necessary result is a diminished resisting power; the artery, at every systole of the heart, is distended unusually, and is not able to contract with sufficient power during the diastole. Dilatation follows. If the degeneration be general, as it commonly is, we have general enlargement of the arterial calibre: but if partial, as I have on three occasions seen it, we may have local distension, and a "true" aneurism formed. In the cases referred to, the distension occupied the ascending aorta, and the aneurisms resembled the bulbs on chemists' tubes. If the degeneration is more local, and only occupies one side, we may have a pouch formed.

As long as the atheromatous deposit does not roughen the inner surface of the aorta, there is usually no sound to be detected by the stethoscope; but when the serous coat gives way and the osseous plate forms an obstacle to the blood, we

have commonly a loud, and sometimes a continuous rasping sound, best heard over the upper sternum, &c.

With these physical signs, constitutional ones are occasionally met with, fairly referrible to the condition of the artery. They are similar to those produced by valvular disease, or other causes which impede the circulation. This is readily explained, for the power of the heart which, in systole, was once adequate to force the blood along a firm and elastic tube, is now partly expended in distending the slightly resisting canal; while the arterial resiliency which, during diastole, was enough to help on the blood till the next systole, is inadequate to the duty. The heart then must increase its contractile power accordingly, or there will be a comparative arrest of the circulation; just as a paralysed rectum or œsophagus will produce the same effects as a downright stoppage of the canal.

A very remarkable instance of the occasional effects of the degeneration we have spoken of has come under my care, at the Northern Hospital.

Mary M., æt. 26, a sailor's wife, with one child, had symptoms of severe cardiac disease. She had terrible dyspnœa, increased paroxysmally, and almost precluding speech. The pulse was feeble, and the countenance livid. The physical signs showed extensive dulness on percussion, and a loud continuous murmur along the course of the aorta. She was long moribund, and died gradually of asphyxia. The only history we could obtain was, that five weeks before her admission she had been lifting a very heavy weight, had felt something give way in the chest, and immediately suffered from palpitation and dyspnœa, which last had steadily increased. Severe pain was complained of, and always referred to the base of the heart. *Post-mortem*.—Heart alone examined. Left ventricle dilated and hypertrophied; its mus-

cular fibres in a state of fatty degeneration ; the valves were all healthy. On examining the base of the aorta, it was found to be distended to double its ordinary area, and *to such a degree that the valves did not meet and close its lower aperture.* The inner surface of the artery was studded with spots of ecchymosis, and effusions of red blood ; at one spot, covering an area of the size of the little-finger nail, and just above one of the valves, there was a genuine ulcer, about the tenth of an inch in depth, and covered with the torn remains of the serous coat. On making a microscopic examination of the aorta, it was found studded thickly with oil globules and blood—the last occurring in masses of considerable size : about the ulcer there was pus. There was little reason to doubt that there had originally been a great amount of fatty degeneration, and consequent loss of resisting power in the aorta, and that during the violent effort of lifting the distending had overcome the resisting force ; that the area of the cylinder had been forcibly augmented by stretching, and rupture of much of the fibrous element. The result had been ecchymosis, and subsequent inflammation of the artery. This is the only instance I have met with of genuine aortitis.

If we inquire now into the function of the capillaries and smaller arteries, and examine their physical condition, we shall find that they are very delicate cylinders, having one single, thin, transparent, homogeneous, and elastic coat. In health, their calibre is generally uniform, but in some parts there is provision for a periodic distension, as in the uterus, penis, mamma, ovary, and probably elsewhere. They, with the parts lying in their vicinity, have an influence not yet perfectly understood, over the circulation of the blood. By the thinness of their coats they readily allow the nutrient material of the blood to reach the tissues, or the effete particles to enter into the venous current.

Any alteration of function can be best inferred from change of structure. This change is generally met with in conjunction with atheroma in the arteries and in phthisis. It is common, too, in old age and all diseases of debility.

We find, if we examine the capillaries microscopically, a series of changes, as important in their nature, if not even more so, than what we have seen in the heart and aorta. The change is not uniform in its character, though nearly so in the results arising from them. We have two grand types of degeneration here: the fatty and the brittle. The fatty degeneration does not essentially differ from what we have already seen in the aorta. The capillary walls are first studded over, and then finally replaced by fatty matter.

This may occur without materially altering the calibre of the tube; but very frequently the hyaline wall is much increased in *thickness*, and sometimes the interstitial deposit in the walls, and the fatty matter adherent to their free surface, is enough *to block up the canal entirely*;—the vessel then has the appearance of a strip of fat globules.

When the change takes place in any vessel of unusual magnitude, the effect is often very disastrous. The resilient wall has lost its quality at the degenerate part, and being no longer able to resist the distending power of the heart's action, gives way at the weakened spot. If the diseased area be considerable, and the vessel large, the hæmorrhage resulting is formidable. If, on the contrary, both be small, the bleeding will be insignificant, and the gap will soon be closed by the pressure of the effused blood. Whenever this degeneration is present, there is peculiar danger from any powerful bodily exertions, such as straining at stool, lifting weights, or from any other cause which distends to a great degree the cerebral vessels. Intense emotion, especially anger or excitement, the too liberal use of alcoholic stimu-

lants, will have a similar effect. All alike promote a rending of the healthy coat from the degenerate portion. The same result will ensue from the ordinary strain experienced in systole, whenever the degeneration has reached beyond a certain point.

For the appearance presented by these fatty vessels, I would refer the reader to the woodcuts illustrating Dr. Radcliffe Hall's "Essay on Tubercle," in the *Brit. and For. Med. Chir. Review*, No. 32, page 482, and No. 30, page 424.

Passing by, for the time, the temptation afforded by the last paragraph to develop our views on the nature of the degenerations we have treated of, we come to describe what we have termed the "brittle" change. We have selected the word, because it simply expresses a fact without involving a theory. Every writer on apoplexy has adverted to this particular condition of the arteries, and has connected it with the atheromatous and osseous change so common in the aorta. I need not describe the appearances presented by the larger arteries, beyond saying that they are commonly of a dull white colour; and that, though they seem thicker than natural, they are readily torn through, and have little real strength.

A similar phenomenon is found in the capillaries: they are thickened, and they readily break in manipulation. The increase in thickness is due to some semi-opaque material, in which no structure can be made out with a magnifying power of 600 diameters. The only thing I have been able to compare to it, was a deposit in the arachnoid, met with in a child dead of hydrocephalus. This membrane was most profusely studded with opaque white spots, which all would concur in calling tubercular, but no structure whatever could be seen; there was simple milkiness or opalinity, and nothing

more. The thickening of the wall of the capillary is often so considerable as almost to choke up the calibre of the vessel. A similar change is to be met with in the capillaries of the lungs in phthisis, and of the lower extremities in senile gangrene.

Through the kindness of Dr. Nottingham and Mr. Millett Davis, surgeons of the Liverpool Southern and Northern Hospitals, I have been enabled to recognise changes analogous to the above in arteries near joints where amputation has been performed for strumous affections.

There is, however, another form of degeneration of the capillaries. In it the walls become thickened by the formation within them of large granules—solid, irregular in shape, and of a faint greenish yellow hue, resembling, in fact, the granules which I once found composing a tubercle in the brain. Their size is about the $\frac{1}{3330}$ th of an inch, sometimes $\frac{1}{2500}$ th. Occasionally I have seen them adhering to the outside of the capillary vessel by a transparent, yet firm plasma; and sometimes in the interior, surrounded by a cell larger than that of the lingual epithelium.

The measurement of the capillary wall gave a thickness of $\frac{1}{1500}$ th; the diameter of the whole vessel was $\frac{1}{600}$ th; the diameter of the canal was only the $\frac{1}{2546}$ th of an inch. The ordinary diameter of the capillaries may be stated at $\frac{1}{1800}$ th; and the thickness of the wall at $\frac{1}{6000}$ th of an inch. When we consider that the diameter of a blood globule is $\frac{1}{3000}$ th of an inch, we can see that a very little farther thickening of the vessel would, in the case above, have rendered it impervious to the red corpuscles.

The necessary effect of the two last changes we have described is a deficiency of nutrient material, in consequence of the quantity of blood circulating in the part being materially diminished, unless, indeed, the contraction in the

canals is compensated for by increased rate of movement: and this is generally impossible; for we find that the changes are attended by degeneration and debility of the heart itself. The heart, however, under favourable circumstances, does become hypertrophied, and thus prevents, to a certain extent, the necessary consequence of the diminished flow of blood.

If we pursue the consequences likely to result from these changes, we find:—First, apoplexy from cerebral hæmorrhage. This is in many instances the result of great excitement or over-exertion. By these a sudden flow of blood is directed to the brain. Under ordinary circumstances the capillaries would have allowed it to circulate freely, but now their diameter is reduced in the proportion of $\frac{1}{1546}$ th to $\frac{1}{2800}$ th, or nearly as two to three, their power of distension is all but gone, and a rupture necessarily follows, not of one or two vessels only, but of many. Secondly: In consequence of the quantity of blood circulating in these altered vessels being diminished to at least a third, the parts around lose a large portion of their vital power, and are prone to fall into a state of mortification. This is averted so long as the heart has tolerable activity, and as long as the degeneration is not increasing; but whenever the former is absent, and the latter present, complete suspension of nutrition follows, and mortification ensues. We recognise this in the senile gangrene of the legs in the aged, and in the softening of the brain, so commonly met with in those whose arteries are atheromatous or otherwise diseased.

The third result from the state of things we have described, is of particular interest to the surgeon. We have seen that atheroma is the most common cause of aneurism; and we have attempted to show that simultaneously with the change in the large arteries we have formidable alterations in the calibre and elasticity of the smaller vessels and capil-

laries. We scarcely need point out how completely this accounts for the frequency with which more than one aneurism is found in a single patient; but we must lay some stress upon the insight thus given into the occurrence of gangrene of the limb after deligation of the artery, and the comparative frequency with which hæmorrhage occurs after operations for aneurisms not far removed from the aorta, as the carotids and subclavians.

It is assumed by the surgeons, that when an artery which supplies a limb is tied, the other arteries will supply its place. This involves the idea of temporary distension of the capillaries, and of all the small arteries. Experience has shown us that this distension will take place in health: it has equally shown us that it will not uniformly take place after aneurism. How can we now expect that it should, when we know that in such cases the capillaries are reduced in calibre from a sixth to a third, and have lost almost entirely their distensibility? They are not in a position to keep up the circulation; their previous inefficiency has already reduced the vital power of the limb, and when the direct supply leaves them, the parts lose their vitality entirely.

That gangrene does not follow ligature of arteries more frequently, is due to the fact that disease is rarely universal over the whole of a system at the same time,—that is to say, measles does not affect the whole skin simultaneously; phthisis the whole of the lung; syphilis the whole of the penis; or erysipelas the whole of the head. The whole system is obnoxious to the morbid change, but rarely at the same time.

Again; it is a melancholy fact that ligature of arteries for aneurisms near the aorta, is generally an unsuccessful operation. We can be at no loss for explanation, when we find that in all these cases the middle coat, upon which

we depend for union, &c., is in such a degenerate condition that it is unable to originate and complete those changes which would take place were it in a healthy condition.

Experiments, in fact, upon healthy arteries and capillaries are not applicable to those which are unhealthy, and aneurism is a certain proof of the presence of disease.*

Lest it should be supposed that I am broaching an entirely new doctrine, let me ask my readers to consult the remarks made by experienced surgeons upon amputation in the aged—in those affected with senile gangrene, and in those whose limbs have mortified after tying an artery—they will almost invariably find a condition of the arteries in the stump referred to, such as I have named: they are either brittle or soft; at any rate, they are easily cut through by the ligature, and when the ligature separates, there is secondary hæmorrhage from non-union of the divided parts of the middle coat.

We have little to say respecting the veins—their function is simply passive. Their walls and valves are arranged to allow of the passage of the blood in a steady current to the heart.

They consist chiefly of white fibrous cylinders, whose walls are incapable of much distension.

But when there is debility present, the veins are greatly distended and become varicose.

This is usually attended with pain.

The distension may be relieved either by mechanical contrivances, by lessening the hydraulic pressure of the blood, or by increasing the general tone of the system.

* It is only fair to other observers who have preceded me in the study of the blood-vessels, to state that I have been engaged on the subject for sixteen years, and that I have not quoted them simply because I prefer giving the results arrived at in my own words. I fully acknowledge their priority and their merit.

Upon the ulterior effects of this, *e. g.* ulcers of the leg, it is unnecessary to dwell.

I may, however, give two instances in which a marked improvement took place in enlarged veins from local and general improvement.

The first is recorded by Whitehead. A lady, while pregnant, suffered very much from enormous venous distension about the vulva; after a variety of plans had been tried in vain, a strong solution of nitrate of silver was used, and the utmost relief followed. The caustic had constricted the veins as it does the capillaries in strumous ophthalmia.

The second has come under my own notice.

A lady in each pregnancy suffered severely from a very large vein close to the vulva,—nothing did it any good, save rest in bed or on a couch; at last it was resolved that, as soon as pregnancy was known to exist, the lady should go to the sea-side. The plan has been successful, and though two periods have now passed, the vein has not again swelled to the same size or become painful.

It is remarkable that in this case the influence of pure air was equally marked on the stomach; the change put a stop completely to the daily vomiting, which had become distressingly severe.

CHAPTER XII.

DEFICIENCY OF VITAL POWER IN THE STOMACH.

Deficiency of vital power in the stomach—Functions during health—Evidence of impairment—Flatulence, acidity, loss of appetite—Case—Anorexia—Its significance as a symptom—Influence on practice—Cases in point.

OUR next examination is into the manner by which deficient vitality makes itself manifest in the stomach.

We have here at our disposal, as in previous instances, various modes for solving the question proposed. We may examine into the changes that take place in the stomach after death; what changes in digestive phenomena ensue while the stomach is being gradually converted into a scirrhous mass; and what phenomena, due to this organ, are met with in cases of asthenia generally.

Ere we enter on the subjects, however, we must first inquire what are the special functions of the stomach? for until we have satisfied ourselves on this point, it is quite useless to investigate morbid phenomena. Each organ when diseased has symptoms peculiar to itself, and these can only clearly be understood by comparing or contrasting those symptoms with the ordinary healthy phenomena.

The function of the stomach during life is comparatively simple. It has to prepare the food for its ultimate conversion into chyme, chyle, blood, and tissue. In the perform-

ance of this function, it has the power of secreting a peculiar fluid of great solvent or digestive attributes ; it is capable of immense distension without its walls giving way, but it is always firmly appressed over the food it contains, and when empty is contracted upon itself, and the digestive processes go on without pain or other sensation. We anticipate, therefore, that any deficiency of vitality will show itself in faulty secretion, intolerance of food, pain, diminished distensile power, and want of contractility when empty.

If we examine the changes that take place in the stomach after death, we find that they differ according to the condition of the individual during life. Thus, a healthy man full of life and vigour, struck down suddenly after having taken a meal, is found with the stomach firmly contracted on the food, and itself partially dissolved ; and if the sudden death ensue when the stomach is empty, it is found firmly contracted upon itself ; in one instance, I have seen it distinctly divided into two parts, like an hour-glass, by a circular band of fibres. This condition, however, is not generally permanent, for after a certain period, say about thirty-six hours, the stomach becomes distended with an enormous amount of gas.

In those who die after long illness, and in whom, prior to the time of death, the vital powers are at a very low ebb, we find almost invariably that the stomach contains other fluid besides food, and that it is greatly distended with gas. Of the nature of this fluid we do not know much—all that we can say is, that it is not healthy gastric juice.

Again ; if we examine the phenomena attendant upon the gradual conversion of the stomach into a scirrhus or other morbid substance, we find, first, a want of healthy gastric juice, and consequently, either simple indigestion, acidity, waterbrash, or we may have a secretion of vast quantities of

flatus, an intolerance of distension beyond a certain point, and consequent vomiting; a condition which may be followed by a loss of nearly all contractile power, the organ then being as distensible as a carpet-bag.

If we turn to asthenic diseases, such as typhus, scarlatina, yellow fever, and the like, we see essentially the same things: vitiated secretion of gastric juice, the generation of gas,* and almost total destruction of the digestive powers, with great impatience of the least distension, and, consequently, almost incessant vomiting; or we may have almost a total want of contractility, the patient taking everything offered to him, but digesting nothing; or there may be irregular contraction, producing very painful cramp.

I well remember an instance in which this last condition was the herald of approaching death. The sufferer, a boy, æt. 3 years, was, at the time of the occurrence, in profound coma from water in the head; but he was able to swallow and to digest "wine whey" with facility; one morning, however, the administration of the food was followed by sudden flatulent distension of the stomach, and the lad sprung up in bed with a most distressing cry, screaming apparently with pain, though insensible to what was going on around him. By diligent friction and shampooing, the suffering seemed to cease, and the child relapsed again into the hebetude of coma. After an interval of three hours some more food was given, containing a larger dose of the stimulant, but it was followed almost immediately by the same agonized cry. Shampooing the abdomen again quieted the sufferer, but he died in another hour.

Now, if we find that a dying condition of the stomach,

* The subject is of sufficient interest to warrant the addition of an Essay on Flatulence, which will be found in the Appendix.

i. e. a diminution of its vital powers, is accompanied by such symptoms as we have described, have we not *primâ facie* grounds for considering that, whenever such phenomena are present, they indicate a debilitated condition of that organ?—and must not this consideration materially influence us in our plan of treating its diseases?

If, then, indigestion implies debility, it becomes the duty of the physician to ascertain the cause of such weakness: whether it exists in the stomach alone, as in malignant disease, ulcer, and other diseases of an allied character; or whether the stomach is simply in the same condition as all the other organs, and weak from simple failure of the constitutional power. An exhausted stomach can no more digest food than an exhausted muscle can contract.

Into the details of this subject it is unnecessary to go; sufficient has been said to make the line of treatment obvious—viz., to suit the food to the powers of the stomach, and to increase these as much as possible by hygienic, dietetic, medicinal, or other contrivances, and to avoid, *as directly injurious*, all depressing medicines, such as antimony, mercury, or drastic purges.* The following case illustrates in

* I have known a case of dyspepsia kept up for many months by what the physician considered very mild alterative doses of blue pills or grey powder every second day. During the whole period, the lady steadily got worse, deteriorating in strength, and losing flesh weekly. When first I saw her, she had constant flatulence, and was so debilitated as to be unable to sustain a half-hour's conversation without faintness. Her illness had been caused by long and anxious watching over a delicate husband, and had been aggravated by the directions received from her medical attendant, "to take plenty of exercise." I simply recommended such tonics as steel, digestible and slightly stimulating food, and a disuse of alteratives and aperients. The lady began to improve perceptibly during the first fortnight, and was sufficiently well in six weeks as to require no farther attendance.

a very remarkable manner the influence of general exhaustion on the stomach, or rather the proof which exists that the stomach is in an enfeebled condition, when the whole system is weakened : Mr. I., æt. 64, merchant, had always enjoyed perfectly good health until he was 56, when he had a fit of regular gout, which recurred at intervals of about two years. He had always lived freely, but during the last few months had entirely given up the use of stimuli, with the exception of an occasional glass of bitter ale. He lived in the country, and his usual habit was to breakfast at eight o'clock, then to go to business, and return at four. He dined an hour afterwards, taking nothing during the intervals. The circulation at this time was very languid, and he complained of coldness of the extremities. There was also an almost total loss of appetite. The bowels were regular; the urine healthy. About five months prior to his death, it was noticed that he occasionally vomited his food; but he refused all medical advice, and paid no attention to himself. It was soon noticed by his family that the vomiting was always induced by any harassing business or unusual fatigue. At first it came on at dinner-time only, and took place before the meal was completed; but after a while it came on at all periods of the day, but very rarely unless he had been taking something at the time. He had no pain or suffering, and no nausea; the bowels were regular, and his spirits much as usual. As the vomiting materially diminished his strength, so it continued to increase in frequency, until he vomited after taking anything; but what was remarkable was, that he would eject a first glass of milk, then take another, and digest it comfortably, without even feeling nausea. After the illness had continued about three months, he placed himself under medical treatment, and was directed to confine himself entirely to the house for a short period,

and to have for diet milk, with or without bread, and cream, with well-pounded blanched sweet almonds. Improvement was apparent in two days' time, and he continued steadily to get better ; but it was again noticed that any mental annoyance or bodily fatigue, or even prolonged fasting, brought on the sickness. The closest attention was now paid to these points, and the tincture of the sesquichloride of iron was used as a tonic. The result was a more rapid amelioration of all the symptoms. In about a fortnight's time, the patient was allowed to take exercise in the open air ; but the first result was unsatisfactory, as he always tired himself, and with this fatigue the vomiting returned,—*the stomach evidencing the effect of fatigue long before the patient was conscious of it himself.** This somewhat retarded the progress to convalescence ; but the patient conforming himself at last strictly to what was enjoined, gained strength daily. With returning strength came returning appetite ; and with this a relish for more solid food. By carefully following out the plan of suiting the diet to the digestive powers, Mr. I. came at last to have a better appetite and better digestion than he had had for years, and was able to sit down to the family dinner and enjoy it. At this time, four weeks after the treatment was begun, he felt so well that he insisted upon returning to business ; there had been no sickness for a fortnight ; he could take long walks

* This observation is important. I have on many occasions noticed the fact ; and have had always great difficulty in inducing patients to believe that the stomach is weakened by an amount of bodily exertion, fasting, &c., of which they are mentally unconscious. I have now under my care a lady, æt. 64, who has painful dyspepsia, invariably produced by over-fatigue ; yet she says she never feels that she has done too much till the pain comes on. Cases of a similar kind will be found farther on.

or drives without being exhausted, and eat and digest a hearty breakfast and dinner. For a day or two he did not go to business for a longer period than two hours ; but as he could stand this without difficulty, he increased the time, and remained in town from ten to four o'clock, returning always to his home both faint and cold. In consequence of this, the appetite began to flag : solid food could no longer be taken : all stimulants were loathed ; the tonic seemed to have no power to counteract the influence of exhaustion ; and in ten days from his first leaving home for business, the sickness returned with all its former severity. He now refused all medical aid ; continued to go to town as usual ; until, after an hour's exposure to a biting cold wind, without any extra clothing, he was laid up with intense sciatica. This was soon relieved by the use of anodynes locally and generally ; but it left him in a sinking state. The sickness continued ; but when beef-tea was substituted for milk, the vomiting ceased. He never rallied, however, after the attack of sciatica, and slowly sank,—the mind first giving way, and the last few days of life were passed without his uttering a word, and seeming unconscious of what was going on. Digestion, however, and the action of the bowels and kidneys, were perfect to the last ; and he was able to walk about his room till within an hour of dissolution. The final cause of death was an attack of convulsions.

This case suggests a very important consideration, and one which the physician can turn to practical advantage. It will be noticed, that at the time the treatment was begun, there was no appetite, and scarcely any power of digestion. Is there any real connexion between these two circumstances ? for if there be, we shall find that anorexia becomes a symptom of great importance. Ere we answer this question dogmatically, let us make a few observations which

will demonstrate the grounds upon which such answer is given. First, let us ask, what is appetite ?

Appetite is a feeling which induces us to take such nourishment as is necessary for the sustentation of the body. In health, it is greatly increased by a certain amount of exercise ; it is diminished by quiescence. It is vastly augmented during diabetes, during convalescence from fevers, after fasting ; and during the period of childhood it is far greater than during adult or old age. It is increased in women during pregnancy, and still more during lactation ; in fine, we may say, that in health the appetite is increased whenever there has been an excessive expenditure of vital power, and that the appetite is in direct proportion to the demands of the system for sustentation. The phenomena attending stricture of the œsophagus, or pylorus, or mesenteric disease, point to the same fact. There is then perpetual appetite, because there is perpetual expenditure, which the food taken cannot sufficiently supply, as from one cause or another it does not reach the blood.

But it is to be noted, that even in health the appetite is not always augmented by exercise. This may be carried to such an extent that the appetite fails. Such a feeling is commonly expressed by the remark, "I am past my dinner." This feeling comes on, not only from fatigue, but from prolonged fasting, and it seems to indicate simply a want of power, for when once food or drink is put into the stomach the appetite returns, — a fact generally expressed by the remark "that the appetite comes on with eating," and "the more we eat the more we seem to want."

This recovery of the appetite, after prolonged exertion or fasting, is not, however, habitual to all men. It seems to depend a great deal upon general vigour of the constitution.

Thus we find the majority of persons living in town do

not regain a lost appetite like hunters, seamen, and others whose general standard of health is very high. They, when they are past their appetite, do not regain it by forcing themselves to take food ; they simply become flatulent and dyspeptic. Now, if individuals who are tolerably strong and well are liable to loss of appetite from exhaustion, we should expect to find this a symptom of those diseases which are characterised by debility. Practically, it is so : we have anorexia as an accompaniment of fevers, of phthisis, of anæmia, of chlorosis ; it is deficient in struma generally ; it is taken away entirely by fright, anxiety, and grief. When lactation is carried to an exhausting extent, the mother often almost ceases to eat anything, and lives upon stimulants. It is often absent during hæmoptysis and menorrhagia, and a similar result is produced by diarrhœa, and sometimes by the presence of cancer. At such periods there is a positive disgust for solid food ; and if the patients force themselves to take it, the dyspepsia is so great that they naturally refuse to continue the experiment.

But though they cannot take solid food, they can take liquid nourishment, and probably digest it well, provided the quantity is not excessive, or the material such as their stomachs would reject in health.

Under the use of liquid food the strength may be gradually restored, and then it is to be noted that the appetite increases with the constitutional vigour, and the augmentation continues until the patient recovers his appetite for solid food. Thus, it may be said, that even in the debilitated the appetite will come with eating ; but it comes very slowly, and only by the use of food of appropriate character.

With this preface, we answer the question above proposed, in the following manner :—

Loss of appetite for solid food, with fondness for aliment

of farinaceous or saccharine character, a craving for stimulants, &c., indicate deficiency of digestive power. The cause of this deficiency may be localized in the stomach, as in cases of ulcer of that organ, or it may be general and constitutional; but into the diagnostic marks decisive of the category to which any individual case is to be referred, it is not our province now to enter.

A belief in the foregoing principles influences our treatment immensely in all cases of dyspepsia. It leads us to avoid all depressing agencies, to discourage any exertion which produces fatigue—even including “exercise” in the category—excessive mental labour, anxiety, &c., to do everything to increase the tone and vigour of the system, to adapt the food to the power of the stomach to digest it, to assist this by appropriate stimuli, to adjust the meals in such a manner that the stomach shall not have time to be exhausted, to recommend that the principal meal of the day be taken about noon or one o’clock, before the individual shall be exhausted by fatigue of body or mind, or a few hours’ fasting, and to eschew such habits as debilitate the stomach, *e. g.* tobacco-smoking and snuff-taking.

A few cases will illustrate our meaning practically :—

The histories of privation tell us, that if a person in good health has been fasting for only two or three days he may indulge his appetite, even to gormandizing, with impunity (*vide* “Ruxton’s Life in the Far West,” pp. 188-9); but if the privation is prolonged, food has to be administered with the greatest care, lest it should produce fatal effects.

In these cases there is simply debility from starvation—a similar effect will ensue if there is equal debility from other causes.

Miss Kate R., æt. 18, of very delicate constitution, had an attack of epidemic influenza, for which the sole treatment

her medical attendant adopted was a dose of salts. While weak from these causes, she ate a hearty solid meal. It was too much, and she died immediately afterwards.

These fatal effects, however, from eating heartily when there is much debility, are not common ; because, as we have mentioned, a healthy appetite is almost incompatible with much constitutional debility : where the two are combined, and a heavy meal is taken, it is apt to produce epileptic fits or apoplectiform attacks, which yield as soon as the stomach is emptied.

Cases like the following are very common :—

Dr. B. had an attack of fever, during which all appetite was gone and fresh meat loathed ; the fever left him, and in an hour or so afterwards the appetite for solid food returned, and his digestive power was perfect.

Mr. B., æt. 50, very consumptive, was extraordinarily weak, and loathed all solid food. He was kept weak by the use of mild aperients (grey powder, &c.) to relieve the bowels. The treatment was changed ; medicine abandoned ; cream with brandy, and milk with rum, used as diet ; the bowels became regular ; he increased in strength steadily, and with this came a healthy appetite for solid food, and a sound digestion.

Mrs. B., æt. 43, or thereabouts, had an attack of diarrhœa which pulled her down excessively ; the appetite entirely left her, and she was much troubled with flatulence ; in four days the diarrhœa ceased : quinine was then given, and in three days she felt perfectly restored ; and with returning vigour there was a healthy appetite and sound digestion.

John S., æt. 25, had acute double pneumonia ; on the fifth day he had profuse perspiration, which lasted thirty-six hours. At the end of that period he seemed constitutionally well. Up to that time he had not the smallest inclination for food. When I saw him, however, thus improved, I suggested beef-steak

and porter to him. His eyes sparkled at the idea, the food was allowed, and in two days he left the hospital as strong, apparently, as ever he was, though the lower half of both lungs were solid. He returned from time to time for examination : he had no relapse, but six months passed ere the lungs were perfectly restored.

Mr. H., æt. 65, had symptoms of intense dyspepsia following influenza ; fearing cancer, he went to London for advice, and was told that his case was simply indigestion from overwork. He was a lawyer, and had a large and anxious business to conduct. He dined late, and always reached home faint and exhausted. He had small appetite then, and so little digestive power that his meal overcame him, producing lethargy and flatulence. On learning these particulars, I simply recommended him to take as medicine, about three ounces of cream and half an ounce of brandy at eleven, two, and five o'clock. The result was apparent in a week, for by that time he had increased in flesh, had a healthier colour, went home with an appetite, and was comfortable during the evening. By sustaining his general power, the stomach power was sustained too.

Dr. K. never dines till late, and takes no lunch. He always takes a walk before dinner ; he invariably returns exhausted, ready for a meal, but with diminished power of digestion. Such meals are with him followed habitually by flatulence and dyspepsia.

Dr. — finds that if circumstances permit him, he can eat largely and digest well a meal taken about one o'clock ; but if he has nothing until six o'clock he loathes food, and has indigestion if he takes it.

Miss M. C. is so weak that three hours' fasting brings on fainting, and food every two hours is necessary to support the system.

Mrs. P. eats largely during the day, and is always comfortable in the evening ; but the long fast through the night is always followed by distressing faintness : this is always diminished by food taken through the night.

Mrs. S. had flooding after miscarriage, and was extremely weak. She required food half-hourly. She was unfortunately allowed to sleep too long, and she awoke only to die. Food was given, it is true, as before, but the digestive or incorporating power had gone. Practically, her stomach was dead ere she herself was a corpse.

When there is much constitutional debility, it is incredible the amount of nourishment which can be taken, and, indeed, seems necessary—which is digested, and yet which gives little, if any, appreciable support.

CHAPTER XIII.

DEFICIENCY OF VITAL POWER IN THE MUSCULAR SYSTEM.

Deficiency of vital power in the muscular system—Functions during health—Contractility—Voluntary and involuntary muscles—Paralysis—Irritability—Want of control—Cramp—Stomach, intestines, rectum, &c.

AFTER having inquired into the influence of deficient vitality on the most important organs of the body as regards life, we may devote a few words to another system, intimately connected with locomotion and comfort—the muscular system—and investigate the manner in which it is affected when the body is brought into a low condition.

The muscular system is commonly divided into two departments—the voluntary and the involuntary—those with striped fibres, and those with unstriped; but this is to a certain extent unsatisfactory to our purpose, and we shall find it more convenient to arrange the muscles under two categories—those whose action is rhythmical or regular, and those whose action depends mainly upon the action of the will. There are some, too, it must be noted, which may be placed in each category—*e. g.* the diaphragm and the muscles of ordinary respiration.

We will commence our investigation into the influence of deficient vitality upon the so-called voluntary muscles.

What is the function of a muscle? It is simply con-

traction. Under the direction of a certain influence, (transmitted from the nervous system, we believe,) a muscle approximates its two ends, and thus brings its two insertions into nearer proximity to each other than they were before ; or it may be, under the same influence the muscle becomes rigid, and prevents any motion : thus the action of the biceps may either raise the fore-arm, if the arm is straight, or keep it rigid, if it is semiflexed ; and the triceps extensor may either extend the arm, if already bent, or keep it straight, if the person wishes to resist a flexing power.

But it is to be noticed that the muscle does not exert more contractile power than what is necessary : it obeys the will distinctly, acting simply, as it were, according to orders. Its contraction is unattended with suffering, and if it is made rigid, there is no pain.

Its physical condition is almost as characteristic as its function—it is simply one of firmness and solidity, as contradistinguished from the softness and semi-fluidity of fat, &c.

Tendon, or fascia, forms an almost essential part of the voluntary muscular system, and its function is one of simple rigidity ; it may be described as an inelastic and unstretchable cord, capable of bearing the strain laid upon it, without the man being conscious of a painful sensation in any part of its course.

In what way are these functions influenced by deficient vitality ? Our first step must be to investigate the circumstances under which there is unquestionably a loss of vital power in the muscular system, and then, from facts which are well known, deduce others not so generally recognised.

There is no difficulty in recognising the fact, that muscular action ceases at the time of death. In many instances (in Asiatic cholera, for example), it is true that the contractile power does not pass away until some time has elapsed after

death, but it does cease entirely after the lapse of a certain period. We have no hesitation, therefore, in saying that deficient vitality involves deficient contractile power.

But we have an undisputable right to believe that vitality is departing from the body generally from the time an individual begins to die, up to the period of his actual dissolution, and that the muscles evidence this condition with the rest of the system. What, then, is their state shortly before death by some such lingering disease as slow fevers, anæmia, cancer, and the like? We notice that their physical condition is one of extreme softness; they have lost all firmness, and resemble fat; and with this they are liable to irregular spasmodic twitchings (so well known as *subsultus tendinum*), entirely independent of the will; and they are unable any longer to do the bidding of the patient's brain.

From these instances we turn to others in which there can be little doubt of the vital power of the body generally being impaired, and examine the phenomena attending muscular action in them. Let us take delirium tremens in adults, chorea in children, and debility with convulsions in infants. Let us go farther, and take those cases of excessive fatigue, in which the individual is reduced so low that he requires the utmost care to survive—*e. g.* persons long at the pumps at sea, or swimming for their own lives, or to save others. In all these there are the following phenomena:—A want of control over the muscles, these organs doing less or more than the will requires of them; great irritability, and great irregularity of action, including cramp.

Upon what this last depends it is difficult to say, but the fact is certain that cramp is far more common in a muscle when it is fatigued and exhausted, than when it is fresh to its work; and we thus become aware of the curious phenomenon, that *what appears to be excess of action may be*

produced by decrease of power, and that the rigidity of muscular fibre, which is perfectly *painless* in the strong, is intensely *painful* in the weak : an interesting corroboration of a remark we have previously made, that the process of dying is, in many parts of the body, attended with severe suffering.

When cramp passes away, it leaves the muscle and the skin over it in a state of *soreness*, the true explanation of which it is difficult, in the present state of our knowledge, to give. We call attention to the fact, because experience has shown us that excessive muscular action is always followed by a similar sensation—a sensation, however, varying so greatly in intensity, that some individuals simply describe it as “aching,” while others speak of it as being acutely painful.

We have already spoken at great length on painful muscular affections, in a work entitled “*Spinal Irritation, &c., Explained*,” and it is not necessary to go into the whole subject here. It will be sufficient for our purpose here if we advert to the fact, that excessive muscular action may take place in a variety of ways : by simple cramp, by long-continued exertion beyond the muscle’s power, or by a very ordinary amount of action when the muscle itself or the individual is extremely debilitated.

The soreness of the muscle is almost invariably accompanied by heightened sensibility of the skin over it, and this cutaneous affection has so often attracted the chief attention, that the condition of the muscular system has not been thought of.

This soreness and cutaneous tenderness is always in direct proportion to the debility of the muscular system, and is more marked during the convalescence from scarlet fever than in any other disease I am acquainted with.*

* A few months ago I had an opportunity of noting this in my own family. I was frequently called up during the night in con-

We find, then, as a general law, that deficient vitality in the voluntary muscular system manifests itself by diminished firmness, by loss of contractile power, by irregular action, by disobedience to orders, by painful rigidity or cramp—*i. e.* muscular contraction becomes *painful*, instead of *painless*—and by soreness.

An important corollary follows from these observations—viz., whenever a muscle acts irregularly, as above-mentioned, there is *primâ facie* evidence that it is weak ; and if weak, it is the province of the physician to ascertain whether it is so from being over-worked or under-powered ; that is to say, whether the muscles have been simply fatigued by a more or less temporary excess of labour, or whether they are weak from constitutional causes alone, or whether they are

sequence of my son, æt. 9, crying from the severity of certain pains. The fever had left him very weak, but he was vivacious enough generally while lying down. The first time he sat up in bed he had intense abdominal myalgia for many hours, and this occurred repeatedly, from a similar cause. On all other occasions he had myalgia in one sterno mastoid, from reclining on the elbow without supporting the head ; on another he had myalgia in the sternohyoid, sternothyroid, and the omohyoid muscles, produced by almost incessant talking and laughing. On all occasions the pain was followed by cutaneous soreness for some days.

My daughter, æt. 11, was an equal sufferer ; and the day after her removal into the country, for change of air, although everything had been done to spare her any exertion, she had such intense general myalgia as to appear a perfect cripple from rheumatism. For a long period, walking, prolonged sitting, talking, sewing, &c., were followed by severe muscular pains.

It admits of doubt whether the so-called rheumatic attacks following scarlatina are not in reality myalgic, and due to over-exertion in weakened muscles, and thus analagous to the pain, soreness, and stiffness, we all more or less experience after a hard day's labour at such unusual work as rowing, pumping, baling or wielding a heavy hammer.

acting irregularly from irregular nervous influence, or by all these causes combined.

The function of tendon, or fascia, being simply passive, the influence of deficient vitality upon it is not so distinctly marked as it is in muscle; it is, however, readily recognisable. It is manifested by the fibrous tissue being more readily stretched, such stretching being attended with more or less of pain. Thus, when the gastrocnemii and solei muscles are fatigued, and their vitality reduced by long-continued walking, or standing, or climbing, we must infer that the "tendo Achillis" is so too, and the result is more or less acute pain in that tendon. Long standing or long climbing in a mountainous country fatigues greatly the peronei muscles, tibialis anticus, and all those whose united action tends to keep the foot in its normal position; with the fatigue comes a greater stretchability, and many are the individuals who practically recognise this fact with great readiness, from the knowledge they possess, that they are infinitely more liable to "put out," or "twist," the ankle joint towards the end of a long walk rather than during the early part of it. However common such "twists" are to a pedestrian, he cannot remember one as occurring before noon.

The influence of struma and general debility upon white fibrous tissue is readily recognised in the failure of the strong ligaments of the knee and other joints, producing what is known as "bow legs," "in-knees," "spinal curvature."

We have already adverted to the influence of deficient vital force upon the respiratory muscles and the heart. It remains for us now to consider the method in which the involuntary and non-striped muscular system is affected from a similar cause. Such muscles are found in the œsophagus, the alimentary canal generally, in the bladder, and in the

uterus. All these, during life, have all separate functions to perform ; their action is more or less intermitting. In the œsophagus and the intestines the action is peristaltic, in a definite direction, and more or less regular and constant ; in the stomach, however, as in the bladder and uterus, distension is allowed to a certain extent, after which contraction follows.

Now, in cases where vitality is at a low ebb in the body generally, how do we find that these muscles are affected ? We find just what we should anticipate—viz., that their actions are irregular, and the rhythm which was present is lost. The œsophagus has its peristaltic action reversed : a ball seems to rise from the stomach to the throat, or instead of allowing the food to pass quietly and painlessly to the stomach, the muscles are affected by painful cramp, and dysphagia is the result.

The bowels may be affected in a similar manner—the peristaltic actions may be suspended, or the reverse ; or they may be so active that intussusception may take place ; or they may partake of the nature of cramp, and be attended, as in griping, with severe pain.

The bladder may refuse to contract when full, and thus it will become distended to an immense size, or it will refuse to be distended beyond a certain point, as in incontinence of urine. The unimpregnated uterus, which, under ordinary circumstances, is perfectly quiet, may take up irregular action, and contract its walls in such a manner as to give rise to anteversion or retroversion, and when impregnated it may either refuse to be distended to its healthy limits, and thus produce miscarriage, or it may suffer from irregular and painful contractions (independently of parturition), either before confinement or afterwards, as in spurious and after-pains.

CHAPTER XIV.

DEFICIENT VITALITY IN THE BLOOD.

Effects of deficient vitality in the body generally, and in the blood—Increase of fibrine—Decrease of red particles—Acute rheumatic fever—Gout—Fevers—Typhus—Influence of famine—Debility increases the secretions of the body, fæces, urine—Debility alters secretions, makes them denser, &c.—Influence of debility upon the excretions—Cases.

AFTER having investigated the manner in which deficient vitality in certain organs shows itself, our next inquiry must be more general in its nature; and we will try to ascertain its influence on the body as a whole, and on the blood, as one of the most important parts of the whole system.

We will begin by considering the blood, as being the most convenient, and ask in what way does the blood of an enfeebled man differ from that of a man in perfect health? The first point is to consider it under those circumstances when the existence of debility must be self-evident, and then to examine it in others in which there is reason to assume the existence of deficient vital power.

We presume that no one doubts the condition of a man or of any of the lower animals, when they are dying from pri-

vation of food—all must allow that they are in a very enfeebled state. The same may be said of any individual who has lost nearly half the blood in the body. Now, if we analyse the blood in these classes, we find two very notable departures from the healthy standard. The blood is very poor in globules, or red material, and extremely rich in fibrine. The proportional diminution of the former varies from 30 to 60 per cent., while the increase of the latter rises to 200 per cent., or even higher.

A similar change takes place in diseases eminently characterised by debility.* Thus, in pulmonary consumption, the red parts are diminished 50 per cent., and the fibrine is augmented 580 per cent.; and in one case it was noted, that after the patient had taken cod-liver oil, the excess was *diminished* until the amount of fibrine was only 250 per cent. above the average.

In cancer there is a similar phenomenon, the average excess of fibrine in that disease being 600 per cent. In one case of leucocythemia, in an old man who had been treated by calomel, the excess of fibrine was 1100 per cent.

In sea scurvy a similar change is seen—the red globules are diminished about 50 per cent., and the fibrine increased at the rate of 250 per cent.; and we may say generally, that in other diseases implying great debility or want of vital power, a similar change is found.

But the alteration in the blood is not confined to its chemical characters alone; there is a change equally conspicuous in its coagulating properties. An individual suffering under any of the conditions we have described, experiences great difficulty in arresting, in his own person, any accidental flow

* The tendency to hæmorrhage in phthisical patients was once attributed to the blood being poor in fibrine. This was clearly a mistake—a false deduction founded on a false fact.

of blood from wounds. In like manner, consumptive females, and others who are suffering from debility, are subject to frequent and excessive catamenial discharges, which there is great difficulty in checking. I knew one lady in whom two hours' walking always produced menorrhagia. Leeches applied to the skin of delicate children, of debilitated females or males, of those suffering from anæmia, chlorosis, erysipelas, and chronic secondary syphilis, produce wounds whose bleeding is arrested with difficulty; and generally we may say, that the arrestation of hæmorrhage is difficult, in direct proportion to the poverty of the blood in red particles, and its richness in fibrine.

We have elsewhere shown* that the quantity of fibrine in the blood is evidence of poverty rather than of richness, and that it is more allied to an excrementitious product than to one intended for nutrition; and, consequently, that the doctrines founded on the contrary assumptions were untenable, and the deductions drawn from them faulty.

If, then, we are able, by the assistance of the chemist, to ascertain that the blood abounds in fibrine in those individuals who have been long fasting, who are wasted by poverty and old age, or debilitated by cancer, &c., are we not justified in drawing the conclusion, that whenever there is excess of fibrine in the blood, a considerable amount of debility is present? And if this proposition be true, does it not lead to the important rule of practice, that in all such cases the physician must have his attention fixed rather on improving the constitutional powers than on impoverishing them by an antiphlogistic plan of treatment.

Acute rheumatic fever forms a most interesting illustration of the importance of this deduction. In it the excess of

* *Vide* Appendix, No. II.

fibrine in the blood is very considerable ; and when that was looked upon as an indication of richness, the disease was considered essentially sthenic, and thus it demanded for its cure the most vigorous bleeding and mercurial salivation. Under this plan it was found that the disease was not only long and severe, but that it was commonly attended with acute inflammation of the pericardium, or the heart generally, and laid the foundation for life-long complaints. But since the same disease has been treated on a milder plan, and the utmost pains have been taken to keep up the vital powers, cardiac complications have been rare, and the duration and intensity of the disease have been very materially reduced.

Remarks of a similar nature may be made respecting pneumonia, erysipelas, and other complaints, in which excess of fibrine is present.

We do not know how far fibrine is identical in its character with the colourless corpuscles of the blood ; whether they are so or not, the following observations of Mr. Paget are of considerable importance :—In order to satisfy himself as to the probable cause why inflammation in one man terminated in fibrous effusion, while in another it ended in suppuration, he applied a small blister to the skin of fifty individuals, and then carefully examined the serum produced. He found that this fluid was rich in colourless corpuscles in direct proportion to the cachectic condition of the individual, and still farther, that the more debilitated the individual the greater was the tendency to suppurative or destructive inflammation.

Associating this fact with what has gone before, with the close microscopic resemblance between the colourless corpuscles and pus globules, and the knowledge that it is in the cachectic constitutions that suppurative inflammations are

most common, we may fairly draw the conclusion, that an excess of fibrine in the blood, and a richness of colourless corpuscles, predispose inflammation, when present, to assume a low or suppurative type ; and if this deduction be true, we may conclude conversely, that the existence of suppurative inflammation indicates a very debilitated condition of the body.

This observation forms a very natural prelude to the farther inquiry—How does debility influence the body generally ? The answer is very simple—it predisposes it to all forms of disease.

In saying thus, we do not mean to affirm that no individuals suffer from disease except those who are in some way weakened—*i. e.* whose condition is below the normal condition of health at the moment of the attack. Such is far from being the fact. Small-pox and cholera, scarlatina and measles, attack the healthy as well as the unhealthy, though in smaller proportionate numbers ; nor does plague fasten solely on those whose health has been deteriorated by excess or other causes.

What we wish to call attention to is the fact, that, as a general rule, the weakly are more obnoxious to disease than the strong.

The importance of this law is such that it will be judicious to exemplify it by quoting a few well-known facts.

The victim of gout knows well that, though he has inherited the disease from his father, it does not attack him in the heyday of his youth, when his vigour is unimpeachable, and his health high ; during the prime of his manhood the complaint does not show signs of existence ; but when once his forces are upon the wane—when the toil and, possibly, the excesses of his youth have begun to tell upon his system,

and his circulation languishes with on-coming age, the disease fastens upon him ; and as his years progress, and his powers of life fail, it harasses him with unremitting pains. It is not the robust who are martyrs to the disease, but those who are delicate and weakly ; and every one is familiar with the long duration of the so-called asthenic variety, as contradistinguished from the sthenic.

Similar observations may be made respecting hereditary insanity, cancer, phthisis, and the like.

We see typhus follow in the wake of war and famine ; its haunts are those of poverty, misery, and distress. Like the plague, "it attacks the poor rather than the rich, women rather than men, patients already labouring under disease rather than healthy individuals, persons constitutionally feeble rather than the robust, and those who are addicted to intemperance than those who are strict followers of the principles of Mahomet." (Williams on "Morbid Poisons," article "Plague.") In dysentery the same law is apparent—the disease leaves the "officer" alone, and attacks the "private ;" it leaves the robust and fastens on the weak ; and, conversely, its invasion is controlled materially by a generous diet which keeps up the powers of the system to their natural standard. Thus it has been noticed in dysenteric districts, that the mortality of European troops from this cause has been diminished ninety per cent. by the substitution of fresh provisions for salt meats, all other things remaining the same. (Williams on "Morbid Poisons," article "Dysentery.") We may go still farther, and point to the remarkable influence exerted by quinine in preventing the accession of yellow fever in localities highly charged with the matter capable of producing it.* Thus it has been known that crews on board ships in African

* *Vide* page 64, *ante*.

rivers, when they have been treated by quinine, escape fever, while others lying beside them, not so treated, have the disease severely.

Take, again, the condition of woman at a time when her powers are very materially reduced by the exertion required in parturition and the consequent loss of blood, &c.—what more common than to find her succumb under influences that do not affect to an appreciable degree her female attendants? Puerperal fever, highly contagious though it be, rarely affects the nurse; nor is even the woman herself obnoxious to it, so long as her strength is firm, and she is not reduced by the contingent drains of “labour.”

From hence we may carry our mental vision along the hosts of patients we have seen, with skin disease, with ring-worm, porrigo, scabies, lepra, psoriasis; with chorea, convulsions, epilepsy; with scrofula, diseased bones, consumption; with indigestion, purging, hæmorrhage; with rheumatism, apoplexy, mania; with gonorrhœa, syphilis, dissecting wounds; with neuralgia, sciatica, cramps, hysteria;—and what do we find, but the broad fact, that these diseases are more common amongst the weak than the strong, amongst women than men, amongst the inhabitants of towns rather than of rural districts; that they are aggravated by low diet, by loss of blood, by excessive fatigue, by purging, by foul air and the like; and that they are improved by generous living, pure air, and tonic medicines?

If there be any truth in the foregoing considerations, if it be true that debility predisposes to disease, that disease implies the existence of debility, general, local, or both, does it not follow, as a most important corollary, that disease must be more difficult to cure in the debilitated than in the strong, that weakness of body will increase the tenacity of its grasp, and counteract the efforts of the physician?

And if this deduction be true, how false and mischievous must be the doctrine that I have heard expressed, which teaches that it is necessary to lower the constitutional power at the commencement of a disease, that it may be the more readily subdued in the end ; and how radically bad was that system of medicine, whose prime supports were bleeding, mercury, purgatives, antimony, and low diet, and which rarely used tonics and generous living until the weakness of the patient was such, that there was manifest and immediate danger of death from asthenia !

Nor when we contrast the active lowering treatment of the physicians in days not long gone by—if, indeed, they may be said to have passed away at the present date—with the do-nothing-in-the-medicine-way-system of Homœopathy, ought we to be surprised at the success of the latter ? for the drugs of the former did positive harm, by keeping up the conditions they were intended to cure ; whereas, in the latter system, the patient was at least left to the pure powers of nature, and ran no risk of dying of the doctor's misinterpretation of nature's signs.

I have already given many cases which will illustrate this remark : I may add another which has recently come under my care, and which proves forcibly the influence of debility in producing disease, and of certain medicines in aggravating it.

Mrs. M., æt. 35, was profusely “unwell” three months ago, and since that period has had menorrhagia frequently. Shortly after the first severe loss of blood, she began to suffer from indigestion, acidity, and flatulence. The bowels were irritable, and any mental emotion would bring on diarrhœa. The pulse was very weak, the circulation languid, the extremities cold ; there was tickling cough from relaxed uvula ; the sleep was disturbed and sometimes absent ; she had nausea in

the morning, and was excitable and "nervous" at night. She had a sensation of fulness in the bowels, for which she took Gregory's powder frequently. She had myalgic pains in various parts of the trunk, which were sometimes very severe. She had been very careful and abstemious in her diet, but had found no benefit from being so.

I adopted a tonic plan of treatment, with every possible adjunct, and laid an embargo upon all aperient medicine. Improvement was apparent in ten days, and in two months she was in better health than she had ever before enjoyed, and her husband repeatedly and emphatically said that the good was mainly owing to her having given up "the frightful system of dosing with Gregory's powder." When she was well, the following was her report of herself. She could now get through the day without discomfort, walk any reasonable distance without fatigue, go to concerts and parties without feeling sure that they would be attended with sore-throat and followed by catarrh. She was in buoyant spirits, and had lost her propensity to cry at trifles; the appetite was good, the digestion perfect, the bowels regular without medicine; the catamenia correct both as to time and quantity; the sleep was sound and natural; and there were no myalgic pains except after very unusual exertion. The only part of the treatment she still keeps up are those I laid the most stress upon from the beginning: viz., a daily rest for one hour in the afternoon after an early dinner, and a total abstinence from all aperients.

I scarcely need point out how forcible an illustration of the value of globulism this case would have appeared to be, had it fallen into the hands of those who, while they give steel and cod oil in full doses to support the strength, administer special remedies in such infinitely small proportions that they neither can do good nor harm. With improvement in the

vital powers all symptoms of disease abate, and the patient recovers ; how easy is it for a careless mind to ignore the influence of the general remedies which gave strength, and to attribute every good result to the special medicine which was given with the definite intention of curing this or that symptom ! It is this carelessness of mind which has made so many converts to a theory so manifestly absurd as Homœopathy.

In pursuance of this subject, we may next inquire into the influence of deficient vitality upon the function of *secretion* generally. In doing so, we shall come upon some very startling facts—startling not from their novelty, for they have long been familiar to all, but because their true significance has been so completely ignored, and a false reading of them adopted.

As far as I can ascertain the general notion about secretion, it is, that it is essentially an active process ; and that increased secretion, as a necessary consequence, implies the idea of increased action in the secreting organ. Thus we speak of perspiration as increased action of the skin, diarrhœa as increased action of the bowels, diuresis of the kidney, and the like. Still farther, we consider that various organs can be stimulated or goaded into increased action, and we find such ideas constantly put into formulas in the following manner : diaphoretics, diuretics, aperients, &c., are given to increase the action of the skin, the kidneys, the bowels, and the like.

Under other circumstances, we have the idea of increased action put in another form ; thus, in rheumatic fever, we are told that perspiration is an “effort of nature” to throw off or eliminate a certain poison ; in the diarrhœa accompanying many cases of Bright’s disease, we are told that the bowels take on “increased action” to relieve the kidneys ;

that in scarlatina the kidneys take on increased action so as to supplement the deficient action of the skin, &c. In all these instances, and many others we might name, there is a steady idea apparent, that increased secretion implies increased action, and that increased action implies increased power. This idea receives corroboration from the constancy with which increased secretion from the nostrils, bronchi, urethra, and vagina, are spoken of as produced by "inflammation" of the Schneiderian membrane, of the mucous membrane of the bronchi, &c.

Now we are not going to make the startling assertion that all our ideas on this point are wrong ; but to group a number of well-known facts in such a manner that it must be apparent to every one, that another interpretation may be given of the phenomenon of increased secretion, besides that of "increased action ;" and to point out some of the very practical conclusions which a re-consideration of the subject involves.

The first fact to which I would call attention is, that during the short period of life which elapses between an apoplectic stroke and its fatal termination, we have, in a vast majority of instances, if not universally, an abundant perspiration upon the skin, and a copious formation of mucus in the trachea and the larger bronchi. Cold, clammy perspiration, and the "death rattle" in the throat, have long been recognised in many diseases as immediate harbingers of death. With the dying condition of the patient before our eyes, it is impossible to attribute these phenomena to increased power, or increased action ; we must, on the contrary, allow that they are due to a failing condition of the vital powers.

But copious perspiration and abundant bronchial secretion do not always come together, and we may therefore advan-

tageously follow up each symptom separately, and ascertain how far the preceding inference is correct.

We ask, in what classes of persons *perspiration* is most common, constant, and severe? The answer is, it is an almost habitual attendant on consumption; it is nearly constant in hectic and rheumatic fever;* it comes on partially in the later stages of typhus fever; it is frequent in cases of psoas abscess and strumous disease of the bones; it attends simple debility, whether arising from accidental or constitutional cause; it is common in delicate children; and it is frequently produced by fright or other depressing mental emotion.† It often accompanies bronchitis; and one of the most severe cases of colliquative perspiration I have seen, arose from sexual excesses. In none of these instances can we suppose that there is increased action and augmented power.

With regard to the causes influencing the amount of the

* It occurs in every case of ague, and in that is cured by quina; and I have recently met with it as a very troublesome symptom in a lady dying of debility and old age.

† I have repeatedly had occasion to note that those cases of acute rheumatism are the most severe and most difficult of cure, in which the amount of perspiration is most excessive. I have rarely seen these recover under three weeks. In all the first sign of improvement is a gradual restoration of the skin to its healthy character. In one case now under my care at the Liverpool Royal Infirmary, the man was very pale and weak, the sweating was extreme, and a copious miliary eruption (sudamina) accompanied it. A profuse supply of lime-juice was given, but with little apparent effect; on the fourteenth day, however, full doses of the tincture of the sesquichloride of iron was substituted for it, and the patient shortly experienced a considerable abatement both of the pain and sweating, and spoke of a consciousness of increasing strength; and he has been steadily improving up to the present date, viz., the twenty-first since his admission.

bronchial secretion, we may again ask, In what persons is it most abundant? We find it far more copious in old age, when the powers are low, than in youth, when they are vigorous, and it augments in quantity every year as the patient grows older and is more enfeebled; it is increased by all depressing agencies, by the action of cold upon the surface, which checks the circulation, by the abstinence of food which poverty too often enjoins, and by the use of such drugs as mercury, squills, colchicum, and antimony.* It is

* The following cases illustrate the influence of antimony on the bronchial and cutaneous secretions:—

R. J., æt. 40, of spare frame, and habitually asthmatical, suffered on two different occasions from pneumonia and profuse bronchitis; from each of them he recovered slowly but completely; in the intervals he drank to excess. I then lost sight of him, as he went to reside in the south of England. One day, however, I received a note from his wife, stating that he was ill again, with his old complaint; that he was far weaker than he had ever been before, and that the expectoration was most profuse. In reply, I recommended her to tell his doctor that he required a free exhibition of stimulants, and that antimony would do mischief. In a few days more I heard that Mr. J. was much worse, that he thought himself dying, and that he was too weak to sit up in bed without fainting; that he perspired profusely, and the cough and expectoration were worse than ever, and, in answer to my remarks, his doctor had said that he was administering antimony, and he thought it was of service. I again wrote as before, and stated that I knew that tartar emetic acted on my old friend as a poison; but his attendant persevering in its use, the patient refused to take any medicine but tonics, and from that time began to improve, the overwhelming debility produced by the drug left him, and with this the skin became drier, and the bronchial secretion diminished, and he regained his usual health by slow degrees.

Mrs. M., æt. 40, had an attack of acute bronchitis, for which she was treated with expectorants, small doses of antimony, and a blister to the chest. As she did not improve, I was requested to visit her in consultation. I found the whole of both lungs affected with the

increased by even trifling exercise, and I have known in many cases a short walk to prove fatal. The bronchial secretion is unusually abundant in strumous children, in those who have a tendency to decline, or are already in consumption. I have known an inordinate amount of secretion induced in a young woman by fasting, and almost magically cured in less than three days, by a very generous diet. Nor is the fact without interest, that of all the popular remedies for profuse bronchitic secretion, those are the most successful which are practically the most stimulating, *e. g.* ammonia, polygala, myrrh, ammoniacum, tinctures, balsams, &c.

We now extend our inquiry into other secretions, and what do we find? That struma is very generally attended

complaint, the cough severe, the expectoration purulent and excessive in quantity, the skin moist and perspiring, and the debility considerable. Acting on the views here promulgated, I recommended steel as a tonic; five grains of styrax pill three times a day, to relieve the cough; friction with turpentine liniment to the back of the thorax, as a local stimulant; inunction with oil on the arms and thighs, to assist the diet; the inhalation of the vapour of turpentine, as a stimulant to the mucous membrane of bronchi; with equal parts of rum, honey, and lemon juice, as an expectorant; generous diet with wine, etc.

Improvement was perceptible in twelve hours, but on the second day she was thrown back by mental agitation and anxiety. On the fourth day, however, I found her so much improved that I discontinued my visits; at that time the cough was easier, the expectoration had diminished one half and had lost its purulent character, and become simply frothy mucus. With this change in the bronchi, a corresponding one had taken place in the skin; instead of its being moist, clammy and perspiring, it was firm and of healthy dryness, and it was impossible for us not to conceive that there was an analogy between the profuse expectoration of bronchitis and the excessive sweating of phthisis. In a few days more the patient was entirely cured.

with increased secretion from the eyes, the nostrils, the bronchi, the bowels, the skin, and in females from the vagina; that a weak old age is attended with, and often fatally ended by, hydrothorax and hydropericardium, *i. e.* increased secretion from the pleura and pericardium; that ascites is common under the same circumstances; and that general dropsy frequently occurs from debility or old age, even when there is neither renal or cardiac disease. We know that large losses of blood occasionally eventuate in the same phenomena. We know that the children of consumptive parents are unusually liable to increased secretion from the lining membrane of the cerebral ventricles, *i. e.* to watery effusion. I have had many patients under my own eye, in whom hydropericardium and hydrothorax have been traceable to no other cause than cold, privation, misery, and hard usage at sea. I have had others, in which large effusions into the knee and elbow-joints have been due to a similar cause, and where the products of the increased secretion of the synovial membranes have been taken up again under the influence of strong local stimulation, *e. g.* blisters and iodine paint. Still farther, we know that diarrhœa, *i. e.* increased secretion from the bowels, is a frequent cause of infantile death in the miserable dwellings of the wretched poor, where starvation is more common than profusion, and a low vitality than a flush of strength. The same complaint is common in struma, phthisis, typhus, and other exhausting diseases; it often attends sea scurvy, and is almost habitually produced by fear, the most depressing of all emotions. Fear will also produce, both in man and woman, a profuse diuresis.

If we turn to the female sex, we find that the secretion of the catamenia is increased by debility; that in the consumptive or strumous, it is not only excessive in quantity,

but that it is brought on at irregular intervals by an amount of exertion and fatigue totally inadequate to produce similar effects on the healthy.* We find, too, that the vaginal secretion is wonderfully increased in the delicate female ; and that leucorrhœa is at once the evidence of debility and the cause of its continuance or increase. In man, we find that the quantity of semen is augmented by various depressing agencies, such as excessive heat, excessive fatigue, and sexual excess ; the quality of the secretion is deteriorated, but the amount formed in any given period, say for a week or a month, is amazingly increased, *i. e.* in spermatorrhœa the amount of the discharge will reach an ounce in three weeks or thereabouts, whereas in health the same amount would not be discharged spontaneously in as many months.

Nor does our experience of gonorrhœa militate against the preceding facts, as we have had repeated opportunities of noticing that the discharge is always most excessive in those of a strumous habit or debilitated frame ; and that it may in them be diminished more surely by the use of steel or other tonic, than by a rigidly meagre diet and total abstinence from stimuli. And we would call attention to the well-known fact, that the most popular medicines in that complaint are such excitants as cubebs and copaiba, *which stimulate the parts to decreased action.* Nor is such increased secretion confined to cases of venereal origin ; for I have the following account from a well-known physiologist :—" In my most feeble state," he writes, " I observed the secretion from the glans penis to be *unusually* abundant, so much so that, having omitted for three days to take my cold bath in a morning, I found stains on my shirt." I have myself repeatedly noticed that the glans is far more moist, and the sebaceous secretion around the corona

* *Vide* Mrs. M.'s case, page 198, and another casually mentioned, page 193.

far more abundant, in delicate or strumous young men, than in perfectly healthy subjects. A similar remark applies to the vulva of females.

We next turn to the secretion from the kidneys, and find that it is no exception to the rule. This secretion, as we have already remarked, is increased by fear and by hysteria—essentially a disease of debility; and in diabetes insipidus—which, there is reason to believe, is the *result* of extraordinary debility of the constitution, rather than its *cause*, inasmuch as the amount of solid matter excreted is too small in itself to produce any marked effect on the system—the amount of the secretion is excessive. Few are ignorant how much the secretion of the mucous membrane of the bladder is increased during that low state of vitality which accompanies paraplegia; and how the mucus, till then hardly recognisable in the urine, becomes one of its most characteristic ingredients.

Respecting the liver, we have not much definite information to offer: all we can say is, that its sugar-production is increased, as in diabetes, by certain debilitating agencies, and is diminished by such things as increase the patient's strength.

Respecting the influence of debility in increasing the secretion of the stomach, we cannot say much beyond the fact that waterbrash is common in those whose stomachs are weakened by ulceration, etc.

But our facts do not end even here; for we may now turn to parts in which the amount of secretion is naturally so small as to be imperceptible, viz., the eye and external ear. In the former, we have increased secretion in the poorly fed, the delicate, the strumous, and the aged. Shakespeare, amongst the characters of old age, sets down "a moist eye," "eyes purging thick amber and plum-tree gum." And we may add as a significant fact, that those who are weakly, not only weep

sooner, but cry with far more copious tears than those who are strong ; that an hysterical burst of crying may be repeatedly checked by a glass of wine, or other stimulant ; and that many a man will, when fasting, weep over griefs, which cannot bring a single tear if presented to him when full. In the ear, we have otorrhœa occurring amongst the scrofulous, the children of consumptive patients, and in those who are or have been reduced by scarlatina or other depressing diseases. I have seen it come on when the patient was at the lowest extremity of weakness, and go off as he returned to his strength.

We speak with some hesitation respecting the influence of deficient vital power on the secretion of the milk in the female. But we think that we have noticed, as a general rule, that very healthy women have not so large a quantity as the weakly ; that the quantity in the weakly increases in proportion to the debility lactation produces in them ; that large quantity and good quality do not generally go together ; and that the influence of tonics and stimuli upon a nurse, is to increase her own health and condition, and to diminish the quantity of the milk produced.

Let us for one moment turn to one of the causes of increased secretion, the presence of so-called chronic inflammation. What are the facts connected therewith ? Why, that during the acute stage of the disease, when the power or increased action may be considered at its height, all secretion is suspended and the secreting surfaces are dry ; that the increased secretion comes on when the inflammation is chronic, and that the parts are restored to health under the influence of stimulants. We know to what extent debility increases the secretion of pus from a sore ; how it abounds under the use of poultices, and almost disappears when dry lint is used, or any stimulating wash or ointment.

Coupling all these facts together, we are forced to the conclusion, *that increase in the amount of any secretion is not evidence of increased action or augmented power, but that it may, and very frequently does, result from diminished vitality, and even expiring life.* How frequently these last conditions are the cause, I would hardly venture to enunciate. My impression is, that they are far more common than any one has hitherto supposed.

The practical application of the view we have been setting forward is readily appreciable. Chronic bronchitis, strumous coryza, and some other profuse discharges, have long been treated by stimulants and the most generous diet; but in some other diseases, which fairly come into a similar category, the same principles are studiously avoided. Thus, in gonorrhœa, while we give with one hand such stimulants as copaiba and cubebs, and even apply such local irritants as cantharides externally, we take away with the other hand the patient's beer and wine. I have long thought that this plan could not be the correct one, and I have sought, first, for some reason why alcoholic stimuli should be prohibited in any case; secondly, when they might be administered with advantage. The reason why they are in general tabooed is, because gonorrhœa is most common in young men, that it prevents them from having connexion, that this encourages erections, that erections are very painful, and that alcoholic stimuli increase sensual desire, and promote erections; hence they are forbidden. But if erections are not troublesome, and rarely, if ever occur; if the patient be not strong, is of a strumous habit, has much exertion, or suffers from any cause of debility, tonics and alcoholic stimuli may be given with great advantage. Under their use I have seen cases of gonorrhœa yield rapidly, which had previously appeared to be intractable.

But there is another application of the subject to which I must refer in a few words. If the increased secretion into the cells of the areolar tissue in general *dropsy* has its origin in an enfeebled condition of the system, (and we will not waste time by demonstrating that it is not produced *simply* by obstruction to the circulation, for that will exist as in phlegmasia dolens, &c., without dropsical effusion, and heart disease without dropsy is common enough,) is not any plan of treatment which ignores the use of strengthening remedies manifestly insufficient to complete the cure? Is not the plan of treating it by diuretics and frequent purgation alone radically bad? To these observations I will add, that I have had under my care a girl with general dropsy from renal disease, in which an artificial diarrhoea had been kept up for some months, ere she came into hospital, and during that period the anasarca had steadily increased. On her admission, the treatment was entirely changed, the purging checked, and tonics given, and an improvement was immediately apparent. She remained, however, only under notice for a fortnight, and was taken away by her friends, the dropsy remaining uncured.

Many cases have now come under my notice in which anasarca, ascites, hydropericardium, and hydrothorax, have been greatly relieved, and in some instances completely cured by the use of tonics alone. Nor is it uninteresting to know that amongst the most popular medicines in the last two complaints is iodide of potassium, which acts as a local stimulant to every part of the body to which it is conveyed.

To these views it has been objected (1) that secretions may be divided into active and passive; (2) that the latter are almost entirely physical acts, and (3) that many of the secretions named above are increased not because they contain more solid matter, but simply because there has been a transudation of

water, which has diluted them. But these objections have little force; for it is practically impossible to draw any limit between active and passive secretion. Nor is it possible, so long as secretion is not met with in the dead body, to call it a physical act. The third objection is founded on false facts; for true experience teaches us that, in the cases we have referred to, the secretion is oftentimes thicker than usual, and in many instances changed in quality. Thus in diphtheria, a disease attended with most intense debility, we have a very dense, copious, and tenacious material, produced by the mucous membrane, far exceeding in quantity and firmness healthy mucus. And we may add, still further, that the complaint is best treated by most vigorous local and general stimulation.

Again, the more asthenic is the type of croup, the more dense is the tracheal secretion.

A very dense secretion of mucus is frequently formed in the throat whenever a patient suffers much from relaxation of the uvula, soft palate, and fauces. The following is a case in point:—Mr. M., æt. 55, called upon me complaining of the daily discharge of a very dense pellet of mucus from the left nostril. His eyes gave evidence of previous strumous ophthalmia, which he told me he had had very severely when a lad and young man; and he told me that he had had an attack of erythema nodosum twelve months ago. I then examined his throat. Its appearance would almost have warranted the statement that he had chronic diphtheria. There was daily a very tenacious discharge of mucus from the fauces, but of that he thought little. It was evident in this case that the nasal and other discharge was due to local debility, and connected with struma, and an appropriate treatment was adopted with great relief.

Again it is to be noted that leucorrhœa from debility is

not simply an augmentation of the natural vaginal mucus—it is in many cases of a genuine purulent character—and so far from its being a dilution of the healthy amount, it exceeds that in solid material by fifty or a hundred fold. In a healthy state the mucus never appears outside the vulva at all; in great debility, it flows outwardly in a continuous stream.*

* In connexion with altered secretion, I may briefly touch upon a point which has not, to my knowledge, been investigated by chemists or physiologists, viz. the acidity of the cutaneous secretion. I have often noticed that the prolonged application of oil-silk to the naked skin produces a considerable amount of inflammation, and sometimes an eruption of vesicles. I, at first, thought that this was due to some quality in the impermeable material employed, but more extended experience demonstrated that similar results followed the use of gutta percha and India rubber, and that somewhat similar effects were produced by thick linseed-meal poultices. After wearing an impermeable finger-stall for some weeks (in consequence of an accident to a nail), I found all the part covered up was inflamed and brawn-like, and covered with minute vesicles from which a serous pus escaped, and the whole skin subsequently exfoliated, as after erysipelas, &c.

An elderly gentleman of my acquaintance has on more than one occasion had extensive cutaneous inflammation, excited by the use of too large a piece of gutta percha applied as “water dressing” to a sore, the redness being confined entirely to the surface covered. Every accoucheur has had his attention called to the redness and soreness (intertrigo) produced in young infants, in parts where two folds of skin are in contact: the surgeon knows that if he should strap two fingers together, without an intervening substance, the surfaces opposed to each other will become inflamed; and the lusty pedestrian knows, to his discomfort, that a most painful inflammation is produced at the spot where the nates come in contact with each other, whenever he takes an unusually long or perspiring walk. In young female children, too, we often see that inflammation is present just where the “labia” are in contact with each other.

Hence we infer that there is some acrid material naturally secreted by the skin, the retention of which within it, or the prevention of whose escape, will produce the same effect as the application of an irritant.

If such a material pass from the skin, we may infer that a similar

Taking all these things into consideration, we cannot come to any other conclusion than that increased secretion is not necessarily a proof of increased action, and that it is very commonly an evidence of decaying vigour, possibly of departing life.

In the preceding paragraphs we have called attention to the influence which a debilitated condition of the system has upon *secretion* generally: we must next examine the influence the same cause has upon the *excretions*.

one may be formed by certain mucous membranes. Be this as it may, it is certain that the nasal mucus in scarlatina, catarrh, and struma, is sufficiently acrid and irritating to produce inflammation of the upper lip. In like manner the leucorrhœal secretion will occasionally give rise to inflammation of the vulva in woman, and a corresponding inflammation in the male who has come in contact with it. This occurs when there is no venereal taint; and when this is present, the effect is heightened. Thus gonorrhœa in the female is never so virulent as when the discharge is profuse; and in man, as a general rule, the discharge is irritating in proportion to its quantity. In many of the above cases the secretion is very acid; in others it has an alkaline reaction.

If we adopt these views of secretion, it will follow, that one very important item in the treatment of leucorrhœa and gonorrhœa is the frequent removal of the irritating secretion from the mucous membrane. In the former this is generally acknowledged, but not in the latter.

To test the truth of the idea, I treated gonorrhœal patients with nothing beyond frequent syringings with tepid water and tonics where necessary, and I found the results on a small scale so highly satisfactory, that I mentioned them to Mr. Nisbet, of Egremont, of whose practical knowledge I have the highest estimate. His reply was characteristic, viz. "There are two ways of washing out the urethra—one by syringing with water, and the other by cleansing it out with watery urine. I have long been in the habit of telling my patients to drink plenty of weak gin and water and to micturate every ten minutes, or as often as they can, and I scarcely ever have a case which lasts over three weeks; and I have never occasion to order any medicine or the use of a syringe." As his plan is the simplest, it is the most worthy of adoption.

All of us are more or less familiar with the fact that the excretions do not decompose, as a general rule, while they are in the body. The *fæces*, retained though they be sometimes for days, and in some rare cases for weeks and months, in the colon or the rectum, do not decompose there, as they do when they are expelled from the body ; and this observation holds good, even though the bowels are distended with flatus, and the *fæcal* matter is in contact with a gas differing in no degree from common atmospheric air. The urine, when retained in the bladder, becomes denser, and undergoes some change ; but it does not decompose in the same manner, in the interior of the body, as it does when expelled therefrom and kept in a close, well-stoppered bottle. We account for this by saying that the excreta have a certain vitality so long as they remain in the body, which enables them to resist the ordinary laws governing the inorganic world.

But we know from experience that the vital power does not leave a limb immediately after it has been amputated ; and it becomes, therefore, a question whether vitality may not also remain in excretions for some time after their expulsion from the body. In other words, do the excretions lose their vitality as soon as they are expelled ? or is there a period during which they successfully resist chemical laws ? And, if such period exist, is it definite for all ? Do the excretions of some decompose, *cæteris paribus*, sooner than those of others ? and, if so, can we associate that phenomenon in any way with the condition of the individual at the time ?

My attention was first called to this subject in the following manner. When M. Ledoyen came to Liverpool, about twelve years ago, to demonstrate the deodorising power of his "disinfectant" fluid, with other experiments, the following was made. The alvine dejections of a certain number of patients, ill with fever and various other diseases, were all placed side by side, to the number of thirty or more, in a

small room attached to the pauper hospital. They remained all night in the chamber, and the next day M. Ledoyen commenced operations. After demonstrating the general advantages of his compound, he proceeded to sprinkle a few drops of his diluted mixture into each utensil. The amount used was the same in each case; but the appearance produced varied immensely; and, according as the chemical change was excessive or otherwise, he judged of the condition of the individuals who had passed the "motions." "This patient," he would say, "is not very bad; that one is seriously ill; this one is dying; this one is nearly dead;" &c. As his observations were correct, he was asked how he judged of the danger the patient was in? His reply was, "that he had found, in the course of his experiments, that *fæces* decomposed rapidly or otherwise, according to the debility of the individual passing them."

For a period, the principle here enunciated seemed to belong to the class of interesting but useless facts. More recent observations have, however, shown that it may be turned to good practical account.

If any one will diligently consult the napkins used by infants, he will find that, during the time the motions are of a good healthy yellow colour, they have a peculiar odour, which they retain for twelve hours at least; but if, from any cause—*e. g.*, debility in the nurse, or inappropriateness of the food—the child loses its healthy condition, the motions not only change in colour and consistence, but in smell, and decompose in a very short time after being passed. Where there is diarrhœa and excessive depression of the vital powers, the motions are often found to be decomposed in a few minutes. We may notice, too, that a similar result is met with at the same time in the other secretions of the child; and that the urine decomposes quickly, and the breath is foul or sickly.

But it is not in children alone that this change may be detected : it is equally evident in adults. If, for example, the doctor is called to attend a case of diarrhœa, where there is always more or less debility present, he may consider it necessary to inspect all the alvine discharges that take place. His visits are at intervals of twelve hours only ; and he has on each occasion placed before him perhaps as many as six motions in different utensils. He is probably struck with the different odour exhaled from the various specimens, and notices a difference in the colour ; but a few words from the nurse soon explains the mystery. The dark brown stinking ones are those passed the longest period ago ; the healthy-looking and smelling ones are those passed only a short time before the doctor's visit.

Simple though this fact seems to be, it is one which is not universally acknowledged and acted on. I have known "motions" which have simply become decomposed taken for "foul secretions," and the patient dosed with mercurials, under the impression that they would improve the condition of the bowels. The result has been what might have been anticipated ; the patient has got weaker, and the bowels no better. The following case came under my notice some time ago. It is valuable as illustrating the danger resulting from inattention to these points.

An elderly gentleman was under treatment for indigestion. He was improving upon a tonic plan of treatment, when he was induced by his friends to have a "second opinion." When the physician called, he was shown a motion which had been passed twelve hours before. It had undergone decomposition, and was pronounced to be extremely "vitiated ;" and, with the intention of improving the secretion, a mercurial alterative was prescribed. This acted freely ; and when the visit was made the next day, the motions were all inspected, and, as the latest passed seemed to be the most

healthy, the natural conclusion was that the medicine had done good. It was therefore persevered with ; on the next occasion, and for some time subsequently, only the last motion passed was inspected, and as it had not time to be decomposed, it was thought to be healthy, and the patient was supposed to be "better," as his secretions were no longer "vitiating." But, notwithstanding this opinion, it was clear to the first attendant that the man was getting more feeble and debilitated day by day. If the medicine did improve the secretions, it certainly impaired the strength. It was then doubted whether the first inference was correct ; and, to decide this, the nurse was directed to save all the "motions," and arrange them in the order in which they were passed. When they were inspected, the same order of things was noted as at the first examination ; but the older ones appeared more vitiated than ever, and the most recent ones had begun to change in colour. It was interesting to know how the same fact struck the two doctors. One remarked, "that with such excretions, there was greater necessity for an alterative than ever ;" the other said, "that seeing such had been the effect of the alteratives which the patient had already taken, the sooner they were suspended the better." This led to a warm debate, which was ultimately decided by an appeal to the nurse. Thus : "Nurse, which is the last motion passed ?" "This" (the healthy-looking one). "How long has it been passed ?" "An hour." "What was the appearance of the other motions when they were passed ?" "They looked precisely the same as the one first referred to." "Then they have all changed in appearance since they were placed here ?" "Yes." "Do the motions change in appearance now more rapidly than they used to do ?" "Yes." This confirmed the idea that the "vitiating character of the excretions" was, so to speak, a *post mortem* appearance, and simply indicated a smaller

amount of vital force (as opposed to chemical) than is usually possessed by vital products when separated from the body. The termination of the case showed the justice of this view ; for the patient's strength continued to diminish, and he died shortly afterwards of pure debility and exhaustion. It is useless to speculate upon what might have been the result had the phenomena been read correctly from the first.

As decomposition takes place in the alvine secretions very rapidly in fevers and all diseases marked by great debility, the practitioner must ever have his attention alive to the fact, that what he calls "vitiation" may be more apparent than real, and a sign which calls for stimulants and strengthening remedies rather than mercurial alterative medicines, whose invariable effect is to make a weak patient weaker.

The excretions of the body being comparatively few, and for other reasons, we cannot prosecute our inquiries into the influence of vitality upon them in the same way as we did concerning the function of secretion. We are not in the habit of requesting our patients to retain their saliva, their tears, their leucorrhœal or catamenial secretions, &c., for our inspection ; consequently we know little about the phenomena of decomposition in these fluids and the changes effected thereby.

There are, however, two other excretions with which we are tolerably familiar ; namely, the breath and the urine, respecting which we may say a few words. As a general rule, we know that the breath of healthy children is free from any odour perceptible to our senses ; and we may say the same of that of healthy adults. But as soon as a child begins to suffer from debility, we know that we can recognise in its breath a variety of unpleasant smells, which we designate as sour, sickly, or putrescent. These odours are increased in intensity and duration by every cause which tends to augment the existing debility ; and they go away as soon as the

health is restored. In adults, the influence of debility in producing "foul breath" is very remarkable. I know individuals in whom it is invariably produced by a day's fatigue, by the occurrence of the catamenia, or by the too prodigal use of aperient medicines. In these instances, it is cured by wine, tonics, and rest, as certainly as diarrhœa is checked by opium, &c. In others, it comes on in consequence of indulgence in such passions as anger, or from excessive fear, anxiety, and disappointment. In others, it precedes and accompanies asthenic indigestion, and in such a debauch as surely followed by foul breath, as it is followed in others by nausea and headache. Of course, it may be argued that this foul breath is not due to decomposition of the expired air after it leaves the lungs, but simply to the exhalation of "crudities" already existing in the blood. I acknowledge the force of the argument; but it matters little which solution we accept, so long as we recognise in such phenomena the presence of impaired vital force, and the necessity that exists for adjusting the work to be done to the constitutional power to do it.

There can be no such difficulty respecting the urine. Under ordinary circumstances, this excretion continues for about four and twenty hours, without undergoing any perceptible decomposition; but when the individual passing it is weak, decomposition takes place with a rapidity varying according to the amount of debility present; nay, we may go further, and say that in some instances—as in paraplegia, where the vitality of the kidneys and bladder is very low—the urine is actually decomposed ere it leaves the body. The decomposition is recognised in a variety of ways: by the smell, by the occurrence of vegetable growths, vibriones, torulæ, &c.; by the abundant formation of ammoniacal salts; by turbidity, &c.

It is scarcely necessary to remark that we are fully alive

to the fact that atmospheric conditions have a great influence in promoting the rapid decomposition both of urine and faecal matter. What we want to call attention to is, that if on a cool day and in a cool room the urine of a patient shows evidence of decomposition in twelve hours, it is evidence of a debilitated condition of the bladder, the kidney, or the system generally. As such conclusion seems very dull and meagre, however, when thus announced, we will endeavour to point the moral by recording the case which originated this train of thought.

A medical friend sent me a bottle of urine, with the laconic request that I would give my opinion upon it, and my views of the treatment to be recommended. The sole information he imparted to me was, that it was passed that morning by a boy about ten years old. After allowing the fluid to stand for some hours, it was examined microscopically, and by simple chemical tests, &c., but nothing wrong could be found with it, except that it had begun to decompose. The first impulse was simply to communicate that fact to my friend, and leave him to draw his own inference; but as it would be an useful mental exercitation to put down the conclusions which might be drawn from that fact alone, I resolved to give an account of the symptoms that I thought the case would present.

The following was the train of argument. As there is an absence of much vesical mucus, triple phosphates, &c., there is presumptive evidence against the idea of vesical or renal disease. There is then general debility; and the presumption is that there will be debility in all the organs of the body, and consequent disorder of function. The signs by which deficient vital power in the brain and nervous system, in the respiratory, digestive, cardiac, and other sets of organs, might generally manifest itself, were then mentioned.

Commencing with the nervous system, I reported thus:—

The child is either preternaturally sharp, quick, and irritable, or he is dull at his lessons, and careless under instruction. He is probably lively and active during the evening, and very heavy and sleepy in the morning. He suffers occasionally from headache, which is relieved by rest in bed. He is soon "put out," the tears are near the surface, and he is given to quiet mischief.

His breath is probably offensive, he sighs a good deal, and is rather short-winded on exertion.

His hands and feet are cold, and he suffers from palpitation, and his pulse is quick and weak.

He is always improved by food. His tongue is foul, and broad, and pale. His appetite is variable, and he suffers from occasional nausea while eating. He is troubled with wind on the stomach in a morning.

His bowels are variable, generally costive; and the motions have a sickly odour.

His skin is unusually moist or dry, and possibly there is some eruption on it.

His muscular system is weak and flaccid.

He suffers from myalgic pains in the back and trunk, and probably in the limbs.

The plan of treatment in such a case is one essentially tonic and invigorating.

In a day or two I had another note from my friend, saying that it was impossible for any one who had seen the case to have given a more accurate account of all the symptoms the lad was suffering with, and stating that I had mentioned certain symptoms which were present, but which had not been recognised until my report was received. He was surprised, and naturally so, at what appeared to be a *tour de magicien*; but it will be readily understood, that the symptoms I have enumerated are simply those indicative of general debility, and that when the presence of this has been

ascertained, there is no difficulty in enunciating the most probable signs by which it may be recognised in the different organs.*

* It is scarcely correct to call the *milk* an excretion; but it is certain that the influence of debility upon it is more marked than upon any of those we have named. A young mother may be well able to nurse her offspring, but as her years increase she finds herself unable to do so; not because the supply fails, but because the milk seems positively poisonous to the baby. At first this may be counteracted by steel, quinine, generous diet, and by country air; but as she advances in years, these do not suffice. A weakly mother invariably produces "windy milk," and ensures a crying child. She produces this vitiated milk equally whether she is constitutionally or accidentally debilitated—a day's passion, purging, anxiety, fasting, or fatigue always "tells" upon the child. An hour's daily rest for the mamma, with a bottle of strengthening medicine, will produce refreshing quiet in many a scream-resounding house; and tonics for the mother will quiet an infant far more surely than all the soothing syrups ever invented.

I am at present collecting information respecting the rapidity with which the perspiration decomposes; the facts, as they already appear, arrange themselves thus:—The perspiration in acute rheumatism is generally very sour-smelling, but it very frequently is odourless; it smells the strongest in the worst cases, and especially when "any internal complication or metastasis supervenes:" these are the cases which are unquestionably attended by the greatest debility. The perspiration and the odour are greatly diminished, and ultimately cured by tonics. (*Vide* case, p. 202, note.)

But the sour-smelling perspiration is not peculiar to rheumatic fever; it is occasionally to be met with in phthisis, after delivery in very delicate women, in strumous diseases of joints, and other diseases characterised by great loss of vital power.

Consequently it admits of doubt whether the peculiar odour is not due to a rapid decomposition of the perspiration *after* its formation, and not simply to an alteration in the chemical constituents of the secretion.

This idea receives corroboration from Dr. Copland's remarks, article "Skin," paragraphs 6 and 7: "The sweat of rheumatic and gouty persons is generally acid, whilst in putro-adyndamic fever and scurvy it has a putrid odour. The sweat of scrofulous persons resembles sour beer." Slack says that "lactic acid is increased in

The practical conclusion to be drawn from the foregoing observations is obvious. If the physician finds that the excretions of any of his patients decompose more rapidly than they would do during health, (under the same external circumstances of light, air, and heat,) he may feel certain that the vital powers are seriously impaired; and if under the treatment he adopts, decomposition occur at an earlier period than it did before, there is reason to inquire whether such phenomenon is due to the augmentation of the disease itself, or to the medicines administered for its cure. It will then be a subject for consideration whether the plan of treatment is to be further developed in the same direction as before, or to be fundamentally changed.

Nor is this a matter of so slight importance as it might at first sight appear. Many seem to think that it is the simplest matter in the world to enable a patient to regain strength; and, consequently, they care little about employing medicines which, while they reduce the powers generally, seem to have some special influence over particular organs. But it is by no means an easy matter to enable a patient to regain health; and any one who systematically endeavours to do so, will have to acknowledge that it is one of the most difficult problems in medicine. It is easy to reduce the strength, for that we have a host of drugs; but directly to increase it, we have literally none.

“Facilis descensus . . .
Sed revocare gradum . . .
Hic labor hoc opus est.”

the perspiration during scrofula, rickets, various cutaneous eruptions; and both it and acetic acid exist in the sweat of females during their confinements, and even during suckling.”

Couple these observations with the sour smell noticed in the green motions of infants shortly after they have been passed; and the hypothesis that the peculiar odour spoken of is a post-mortem one (so to speak) seems a tenable one.

CHAPTER XV.

PRACTICAL CONCLUSIONS.

The question, Is it right to treat a diseased man by means which would make a sound man ill? considered—Does the physician do so?—Examples—Mercury—Opium—Antimony—Under what circumstances are they used?—Prevalent ideas—Delirium tremens taken as an example—Drug power ought not to be increased *pari passu* with diseased action—Conclusions drawn—False theories respecting the use of mercury—What was the result of the energetic treatment once adopted?—“Success” a comparative word—What was considered success formerly, is not so reckoned now—Illustrated by reference to water in the head—Tubercle, Cancer—Amputations, &c.—Is all medicine useless?—Proofs to the contrary—Ague—Gout—Fever—Lead colic—Mercurial tremor—Chlorosis—Tic, Neuralgia—Tape and other worms—Ergot of rye, &c.—Rule for the use of medicines—Exemplified by reference to arsenic—Iodide of potassium—Quinine—Opium—Alcohol—Colchicum—Deductions.

IF the principles we have been enunciating are reliable, it follows as a necessary consequence, that the aim of the physician must be to restore the vital forces of his patient, and thus enable him to regain his health.

But for a period so long that its origin is shrouded in obscurity, it has been the practice of physicians to treat their patients in a manner likely to reduce their vital powers, *e. g.* by drastic purging, low diet, and venesection, in

the time of classic antiquity ;* and by mercury, antimony, colchicum, and other depressing drugs superadded, in more modern times.

This "time-honoured" custom deserves a rigorous inquiry. It would not be fair to pass it by in contemptuous silence, or class those who have pursued it in the same category as they have been accustomed to place the holders of false doctrine in. We propose, therefore, to inquire into the following questions :—

On what principle does a physician endeavour to restore his patient to health when he employs means which would make a sound man ill ?

This necessitates the further questions :—

* This is not universally true ; for we find Celsus in many parts referring to the state of the strength. Amongst his rules for bleeding, he says, "The question is not what is the age, nor whether there be pregnancy, but in what state is the strength," Book 2, ch. 10. Again, ch. 12: "But physic is generally hurtful to the stomach ; and when the bowels are much relaxed, or when frequently opened by clysters, the patient is weakened." Again, Lib. 3, ch. 3: "But even when the malady is not in the whole body, but in a part only, it is more to the purpose to aim at increasing the strength of the whole system than to remedy diseased parts exclusively." We find him also stating, that in certain cases "food seasonably administered is the best medicine," Book 3, ch. 4. And nothing can be more appropriate than his remarks upon phthisis, Book 2, ch. 22. Again, he remarks : "But although purges are sometimes necessary, yet they are often dangerous ; for the body thus becomes inured to the receiving of no nourishment ; whilst debility subjects it in the highest degree to all manner of diseases," Book 1, ch. 3.

On the other hand, he recommends bleeding in phrenesis (mania), though Asclepiades condemns it, Book 3, ch. 18. For a cachexy, he recommends abstinence ; and for epilepsy, bleeding, purging, and clysters.

Had Celsus lived in our own times, he would probably have written the most philosophical book on medicine of the present age.

1. Does a physician employ means which would make a sound man ill ?

2. Under what circumstances does he do so ?

3. What are the results which he obtains ?

That the physician does employ means which would make a sound man ill, no one can doubt who takes up any book on *Materia Medica*. We will select a few examples.

Mercury has been given in syphilis and a variety of other diseases to a great extent ; indeed, few complaints can be named in which it has not at one time or another been employed in large doses.* Of its effects on persons in comparative health, or who are only suffering from primary sores, Dr. Porter remarks,† “Persons while taking mercury become deranged. The examples of this which I have seen were all maniacal ; and the symptoms, such as might be expected, from inflammation of the brain or its membranes.‡ They all died. . . . At the time when each case occurred I could not avoid placing the mercury and the madness as cause and effect. Again, persons whilst taking mercury become paralytic. Several years ago, when investigating the pathology of aneurism, I remarked the frequency of that disease in persons who had been subject to protracted courses of mercury Almost all the aged people treated with mercury for syphilis have, according to my observation, died shortly afterwards of hæmoptysis or apoplexy ; nor are such

* One physician in Liverpool, now dead, ordered ʒij of calomel nightly to a child with supposed hydrocephalus, and defended it on the ground that desperate diseases required desperate remedies ! Fortunately the medicine was not given. This was only twenty years ago.

† “Dublin Medical Press,” quoted from “Ranking’s Abstract of the Medical Sciences,” vol v. p. 66.

‡ Compare this with the remarks upon pages 89, 90, respecting madness from famine, &c.

casualties confined to the aged, for I have seen several instances of young persons, under similar circumstances, being seized with spitting of blood and dying rapidly of consumption." I forbear quoting Dr. Porter further in his observations on mercury, as they form so dark a picture of the thoughtlessness of routine. There is not one of his remarks which I cannot endorse from cases which have come under my own ken.

It must not be supposed, however, that these observations apply to the excessive use of calomel alone, or solely to the administration of the most active of mercurials; they are, in a modified way, applicable to the mildest forms of the drug, for I have myself seen in women, in delicate children, in the consumptive, and in those affected by Bright's disease, as serious results from small doses of grey powder, as are recorded of large doses of calomel; nor can we wonder at this when adults in health are sickened by a simple aperient dose of blue pill; and when the healthiest convicts succumb to the influence of the quicksilver in the mines of Almaden and elsewhere in the course of two or three years.

There are few medicines more frequently used than opium. Of its poisonous effect in large doses upon those unaccustomed to its use our coroners' courts give abundant proof; and those to whose lot it has fallen to notice the depressing effects of the drug after its first poisonous action has gone off, are well aware of the intense prostration of power which ensues from it. Taylor gives one instance in which an individual died of the debility the drug induced, though recovery had taken place from the original narcotism.

Yet this drug in excessive doses is given in certain diseases to patients who are wholly unaccustomed to its use.

In tetanus, in mania, and delirium tremens, its administration is constantly resorted to ; and we find in standard authors a recommendation to use opium in full doses, and to repeat them fearlessly in the last-mentioned complaint until sleep is produced.*

In other words, we are told that it is sound practice to risk the patient's life, by giving poison, to keep him alive. That opium does act as a poison when used in large doses in delirium tremens we have many examples. Dr. Laycock, in a most deeply interesting paper on this subject in the *Edinburgh Review*, has given some cases of this kind ; and, taking a series of years, has put down the mortality from delirium tremens, when treated by opium, as about one in four. Dr. Noble, of Manchester, communicated to a branch meeting of the British Medical Association two cases of death from the persevering use of morphia to procure sleep in mania. The first case of delirium tremens under the author's care was, he feels convinced, sacrificed by the administration of a small dose of opium, and since then he has been informed by medical friends of others equally unfortunate. Another very important paper on this subject is to be found in the *B. and F. Med. Chir. Rev.* for October, 1859.

Antimony is another medicine in great repute. That it

* In a conversation recently held with a young surgeon in a responsible position, he assured me that he had seen large doses of opium do good when small ones had produced irritation, and that one patient under his care for delirium tremens had experienced no benefit whatever, until the dose of this drug had been increased to *eighty grains at bed-time*—an equivalent quantity to about two ounces of laudanum ! Under this plan a cure was effected. He had, he said, “seen patients die under the opium treatment, but this was only because they had not had a sufficient quantity.” It is difficult to appreciate the philosophy which would adopt so desperate a remedy, and the temerity which would carry it out in a country where coroners' inquests abound.

has an influence prejudicial to the vital powers is readily proved by the numerous instances in which it has been successfully used by the murderer as a poison. Of its effects when used medicinally to counteract the effect of inflammation, the following, from the pen of Dr. Boling, U.S.A., is a graphic account.* Speaking of pneumonia, he says, "The patient may be seen to be doing very well under the antimony . . . when suddenly in some cases, more gradually in others, he becomes restless, thirsty, somewhat purged, the belly becoming tympanitic, and sometimes tender. He vomits, or tries to do so, the tongue is dry and pointed, jactitation and anxiety of countenance appear, together with delirium, and, perhaps, shortly before death, stupor. Occasionally jaundice supervenes, and in a few cases the matter ejected closely resembles that of yellow fever. During the occurrence the pulse becomes hard, small, thready. Death may take place within six hours after the first appearance of these unfavourable symptoms : more frequently it is delayed for ten or twelve hours, and in some cases yet longer. Simultaneously with the advent of the above symptoms, or just preceding them, there is a more or less rapid disappearance of the symptoms of the original disease." In few words, the patients are cured of pneumonia by poisoning them with antimony. They die of the doctor rather than of the disease. The Abstract goes on to remark, "This cannot be a rare occurrence in the Southern States of America, as the author has seen almost as many die of the induced as of the primary disease . . . Gölis gives a graphic account of a similar train of phenomena produced by the use of large doses of calomel in hydrocephalus and croup."

The effect of his experience upon Dr. Boling has been,

* Quoted from "Ranking's Abstract of the Medical Sciences," vol. xv. p. 25.

that he now uses only three grains of tartar emetic in twenty-four hours, instead of double the quantity, as he used to do, and he finds the remedy as efficacious as before, and far less dangerous. In a hospital experience of seven years the author has only used antimony once, for pneumonia, and he has never seen cause to regret it. On the one occasion, according to the laws of evidence, it did good.

The prejudicial effects of antimony used medicinally are not, however, confined to America; for the author has seen patients brought to a most fearfully depressed state from tartar emetic used under the impression that it was a remedy for inflammation. In one case of bronchitis thus treated, the patient died in twelve hours.

We may take another illustration from the treatment adopted for gout by various physicians; and, in doing so, we shall follow Dr. Gairdner's philosophical and valuable treatise on the disease.

After giving "authorities" in favour of bleeding in gout to an extent sufficient to subdue inflammation, he adds, as his own experience, that such losses of blood "are much to be avoided;" but on the next page he speaks most highly of small abstractions of blood not exceeding six ounces. Such venesections act as tonics to those whose stamina is unimpaired.

After giving the opinions of various older authors on purgation, he says, "The opinion of Scudamore, that gout was chiefly owing to obstruction of the liver, confirmed these prepossessions (in favour of aperients), and for some years past the strongest cathartics have been used with a freedom which I think in the highest degree dangerous;" and he subsequently adds a paragraph with which I most cordially coincide, viz., "Had we not fallen into the very great error of using the most drastic purgatives with a rashness which

has received so stern a rebuke from the public, it is probable we should have heard little, in this country at least, of Homœopathy. But it seems to have flourished here even more than in its parent land. It found us enslaved to a system of overdosing of the most reckless and pernicious kind," &c.

But it is only the abuse of purgatives that Dr. Gairdner aims at, for in his next paragraph he says, "Laxatives are essential in gout; even when the patients lead a most abstemious life, it is necessary that the bowels should be relieved by medicine."

Both these sets of remarks show that there is a point, carried beyond which, *beneficial* remedies become *prejudicial* and positively dangerous.

It would be a thankless task to prosecute this inquiry, and catalogue, as we might readily do, a list of cases which have succumbed under the use of digitalis, venesection, low diet, purging, squills, and even of leeches.

It suffices to our purpose to show that these drugs have been recommended, and their use in full doses generally adopted, and that they have a direct tendency to deteriorate health. But we cannot imagine that physicians ever have used these drugs with the knowledge that they were extremely dangerous to health, and possibly fatal to life. We presume that they had a reason sufficiently valid to themselves for what they did. This reason it is well to ferret out. We inquire, therefore,

2. Under what circumstances did they use them ?

To answer this question at length would involve a history of medical theories for past centuries. We should have to go into the nature of fevers and inflammation as held by our fathers and ourselves—to show how they held that such diseases were evidences of power rather than of weakness,

and how they practically believed that if a small quantity of a medicine did good, double the quantity would do more. This task would be tedious. We may sum up by saying, that diseases were looked upon as invaders of a soil, and medicines as the weapons by which they could be annihilated—the one was supposed to counteract or neutralize the other—and by the free use of chemical terms the physician at last came, practically, to entertain the idea that the disease might be compared to an acid, the remedy to an alkali, and that by their mutual reactions a neutral salt might be produced, which would be innocuous ; and it followed, as a necessary corollary, that the active mischief in the system being thus neutralized, the body was freed from disease, and the patient was necessarily well !

How untenable this idea is it is unnecessary for us to prove.

But, leaving generalities, we may fix our attention profitably on one disease, of which mention has already been made, viz., delirium tremens ; and examine, step by step, the reasons which induced physicians to risk the patient's life by poison, that he might not die from disease. The argument runs thus :—

Delirium tremens is a disease whose chief characteristic is sleeplessness. If the patient do not procure sleep, he will surely die. If he sleep, the disease is practically cured. The indication of cure is manifestly to procure sleep. There is nothing which we know that has so powerful an influence in producing sleep as opium. Consequently, opium is the drug, *par excellence*, for the cure of the complaint. But experience shows that a moderate dose of this drug does not produce the sleep required—it would do so in a healthy man—therefore, it is argued, there is an unusual amount of tolerance of the drug in delirium tremens ; and to get the

same effect as would be produced on a healthy man, we must vastly increase the dose. There is no danger of poisoning by opium, for the danger from the drug is counteracted by the tendency of the disease. Figuratively, the physician increases his drug power, as an engineer would do his steam power, when he had to drive his locomotive up a steep incline.

This reasoning, promulgated by high authorities, captivated the minds of students for a long period. After a time, however, experience showed that there must be some fallacy in the line of argument, for patients who were sent to sleep by opium sometimes never awoke again—and often when they did awake they died shortly afterwards, or else they awoke just as bad as they were before. The author is cognizant of cases illustrating all of these misfortunes. Then, again, a close attention to the influence of opium showed that it did not always procure sleep in healthy people ; nay, that in large doses (short of poisonous ones) it kept the patients awake. It became clear, therefore, that delirium tremens was not simply want of sleep ; and opium was not always a sleep-giver. As observation extended, it was evident that the phenomena of the disease resembled those of mania, of hysteria, of puerperal delirium, of insanity from mental emotion ; and in all these it was possible to demonstrate that the essential cause of the symptoms were cerebral exhaustion. Other observations showed, that loss of sleep was a frequent concomitant of loss of blood, excessive fatigue, fasting, and other debilitating agencies ; and from these data the deduction was fairly made, that the essential nature of delirium tremens was cerebral exhaustion, and that this it was which produced loss of sleep. In corroboration of this conclusion, it is to be noted that delirium tremens is most common in those persons in whom insanity is hereditary ; and

as we have already shown that hereditary disease indicates hereditary debility, it follows that in the children of lunatic parentage cerebral exhaustion is sooner produced than in others.

From these considerations the treatment of delirium tremens has been greatly modified, and digestible food, frequently administered, has taken the place of opium or other medicine, in the practice of many thoughtful practitioners.

But experience has shown that opium is really of service in many instances of delirium tremens. It has procured sleep, and the patient has awaked well, or nearly so.

Opium has proved equally efficacious in cases of exhaustion from loss of blood, &c.

But in these instances the drug has been combined with liquid or solid food, or other stimulant.

Consequently, it is argued, that opium does good when it acts in the place of, or as an adjuvant to, food; and a comparison between it and alcohol suggests the idea, that, as a little spirit or wine may invigorate and strengthen the system, while a large amount may deteriorate or positively destroy the vital power, so may a small amount of opium do good, while a large dose would destroy.

The tendency of this reasoning is to show that the physician must endeavour to find the limit beyond which the drug must not be administered.

Let us illustrate this idea by some imaginary cases. A man is dying of hunger,—he wants food, food will prevent his death; but if too much food is given he will die of repletion. Another is dying of cold—warmth will restore him—but if he is heated suddenly, his extremities mortify and he dies of the remedy. Another is exhausted by labour, and gin, wine, or ale are taken; they recruit his powers—but he

continues to crave for more and more, and at last dies of alcoholic poisoning, or the depression which succeeds their use.

The circumstances connected with any case of starvation would influence us in the administration of restoratives.

In like manner, the circumstances of every case should influence us in the use of opium for delirium tremens.

It may be laid down as an axiom, that no one would attempt to cure starvation, or frost bite, by using an amount of food or heat which would surfeit a healthy labourer or burn a comfortable man. So, in like manner, we infer, that when opium is used the quantity should never exceed what would be a poisonous dose to a sound constitution.

The effect of this reasoning has eventuated in these results :—

1. Delirium tremens may be cured by food without physic.

2. Such plan is less dangerous than the old opiate treatment.

3. That food is more important than physic.

4. That opium, when administered in moderate doses, assists the use of food.

5. That large doses of opium are positively prejudicial, as they have a direct tendency to produce death by narcotic poisoning.

6. The larger the dose of opium employed, and the less the amount of food given, the greater is the patient's danger.

The following observations of my friend Dr. G. Johnson are so apt that I have great pleasure in quoting them, premising simply that our results have been independently obtained. He remarks (in his inaugural Lecture on *Materia Medica*, 1857), "It has long been observed that those who are suffering from delirium tremens often exhibit a tendency to

prostration, faintness, and even fatal syncope; so that a patient, while violently struggling with his attendants, has been known to fall dead from sudden failure of the heart's action. Within the last few years it has been found, that in nearly every fatal case of delirium tremens the muscular substance of the heart has undergone more or less of that structural change which is known by the name of fatty degeneration, and in this condition of the heart we find, I believe, a sufficient explanation both of the tendency to death by syncope, as a consequence of violent muscular exertion, and of the depressing influence which opium has in some cases of delirium tremens. When opium is acting thus unfavourably, it appears to have no narcotic influence whatsoever; the patient continues wakeful, excited, delirious, but he grows rapidly weaker, the pulse becomes quick, small, and feeble; the pupils are contracted, the skin is bathed with a profuse perspiration, and if the opium be continued in large and frequent doses, the patient rapidly sinks, but remains wakeful and conscious, until perhaps within a few minutes of the fatal termination. These are cases in which opium appears to act as a powerful sedative poison upon a feeble fat heart, the narcotism or deep sleep which usually follows a large dose of opium being entirely absent."

Again, mercury has long been used as a remedy for inflammation, much in the same way as opium has been used for delirium tremens. Why has it been so?

The grounds for its use have been the following:—In phlegmasiæ there is a tendency to fibrinous effusion: mercury has a power to prevent or bridle this*—consequently, it ought

* "The great *remedial* property of mercury is that of stopping, controlling, or altogether preventing the effusion of coagulable lymph, of *bridling adhesive inflammation*; and if we in our turn could always bridle and limit the influence of mercury itself, it

to be used whenever there is adhesive inflammation, 1. To prevent the deposition of lymph; 2. To promote its absorption.

But more extended observation shows, 1. That serious adhesive inflammations are by no means uncommon where the sufferers are already under the influence of mercury, *e. g.* pericarditis. 2. That mercury converts adhesive into suppurative inflammation, *i. e.* a high into a low type. 3. That adhesive inflammations, as a rule, are recovered from *earlier* where mercury is not profusely used than when it is.*

Observation has not yet been carried sufficiently far for us to state the true value of this drug, and we abstain from speculating on it further. The author will only add, that every year he prescribes less and less of it, and that many of his friends do the same, and that all alike report that they are able to do very well without it, as a general rule.

We next inquire, Had the older physicians who used the powerful (and *heroic*, as they have been called by some) remedies we had adverted to, any successes to boast of? Unquestionably they had, but the extreme looseness of their

would be a still more valuable resource."—*Dr. Watson's Practice of Medicine.*

* It has long been supposed that mercurial purges stimulate the liver, and on this ground calomel has been used as a sort of counter-irritant, or eliminant in diseases of the lungs. This idea, however, has recently been rudely shaken by some experiments on dogs, in which it is demonstrated that such medicines positively diminish the biliary secretion in the majority of cases; and that excess of bile is rarely produced by this means. (Beale's "Archives of Medicine," No. 3.) If the office of the liver is simply to *separate* the bile formed in the blood, we cannot see how the amount can be increased by stimulating the bilious filter. We do not agree with this view of the liver's function; but the consideration must form an ingredient in our appreciation of the influence of calomel.

observations prevent us from forming any definite idea of their success, in comparison with that obtained by those whose plan of treatment has been less energetic.

Success is ever a comparative word in medicine, and it is measured necessarily by a fluctuating standard. There is every reason to believe that the success which pleased our forefathers would be considered by us as downright failure. Five-and-thirty years ago the author well remembers to have heard pneumonia and pleurisy spoken of as diseases for which there was little or no hope. Water in the head was then considered as hopeless as hydrophobia is now ; jaundice was a terrible infliction, and few ever recovered from what was called croup. To be ill of anything, indeed, was no joke, as it involved, at the very least, a week's doctoring. At that period every recovery from brain fever, mania, or typhus, was considered almost a miracle ; and though this state of things may not have existed to the same degree all over Britain, there was not an author who did not regard a cure in any of these complaints as a proof of his skill and an evidence of the justness of his treatment.

Now, on the contrary, we regard these diseases with comparatively little dread ; we do not ignore the danger, but we know its measure ; and while our ancestors were boasting of success in curing one, or, at the most, two out of three, *i. e.* from 33 to 66 per cent., we consider ourselves liable to animadversion, if, in the long run, we do not cure from eighteen to fifteen out of twenty, or from 75 to 90 per cent.

In days gone by, few patients recovered their health, after a phlegmasia, under many weeks or months of treatment. At the present day many scarcely require a fortnight, few more than six weeks. We may judge still further of the ancient idea of success, by the relics of ideas still so prevalent amongst us

that some of them have been adopted as fundamental truths by the *Lancet* within the last two years.

About that period this journal, in reviewing a recent publication, remarked, "What would Dr. — and Dr. — say to its author's statement, that acute hydrocephalus was a comparatively curable disease?" The assertion that it was so, was, in the *Lancet's* opinion, enough to damn the article. That Drs. A. and B. considered water in the head almost incurable was conclusive evidence that the writer, who said it was very amenable to treatment, was a presumptuous fool! A like scepticism remains at the present day respecting tubercle. Physicians of fame and standing still assert that that disease is beyond the reach of the healing art, and with curious pertinacity insist, that Richardson, Thompson, and Turnbull *must* have been mistaken in their diagnosis of those cases they report as cured.

A still greater incredulity exists respecting the subject of cancer. A large proportion of the profession yet look upon it as incurable. Their notion of the disease is, that it has a tendency to grow indefinitely, to return again after removal, and to destroy the patient. Incurability by other means than the knife or cautery is an essential part of their diagnosis, and any one who records a case in which a cancerous formation has spontaneously ceased to grow and ultimately withered, is looked upon as deficient in diagnostic skill!

Now, it is clear, that individuals reasoning thus must have a far different standard of success than have those they attack. Dr. — may treat fifty cases of water in the head on the old plan, and speak enthusiastically if he find five recover: to him such is "a great success;" while another, using a different method, would think a mortality of 90 per cent. indicated a total failure both in theory and practice.

The average mortality in French hospitals from amputation of the thigh is 50 per cent., and a surgeon there prides himself by diminishing the average to forty in a hundred ; but the English surgeon is sadly disappointed if his average exceed 33 per cent.

Tested by this, let us compare the results of active energetic treatment with a plan which practically does nothing. Out of a large number of cases taken promiscuously, the mortality of the former practice is about ten per cent. : of the latter, five. In other words, a doctor of the Heroic school has one death amongst every ten patients he attends, while one of the modern school asserts, that he has only one amongst every twenty.

It is clear that the former's boast of success is untenable, as compared with that of the latter.

We conclude, from the foregoing considerations, that the plan of treating diseased persons by means which would make sound ones seriously ill, is opposed as much by experience as by common sense and true philosophy.

The question now naturally arises, Is all medicine useless ? Have the labours of our ancestors only sufficed to find out poisons under the guise of remedies ? and the query receives considerable point if it be argued that all medicines are likely to make healthy men diseased.*

* The following remark of Celsus is as true at the present day as it was in his own time:—

“To confess the truth, there is no disease over which chance exerts less influence than art, for with nature against us our treatment is of no avail.”—Book 3, c. 1. Again, after speaking of “critical” occurrences, he says, Book 2, c. 8, “Since most of these occurrences happen spontaneously, one may understand that by giving effect to the means employed by art, nature is of more avail than the remedies themselves.” No one can fail to see the good sense of these observations, and their pertinence to a due appreciation of the value of remedies.

To this we answer unhesitatingly, first, that the proper administration of medicines does a vast amount of good ; secondly, that they should never be used in doses sufficient to make a sound man ill.

Who can doubt, for example, of the value of quinine in diseases of malarious origin ?—of the use of quinine, opium, and steel in neuralgia ?—of alum in lead colic ?—of iodide of potassium in mercurial tremors ?—of steel in chlorosis ?—of turpentine in hæmorrhages ?—of kousso in tapeworm ?—of ergot of rye in hastening parturition ?—of opium in diminishing excessive secretion, irritability, and pain ? Who now doubts the use of colchicum in gout ?—of chloroform inhalation in convulsions ?—of creosote in vomiting ?—of lime-juice in rheumatic fever ?—of gallic acid in albuminuria ?—ammonia in bronchitis, &c. ?—arsenic in skin diseases ?

But in all these and other instances, we hold that the medicine must be administered in moderate quantity, and must never be used in doses sufficient to make the patient seriously ill, supposing he were healthy. Medicines are means to an end, not weapons to fight disease, whose power may be indefinitely increased. Of the value of medicine, in the most extended sense of the word, we have a most profound confidence and belief. Of the abuse of medicinal agents we have a corresponding dread.

A few illustrations will serve to show our meaning.

Arsenic for skin diseases is most useful when used in such small doses (*e. g.* three minims of liquor arsenicalis thrice daily), that the patient feels no ill effects from it.

In fuller doses it is absolutely prejudicial both to the cutaneous eruption and the patient's general health.

Iodide of potassium is another medicine which, when largely given to a healthy man, produces several local inflammations, *e. g.* of the nasal mucous membrane of the

laryngeal, and sometimes even of the skin. Some are so susceptible of its influence that half-grain doses suffice to produce these effects. Now, a close attention to effects of this drug has convinced me that the dose to be employed ought always to be short of that which produces these distressing symptoms; and I have also noticed, in many instances, an improvement follow a cessation of its use far greater than accompanied its employment. A similar remark applies to the use of Donovan's solution.

Quinine is another medicine which, in large doses, produces, in healthy people, symptoms of a peculiar cerebral disorder, known as cinchonism. Twenty grains for a dose suffice to produce this effect in the generality of cases. The drug, it is well known, has long been used for ague. As we see yearly a vast number of cases of this disease in the Northern Hospital, Liverpool, I have endeavoured to ascertain what, as a general rule, is the best method of using quinine, as to dose and time of administration. Amongst others, I tried scruple doses half an hour before the fit; on one or two occasions they staved off the access, but when I found one patient suffering from the fit of ague and the signs of cinchonism simultaneously I gave up the plan. The case referred to was the most violent of all the intermittents I have seen, the hot stage being accompanied by intense fever and almost maniacal delirium. A scruple of quinine arrested the fit during the first day, and he had no return for some days. The ague returning, the same dose was used; it produced headache, and great "ringing in the ears," and deafness; but the disease continued unchecked, and the succeeding fit was the worst he had. He was subsequently cured by five grains every four hours.

Opium is another drug which, in large doses, is poisonous to a healthy man, but, as a general rule, one or even two grains may be taken without a worse effect being produced

than would follow the imbibition of a tumblerful of brandy and water. Now, experience shows us, that in these doses, or others rather less, this drug is most useful; in grain doses it acts, in many instances, as a tonic—we have seen already that excessive doses are dangerous to life. These remarks, however, are not intended to apply to those cases in which, by long use, the system gets so accustomed to the drug that large doses can be borne with impunity.

Alcohol is another article of the *Materia Medica* to which these remarks apply. Of the value of moderate doses no one can doubt; of the prejudicial effect of large ones there cannot be two opinions.

Of mercury we may say much the same thing. Experience has demonstrated that small doses are more efficacious in syphilis than the vast quantities used in days gone by; and the tendency of observers at the present day is to the belief that a quantity of the drug, short of salivation, does more good than a larger dose. In my own experience I have seen the drug apparently of great utility, but I cannot charge my memory with a single instance where it affected the gums. I have rarely seen occasion to continue its use longer than two or three days.

Of antimony, belladonna, strychnine, conium, aconite, ipecacuanha, prussic acid, sulphate of zinc, iron, and copper, nitrate of silver, acetate of lead, and a variety of other active remedies, we may say much the same thing, viz., that experience has shown that their medicinal value is most conspicuous when they are given in doses so moderate that the patient is only aware that he is taking medicine by the repeated visits of the nurse to administer it, and by the amelioration of his complaint.

We may wind up these observations by a few remarks upon the use of colchicum in gout. Twenty years ago it was almost universally taught in the medical schools that

this drug should be used in such doses, and continued steadily, so as to insure abdominal pain, purging or vomiting; its use was then to be suspended, or the dose diminished. As a result of this doctrine many patients died, including the late Mr. Shaw, of Cheltenham, an accomplished surgeon of vast experience and most extensive practice. Dr. Christison has endorsed this doctrine nevertheless with all the prestige his experience commands. But as far as my own limited experience has gone, I consider Dr. Gairdner's dictum more consonant with truth, falling in as it does with sound philosophical deduction. He says of colchicum, "Its effect in freeing the body from disease bears no adequate relation to its immediate visible and tangible, or, as it has been called, its physiological effect on the system Colchicum never more effectually relieves the patient than when it acts silently and peacefully without producing any evacuation whatever, or in any way disturbing the patient's comfort and ease."—*Gairdner on Gout*, 3rd edition, pp. 306-7.

It would be impossible to find any quotation more forcible with which to point the truth we have been attempting to expound, which we may sum up in few words thus :—

We believe that the principle of doing evil to the constitution that good may come, is as false in medicine as it is in theology.

We believe that this vicious principle has been adopted, unintentionally, ever since our science has been studied, and that medicine will never rest on a firm basis so long as this doctrine retains its hold on the minds of practitioners. Lest it should be objected that our opinions are new-fangled, and therefore unworthy of credence, we crouch under the cloak of Sydenham, and say, that our motto is none other than a translation of his Latin aphorism respecting a physician's duties, viz. :—

"Primum est ut non nocere."

CHAPTER XVI.

HYGIENIC MEANS CONSIDERED.

Application of preceding remarks—Use of medicines—Each patient a separate study—A healthy peasant—His circumstances—How far he may be a standard for a townsman—Influence of exercise considered—Exercise is exhausting, and *per se* prejudicial—Must be proportionate to person's powers—Cases where it has been excessive—Rules for guidance—The dietetic value of alcohol in towns considered.

It is now time for us to call attention to the practical results which flow from the preceding observations. We have attempted to show that there is a certain force in operation in the body by which it is conserved during life and health in a certain definite condition ; that when that force is no longer present, the individual is in the condition of a dead body, and amenable to the laws which govern the inorganic world ; that there is a condition of the body in which it is not totally devoid of the vital force, and is not altogether under the influence of the inorganismal forces ; that this condition is a variable one—the departure from the standard of full health being far greater in some cases than in others ; that a departure from the healthy standard can readily be recognised ; that such departure manifests itself by alteration of function of structure, or of both ; that it is *theoretically* impossible to consider that a departure from health can take place without the whole organism suffering, but that, *practically*, it is found that departure from health may show itself

in one organ only, without such departure being recognisable in other parts of the body ; that diseased conditions of the body may originate simply from an excessive expenditure of vital force without an adequate restoration ; or that the presence of disease implies that the vital powers have been in some measure overcome by an extraneous force ; that if that force is sufficient to overpower them altogether, death is the result, but that if such extraneous force is not sufficient to destroy life, the body is again restored to a healthy condition by the continued operation of the vital powers ; that the severity of any disease must be proportional to the comparative power of the extraneous force, and its duration must be proportional to that, *plus* the rapidity with which the vital forces are recruited after the foreign force has ceased to operate ; and that, under all circumstances, health can only be restored through the instrumentality of the natural forces inherent in the healthy body.

If these conclusions are correct, it necessarily follows that the chief aim of the physician, when called upon to exercise his art, must be to bring back the vital powers of his patient to the healthy standard. This seems to be a self-evident proposition, but it has too often been lost sight of. Dr. Brown, the author of the "Brunonian System of Medicine," appears to have approached nearer to the enunciation of this doctrine than any other writer ; but his theory failed, from the then current belief in the great power of medicines as absolute remedial agents, and not simply as *means to an end*. To many it may seem a very simple thing to say that the sole art of the physician is to bring back the vital powers of his patient to the standard of health, but in reality nothing is more difficult to effect. He has to deal with parts whose physical condition he cannot see—with diseases, the true nature of which he can only infer—and with organs so far

removed from the surface of the body, that he can only influence them in a round-about manner. He has comparatively few means at his command, and many of those are possessed of properties he does not thoroughly know. He finds that the very remedy he trusts to in one case, is utterly powerless or positively prejudicial in another; that the individual constitutions of men are almost as numerous as the human race; and that, though certain general laws may be framed, they are subject to innumerable exceptions. Thus, the plan of diet an Esquimaux physician would lay down as likely to restore the health of one of his nation, would be certain, if adopted by the Englishman, to do more harm than good; and the laws which govern our healthful state in England do not obtain full sway in India. One man finds cold mutton the most digestible of dishes, and a joint of lamb the most exquisite of luxuries; another finds both a constant source of dyspepsia; and one revels upon veal and pork, which send another into a miserable condition of suffering. The same is true of mussels, cockles, crabs, and lobsters. The old saying is in some cases literally true, that "what is one man's meat is another man's poison." Cod-liver oil, which restores one consumptive patient to health, cannot be borne by another in consequence of the vomiting, sickliness, anorexia, or loathing which it produces; and opium, which mitigates the pains of many, absolutely will produce severe stomachic suffering in others. I have met with one man on whom Epsom salts acted as a narcotic, and a lady on whom assafœtida acted as a cathartic.

Under these circumstances each individual becomes a separate study for the doctor, and general laws have necessarily but a limited range of authority.

I propose in the succeeding pages to consider the means we have for improving the condition of the body when from

any cause the vital powers have been deteriorated. In doing so, we must first examine into those general facts which are more or less familiar to us all, and which, being based upon close observation and common sense, require no learned medical arguments to establish : and then we must investigate the special powers of those medicaments on which we are in the habit of relying as means for effecting cures in various diseases.

We shall see that, in the treatment of disease, "hygiene" has a far wider application, and more vast importance, than we have hitherto thought, and that any one who neglects its study has necessarily a most imperfect knowledge of the healing art.

For years we have flippantly attributed the success of Hahnemann's followers to the powers of nature, and the system of diet or hygiene they enforce ; yet we ourselves have been content to pass both these by, as almost beneath the notice of dignified orthodoxy. It is high time that a well-deserved reproach like this should be wiped away.

We have already adverted to the fact that we are positively unable to make a perfectly healthy man more healthy or more long-lived than Providence intended him to be ; no medicine or contrivance can hasten adolescence in the child, arrest it in the man, or recall it in old age. The very idea seems absurd : to entertain it for an instant is to exalt, in imagination, man to the rank of a Creator. Man can never create a force, though he may do his utmost to employ, conserve or economise such forces as the Almighty has placed at his command ; consequently, we may say, without any fear of contradiction, that there is no medicine in existence by which we can *directly* give a person vital power. But as we do see those whose powers have been brought low, return again to their former healthy condition, we conclude that

there are means by which vital power may be restored, rebuilt, or regained. Whatever those means may be, they must act *indirectly*, for no druggist can keep "strength" bottled in his shop, to sell to his customers. If then they want strength, they must get it in some other way. What that way is, it is now our business to examine.

Our first duty is to take a perfectly healthy man, the *beau idéal* of his race, and examine all the circumstances by which he is surrounded ; our next to take a number of unhealthy men, and investigate how the circumstances in which they are placed differ from those in which the healthy man was ; and we must then attempt to ascertain the influence of such circumstances. We must then examine how far a removal of obnoxious conditions is followed by improvement in the condition of the body, and whether there are any means for counteracting the influence of such prejudicial agencies as cannot be directly removed or escaped from.

In few words, we must examine hygienic and medicinal agencies.

The respective values of these influences it is difficult to estimate completely. Under one set of circumstances hygienic means will restore health after medicinal ones have failed ; and under other circumstances, medicinal agents restore health which hygienic means alone have not been able to impart.

There can be no doubt that it is often judicious and necessary to combine the two, so as to make one supplemental to the other.

Now, if we throw our eyes around us, and note the parts of the country in which there is the greatest amount of health and the greatest average longevity, we shall find that such are to be found in rural districts, where there is a free circulation of a pure air, where the soil is gravelly or

sandy, or where at least some complete system of drainage is adopted ; that the healthiest of the dwellers in these districts have all of them much exercise in the open air, plenty of light, wholesome food, adequate rest at night, and a sufficiency of clothing to guard against sudden or prolonged inclemencies of the weather ; that they have no great mental labour or intellectual harassments, and are as free as human beings can be from anxiety and care. If such people reside near the sea-side, we may fairly consider that their tenure of life, *cæteris paribus*, would be greater than if they were living far inland.

So much for positive conditions absolutely present ; we must now add that for the individuals to remain permanently healthy, there must be an absence of certain influences which we are in the habit of speaking of as poisons. There must be an absence of the poisons producing ague, dysentery, typhus, small-pox, scarlatina, measles, syphilis, and the like, the absence of intoxication, whether from alcohol or opium, and we may add, the absence of all mineral, vegetable, and animal poisons, and accidents to life and limb.

Under such circumstances, we can well believe that we should find abundance of healthy men and women—individuals whose health could not by any means be exalted.

Let us now take a couple of individuals from such locality, and place them in different circumstances, and note the result.

We deprive them of light by confining them in dark alleys and gloomy rooms, and surrounding them above with a vaporous cloud of smoke arising from myriads of chimneys ; we deprive them of fresh air, compelling them to breathe over and over again that which has passed through other lungs, or is tainted by vegetable or animal refuse, by small-

pox or other malaria, and the like ; we provide them with houses whose cellars are damp, whose areas are undrained, and whose offices are habitually filthy ; we place them in some business where they have to inhale dust of various kinds, or even mercurial fumes ; we exact an amount of labour from them which habitually wearies them ; and we give them abundance of stimulants, but take away their appetite for solid food, and the capability to find nutritious fluids, such as good milk, &c. We do all or any of these things, and what is the result ? Loss of health, loss of strength, diminution of vital power, a shortening of life, and the imparting to the offspring a tendency to diseases, under one or other of which they may succumb, even before death has carried off the parents.

It requires no great acumen to demonstrate, first, that individuals in such condition are not in high health, and that their vital powers are diminished ; and secondly, that if we wish to restore them to health, we must either put them into the same condition they were at first, or that we must try and find something which will enable them to regain and conserve in a town, the health which was their appanage in the country.

As the subjects of climate, change of air, choice of locality, and the like are freely treated by other authors ; and as, when such change is adopted, the patient is, as it were, given up by the physician, I shall not speak of them, but confine my inquiry to those contrivances which the doctor brings into operation to counteract the influences of town life, and which are at the best only an imperfect substitute for a rural existence.

There are many instances in which a physician feels certain that change of air, absence from business, &c., will cure his patient ; but the patient cannot afford the one or

the other ; the doctor then is called upon to find the best substitute he can for these.

I need not dwell upon the importance of efficient house and general drainage, or of large rooms, and when these are not available, of thorough and complete ventilation, especially of those rooms where many persons are congregated together, such as children's schoolrooms, bedrooms, nurseries, &c. ; of the necessity for dryness (*i. e.* an absence of such moisture in the domestic atmosphere, as would arise from the daily scouring of stairs and bedrooms), of the advisability of comfortable warmth, of the necessity for good wholesome food, and the like : for these are points which would suggest themselves to the good sense of every one, and their importance has long been recognised.

Ere we inquire into positive facts, we must say a few words upon those we believe to be fallacious doctrines, and amongst the most prominent is the value of *exercise*, and the definition of *wholesome food*.

There is no single item in the subject of hygiene which is surrounded by more fallacies than that of exercise. The ideas generally connected with it may be thus summed up. "Experience shows," it is said, "that the most healthy men are those who go through a great deal of exercise ;" therefore, it is argued, "exercise is essential to health ; and it follows, as a corollary, that a person who takes exercise must be benefited thereby." As a natural result of this reasoning, exercise is looked upon as an essential item in the treatment of all diseases attended with debility, and there are few who do not consider it one of the most potent of the incentives to appetite. The rural ploughman, it is said, comes in, hungry for his dinner : then how can an urban gentleman hope to have any appetite, unless he has in some degree emulated the labour of the former ? These conclu-

sions are so very mischievous that they require a complete refutation.*

Does exercise benefit all individuals? or is exercise in *the town* to be taken as the equivalent of exercise in *the country*?

In answering this question, we ask, what the real effect of exercise in the country is? It produces a brisk circulation of blood, a rapid expenditure of the old material of the body, a vigorous appetite, a good digestion, a perfect aëration of blood, and consequently, a rapid rebuilding of the body; it insures, in fine, an energetic and constant change from old and effete particles to new and healthful ones.

But exercise, even in the most healthy atmosphere, is *exhausting*, when the individual is not recruited by food and rest. The willing horse, the active sailor, or the powerful swimmer, have all of them been known to die from an excess of labour. *Exercise, then, per se, is prejudicial, and it does good only when it promotes an appetite which can be allayed by sufficient food, and produces a vigorous circulation of blood, in air sufficiently pure to insure a perfect aëration of that fluid in the lungs.*

The necessary inference from this is, that exercise in a town is not the equivalent of exercise in the country, and that it is positively prejudicial unless it promotes the appetite and the digestive powers, and unless (a proviso necessary in towns where poverty is rife) there is a sufficiency of food obtainable to satisfy the appetite existing.

* In accordance with this view, our books teem with observations upon horse exercise, carriage exercise, boat exercise, calisthenics, gymnastics, pedestrianism, and the like.

The prevalent idea running through the mind of each author appears to be, that exercise, of itself, is conducive to strength—that it is as necessary to health as food is to the satisfying of hunger.

The foregoing inference is one which is abundantly fortified by experience. Numbers of people have come under my care, in the Liverpool Northern Hospital, whose sole complaints have been "over work." Compared with what the rural labourer goes through, their exercise has not been excessive, but it has not been accompanied by commensurate appetite and digestion, and it has exhausted them. Office lads, shop boys, messengers, and others, whose avocations are most active, soon succumb when the appetite fails. Domestic servants, whose activity is proverbial, are, as a class, less healthy than their more indolent and luxurious mistresses. I have known cases where healthy ladies have come from the country into town, and imported with them their usual habits of active out-door exercise, but after a time it has positively done them mischief: instead of promoting appetite, it has diminished it, and instead of insuring digestive power, it has actually induced dyspepsia; but with diminished exercise the appetite and digestion have improved, and the patients have enjoyed apparent health again.

The following cases have recently come under my notice. They illustrate well the prejudicial effects of a false estimate of the value of exercise:—

Mr. R., æt. 26, of spare frame, and about six feet high, consulted me for an acutely painful abdominal affection, of some years' standing. The following was the history I obtained. Of healthy family, he had himself been free from any serious complaint until the age of eighteen, or thereabouts. He was then a druggist's assistant in London—growing fast, standing in the shop for twelve or fourteen hours a day, eating sparingly, and sleeping indifferently. From frequent contact with the counter he had occasionally swelled testicle, which was acutely painful (*vide* remarks on pages 93—96), but which rarely lasted beyond three or four

days. After these attacks the testis was reduced below the normal size, and there was spermatorrhœa. He never had a venereal affection. During one of these attacks he put himself under medical treatment; and amongst other things a large quantity of mercury was administered. He was not salivated. Little alteration took place in his condition except for the worse, and at the age of twenty-two he went to his home in the country broken down in health, and unfit for work. Since that time he had simply been assisting his father (a surgeon) to dispense. He had occasionally expectorated a small quantity of dark blood, apparently from the throat.

As the affection of the abdomen was clearly myalgic, I inquired into his daily habits. They were as follows:—He rose early, about six, had a sponge-bath, dressed and came down stairs to read till breakfast. He had tried walking at that period, but was obliged to abandon it, as it made him worse. At breakfast he ate little. He then went to the surgery to make up medicine for about an hour and a half; after that, walked out for a similar period; dined at twelve, having little appetite, and eating sparingly. In the afternoon came another spell at the counter and another walk; reading in the evening, and bed at nine. Bed was the chiefest luxury he had, and he often felt as if he would like to go to rest twice or three times during the day.

His extremities were always cold, the mental faculties were benumbed, the respiration was sighing, the circulation feeble, digestion impaired, the bowels torpid, and flatulence common; in fine, there was every mark of constitutional and local debility. The plan of treatment was readily deduced.

1. To relieve the present sufferings.
2. To diminish the muscular fatigue.

3. To increase the constitutional power.

It is unnecessary to enter into detail further than to say that an increased amount of rest and a diminution of exercise formed the main ingredient in the cure. The recovery, however, was very slow, as the deterioration of his constitution had been considerable and of prolonged duration.

Mr. O., æt. 30, consulted me to ascertain whether he had spermatorrhœa. The symptoms he described were those of myalgia, affecting principally the muscles of the back. He had a most distressing impediment in his speech, and, like most confirmed stammerers, was thin and weakly. His health had obliged him to leave off business. He was doing everything which his advisers had recommended to recover his health; but unsuccessfully. On finding the urine, etc., healthy, I inquired especially into his daily habits, and found that he was accustomed to walk about the docks, quays, and landing stages for nearly six hours a day, under the impression that he was thus benefiting himself by air and exercise. I recommended him for the next week to amuse himself with light reading, in the recumbent posture, and abstain from all exercise. At the end of that period, the alteration in his appearance, voice, manner, and even in the stammer, was most remarkable. He seemed a new man, and expressed great surprise that so small a matter should have done so much for him. I have seen him once since then, and found him fat, flourishing, in excellent health, and stammering very little.

The next case is less striking, but equally important. Mrs. N., æt. 67, had suffered for many years from myalgia, which had been mistaken for hepatic and cerebral disease. The treatment she had undergone pulled her strength down, and this, combined with advancing years, produced anasarca and great depression of spirits. The former was cured by

tonics, &c. ; the latter continued much the same. I ascertained from observation that she was always worse in the evening, that symptoms of exhaustion were apparent shortly after noon, and that she got up early, took upwards of an hour to dress, and came down stairs to breakfast. I recommended the simple plan of breakfasting in bed, and only coming down to dinner. Since that, life has been enjoyable. A number of similar cases are given in my work on "Spinal Irritation." There is no doubt that, as years increase, the power fails ; and thus habits which seemed to promote health in youth may be the source of severe suffering in old age.

The most remarkable case which has come under my notice, as illustrating the exhaustive nature of exercise, is the following :—

Mr. E., of spare frame and great activity, after many years of harassing mental labour, found his mind give way at the age of forty-two. After being in confinement for a few weeks, he returned home. Though his mind was restored, he was in a deplorable state of debility, unable to stand or walk without tottering. His doctor now ordered for him a most profusely liberal diet, and an absolute repose of body and mind, giving at the same time steel and cod oil. Under this plan he improved considerably, gained flesh, and became of ruddy complexion. As it was now thought desirable for him to have some exercise, he was allowed to be out of doors for ten minutes at a time ; and as his food was given hourly during the day, the exercise was directed to be between his meals. Everything went on prosperously under this plan, until one day when he walked about a mile and a half to a concert, sat it out, and then returned up-hill to his home. Next day he began to suffer from fainting, and there was such complete collapse that for three days his life was despaired of. By extraordinary care and the lavish use of stimuli, he came

slowly round, but a month elapsed ere he regained the ground he had lost.

Here, as in a great number of cases, it will be noticed that the debility came on the day after the extra exertion, and not on the day itself. In some instances that have come under my care, the effect of excessive exercise has been shown on the second day after it has been taken.

The exhausting influence of exercise shows itself more or less in all organs of the body, and upon the constitution generally. When very excessive, it will produce typhus; when less severe, it simply induces prostration of strength, lassitude, debility of the heart, brain, stomach, &c. Our chief business at present is with the last. Excessive exercise, we say, destroys for a time the appetite, and interferes materially with the power of digestion. This fact is familiar to every pedestrian, to many a man of business, and active female. There is a period of the day at which they feel hungry, and know they could eat a large dinner; but if, from any cause, they are unable to satisfy their appetite, the sensation of hunger gives way to faintness; they feel, they say, that they are "past their food," and when it is set before them, they are able to eat only sparingly. But if they commence the meal by the use of a glass of wine or other stimulant the effect of exhaustion is counteracted, and the appetite returns.

We see a similar state of things in horses who have had a long journey: they are, to use the expression of grooms, "off their food;" but the experienced ones know how to restore the appetite by giving such nutritious drinks as ale and porter, which I have seen in Ireland rendered more stimulating by the substitution of whisky and water.

But it would appear, as a general rule, that the digestive power suffers sooner than the appetite. Thus it is a common

occurrence for a man or woman to go all the day, from eight in the morning to five in the evening, without food. During the whole of this period they have been transacting business, it may be, or otherwise actively occupying themselves; and, as usually happens to business men, the work is terminated by a walk home, to insure them a good appetite for dinner. Individuals thus circumstanced have appetite; but if they indulge it, it is followed by indigestion, or else—a common occurrence—a quantity of wine or other stimulant is taken to whip up the digestive powers.

How much the meal overpowers these individuals is shown in the frequency with which such dinners are followed by more or less profound sleep. The influence of the preceding exercise upon the digestive power is readily recognised in such cases, *for the sufferer from dyspepsia will find that he can eat more and digest better after a one o'clock dinner than after a later one, and that with the former he will require less stimulant, and will not be weary for sleep.*

Having then recognised exercise or exertion as being positively prejudicial when excessive, inasmuch as it interferes in an especial manner with appetite and digestion, which it ought to promote, our next inquiry must be directed to ascertain when or what exercise is to be considered as “*excessive.*”

If we turn to our dictionary for the meaning of this word, we find it to be “beyond due limits”—“in excess.” We adopt the latter, and say, that exertion or exercise is excessive when it is “in excess;” *but in excess of what?* Of the average amount, or in excess of the individual's powers? In common parlance, the first of these significations is the one adopted, and we say that such and such labour is excessive only when it is far beyond the average amount undertaken by the generality of mankind. But when we are discussing a medical point, we must adopt the second signification, and

consider that the *word has reference to the patient's powers*. Thus we should say, that an ordinary day's work was very excessive exertion to a man who had bronchitis, influenza, or other weakening disease, or who had had his strength pulled down by loss of blood, hunger, or protracted disease.

It is the general adoption by physicians of the first signification of the word "excessive" which has led, and still leads, so many persons astray upon the subject of exercise.

All agree upon *excessive* exertion being prejudicial, but they adopt as a standard the average work of mankind, and *not the patient's power*. The practical result of which is, that an individual is often recommended by the doctor to use an amount of exercise which is excessive for him, though it is inconsiderable for other people. I have known patients directed to walk a certain number of hours per day—say two or three—with the idea that it would improve their condition; yet they have got steadily worse, and have improved immediately upon giving up their exercise altogether. I have known others directed to increase their exercise from time to time, until they have been at last unable to take any, by being confined to bed. I have known the stomach to indicate exhaustion when the man was perfectly unconscious of fatigue: severe indigestion was the result, and yet the patient was recommended to take a walk to prepare the stomach for its work! In none of these instances, however, did the exercise *seem* to be excessive, *i. e.* beyond the powers of the generality of mankind; but *it was excessive* to the individuals, for it was *beyond their strength*.

When once the powers of an individual are made the standard by which to judge of excess, it is clear that we are no longer in the region of comparative certainty, but are thrown upon a sort of irregularly sliding scale. Of the de-

degrees of this scale the following will serve as examples :— Miss C., with fatty heart, from being able to walk four miles with ease, was at last unable to walk up stairs, was then unable to walk across the room, and, finally, to hold conversations for more than an hour or two. When her condition improved, she gradually regained her strength, and could walk four miles in one day ; but this exercise for two or three days together would bring on paroxysms of dyspnœa, which would last for two days. These would equally be brought on by one day's exercise, if taken after the use of aperient medicines or other depressing agencies. I repeatedly see patients quite exhausted by *talking*, coughing, or reading aloud—so much so, that they do not get over the effects for some days. Mr. S. is always painfully exhausted by half an hour's walk, though he looks healthy. Mrs. L. was thoroughly “knocked up” by a drive in a car of four miles. Mrs. J. had intense dyspepsia, and was so weak as to be confined to her own room. As long as she was perfectly quiet, the digestion was fair ; but the visits of friends, and the conversation consequent thereupon, were too much exercise for her, and the digestive powers were temporarily suspended entirely. This state of things might be mitigated by the free use of champagne. Mr. H. was so weak, that the exertion of walking some thirty yards prostrated his powers so completely, that he was unable to think or to write clearly for some hours after, and loss of appetite and indigestion followed. Mr. B. was exhausted by putting coals on the fire. Mr. J. had exhaustion, vomiting, and indigestion from an hour's driving, but gradually recovered his powers, until he could do as other people, and digest and enjoy solid food. All are familiar with the frequency of death caused by the simple exertion of getting out of bed to go to the night-chair, during the early convalescence of fever ; and I doubt not, that

many can recall cases like the following :—Miss R., an overgrown, delicate girl, had epidemic influenza, for which she was treated by Epsom salts : these acted freely, and she became extremely languid, and was confined to bed. Her friends now visited her, and under the cheerful influence of their presence she sat up in bed, chatted merrily, ate heartily of chicken, and then lay down and died. One man has come under my notice who had suffered for years from bleeding piles ; he was thoroughly blanched when they were tied. No special means were adopted for restoring his powers, beyond keeping him in bed : but as his appetite and digestive power had gone, this did not improve his condition. About four days after the operation he died in the act of turning over in bed. Mary —, aged about 22, died during a fit of laughing ; her heart was fatty ; not a fibre was found healthy. She had been for some time greatly addicted to intemperance, and had been very drunk the day before. I have known many patients with bronchitis, phthisis, &c., die very unexpectedly of pure exhaustion, from walking up the hospital stairs to their wards ; and others from simply walking about one hundred yards on level ground. Mrs. T., aged 64, had an attack of diphtheria, but was so much better on the third day that she walked up and down stairs, and from room to room, frequently, under the idea that the exercise would do her good. The next day she was so very prostrate that she could hardly speak audibly, and the debility steadily increased for a fortnight in spite of the most generous diet, tonics, and a free use of wine. I am at present attending a lady who is free from all organic disease, but who is so weakly that the exertion of going up one pair of stairs unassisted will confine her to her room for a week. She attributes this debility entirely to the exercise she was recommended to take while at a fashionable watering-place.

In discussing this subject, it occurred to us to make some investigations upon the subject of gymnastics, training athletes, &c. We came upon the following facts :—All young men are not capable of being trained as oarsmen, or runners, or boxers ; some break down during the first week, others during the second, others, again, “last out” for a period of six weeks, and then suddenly break down. One case has come under my own notice, in which a very highly-trained athlete, with muscles of extraordinary power, died suddenly of phthisis after a fortnight’s illness ; and another, in which the stroke oar of his College became, in a similar period, a perfect wreck from the same cause. He recovered from the disease with a cavity in the left lung, and utterly unfitted for any business or profession. A third man had acute phthisis from running a race against time. I have met with apprentices who, though slowly inured to their work, have been compelled to give it up at the age of nineteen ; with seamen whom their work has not strengthened ; and every general knows that many of his army are habitually knocked up by forced marches, while others can stand them almost with impunity.

If there is constitutional debility, exercise beyond a certain point increases it, and no gymnastic contrivances can give to a delicate individual the vigour of perfect health.

This being so, it is clear that an amount of exercise of which one man may be absolutely unconscious, may suffice even to kill another. It is equally clear that the prejudicial influence of the exertion will be in direct proportion to the debility of the patient.

The sliding scale, then, which we have for a guide, is one having for one extreme, “exercise conduces to health ;” for the other, “exertion is a cause of death.”

With such a scale, it is manifest that exercise cannot be

indiscriminately recommended as a means of restoration to health.

May we not go further, and say, that as exertion carried beyond the bodily powers conduces to disease and death, so a cessation from exercise suspends the downward tendency? Thus *rest* becomes almost as important as *food*.

To this conclusion a number of experiences induce us to come. All know the powerful influence of "tired Nature's sweet restorer, balmy sleep," in recruiting us after the fatigues of a day; its influence, when hunger is not verging into famine, is independent of food. Simple rest from labour has a similar result. The tired pedestrian throws himself on the ground, when, overborne with fatigue, he scarce can make his way; no inn is at hand, and his own store of food is exhausted; he lies down for a few minutes, sleeps, perhaps, for a few moments, and then rises again, conscious of refreshment and renewed sense of power.

Horses, dogs, and other animals do the same. For those who are originally strong and healthy a short rest suffices; to the weak and feeble a far longer repose is necessary. On this point the experience of horse-keepers is very decisive, and I am told that huntsmen find the same in packs of dogs: a few can be "hunted daily," a majority thrice weekly, but some few can only stand the fatigue once or twice during the same period.

We come, then, positively to the conclusion, that there are instances in which we must attempt to re-invigorate the vital powers, by adopting a plan which would be positively prejudicial in conserving them at a first class standard, viz.: by rest and repose—cases in which we must prohibit the smallest amount of exertion, and where we must appear as the encouragers of absolute indolence.

But how simple does this become when we throw our con-

siderations into the form of an aphorism, thus—*If the physician wishes to increase the vital powers of his patient, he must be as careful in husbanding those which are present as in trying to increase them.*

In illustration of this, I could give numerous cases, in which patients have been relieved of months and years of suffering, by simply adopting the habit of resting on their bed for a period of one, two, or more hours during the day. Even where there is no illness, but only weariness, and fatigue at night from the ordinary feminine household duties, the individual can get through the day with comfort to herself, and with increased efficiency for others, if this custom is invariably adopted. The posture chosen should be the recumbent one, and the head should be low.

Many cases illustrative of this fact may be found in my work on "Spinal Irritation." One of the most interesting I venture to reproduce.

M. I., æt. 27, of delicate appearance, came under my care for pain and tenderness along the whole of the back. She was a housemaid, had an easy place and kind mistress. She was chlorotic, had no appetite for food, lived chiefly on tea, and was extremely weak. The pain was so severe that she could not sleep: contact with her body-linen was productive of great suffering, and it required all her energies to go through her day's work. I found that the abdomen and chest were almost as sore as the back, and that she had a cramp in most of the muscles of the trunk, at one time or another.

I prescribed tonics and rest, but she got worse to such a degree that she could scarcely endure any movement of the body.

She now left her place, took lodgings, lay in bed all day long, abandoned medicine, and in six weeks was quite well.

Since recording that, I have met with very many others of a similar kind.

Now, the whole of the remarks we have made turn upon the effect which exercise produces upon an individual patient, and it may naturally be asked if we can suggest any natural and simple means for ascertaining the effect of exertion upon any one. I doubt whether any absolute rules can be laid down : the following are approximations to the truth :—

1. All exercise is prejudicial in patients who are weak and feeble.

2. Exercise is prejudicial when it produces the idea of exhaustion.

3. It is prejudicial when it is followed by loss of appetite, indigestion, or both, at the time or subsequently.

4. When anorexia, flatulence, palpitation, nervous irritability, sleeplessness, consumption, diarrhoea, menorrhagia, chlorosis, &c., are present as prominent signs of the state of the constitution, exercise is far more likely to do harm than good, by aggravating the diseases present.

5. In the above-mentioned conditions, rest is of far more service than exercise.

6. When exercise is resorted to, and a moderate amount does good, it should always stop short of fatigue.

Our next subject of inquiry is, how far can the *diet* of the rural population be adopted with advantage by townspeople ? Ere we answer this question, we must recapitulate some of the differences existing between a town and country population.

I think it may fairly be taken for granted, that the average amount of work undertaken by a countryman is equivalent to that undertaken by an urban labourer. But there are points in the history of the former to which it is well to call attention.

Taking the case of agricultural labourers, we may give the following as an outline of their day's work. It begins about four or five in the morning and finishes at seven or nine, according to seasons. They fetch the cows, milk them, take them back ; feed and groom the horses ; then plough, harrow, sow, dig, plant, hoe, churn, thrash, winnow, cut hay, cart it, make up straw for market ; feed pigs, poultry, calves ; tend sheep, wash them, clip them ; and at stated times they mow grass, make hay, cart and stack it, reap wheat, &c. The ingathering of the harvest is the most laborious of all their occupations, both as regards the physical labour it involves, and as regards the duration of their employment, and the short period of rest allotted to them. During this period, our own country is visited by many labourers from the sister isle, who share with our peasantry the fatigues of the harvest.

As far as I can ascertain, it is not usual for master farmers to allow their labourers any amount of malt liquor, day by day, under ordinary circumstances, or if they do, the quantity is limited, but during the time of harvest there are few who do not allow a very liberal supply. Still further, I have been informed by farmers, that it pays them better to allow their Irish labourers a sufficiency of ale, in addition to their wages, than to pay them their bare money, and give them an unlimited supply of buttermilk. I scarcely need go into the experience of railroad contractors, and the contrast noted between the Frenchman's work on his meagre diet, and his subsequent performances when he adopted the diet of the English navy ; enough has been said to show, that experience has shown to British farmers, railway contractors, and others, the utility of adding an alcoholic stimulant to the ordinary food of their labourers during times of unusually great exertion—an exertion supposed to be *excessive* for their

average amount of strength, even though they live habitually in good air, and are accustomed to fatigue.

The labour of the denizen of the town is rarely so prolonged as that of the countryman, it rarely extends over ten hours, and is severe or otherwise according to circumstances ; but though when we compare work with work there is little difference between the actual amount done, *there is a vast difference between the powers of the respective parties to do it.* The rural labourer as a rule is habitually strong, the town one is habitually weakened by influences independent of his work, and he is, therefore, almost daily in the same position as the agriculturist is during the harvest period only. He requires something beyond what the countryman usually lives upon.

The following conclusions we think may be relied on :—

1. A town population is not so robust and healthy as a rural one.

2. A town labourer is more exhausted by his daily labour than is an agriculturist ; and, consequently, he requires a greater amount of nourishment.

3. As solid food in towns is expensive, and labour has frequently a direct tendency to diminish the appetite for it, the townsman is under peculiar temptation to have recourse to alcohol in place of food.

4. In moderation the use of alcohol is of considerable service ; it is not only in itself a substitute for solid food, but it assists in evolving the digestive power for the latter. The use of alcohol in excess is as prejudicial as is gorging the stomach with an excess of food.

5. A labourer who is unable to take alcohol, or who abstains from it in every form, requires a larger quantity of solid food than his neighbour who takes beer, &c.

6. A townsman may live comfortably on the same diet as

a countryman, provided he is not called upon to do much work.

7. The laws apply with greater force to the town-born and bred than to those who come directly from the country.

8. We know of no substitute for alcohol in its two qualities as food and stimulant.*

If there be any truth in the foregoing rules, it will be seen that we cannot hope to restore a debilitated individual to health, simply by imitating the exercise and diet which serves to keep the robust countryman in good condition. A host of experiences point to the same conclusion: some patients are totally unable to endure a milk diet, in consequence of the acidity, flatulence, heartburn, and indigestion it produces; others can digest it well enough, but they gain no strength from it—they sink lower and lower in vital power from day to day, until wine, or some other stimulant, is added, and an animal food supplants the farinaceous and milk diet. Some find all diet flatulent except that which may be called purely animal; while others loathe all flesh meat, and can only digest vegetables and milk. From these considerations we

* As an illustration of the nutritive properties of alcohol and opium, the following case, which was reported to the author by Mr. Slack, an unusually close and original observer, may be cited:—A middle-aged woman came under his care during the temporary absence of a friend. For two years she lived entirely upon opium and gin and water. Her chief symptoms were frequent, almost daily sickness, and epileptic fits three times a week. The bowels were not opened during the whole two years. At her death, the abdomen was so distended as to appear ascitic. This was due to the coating of fat, four inches thick, in the abdominal walls. There was no obstruction in the intestinal canal, and no fœcal or other accumulation within it.

A case more extraordinary it rarely falls to the physician to record.

conclude, that although it is advisable and necessary, as a general rule, to endeavour to surround a patient with all the circumstances which conduce to make a countryman healthy, yet that there are special cases in which such rules must be departed from, and where a plan purely artificial must be resorted to.

CHAPTER XVII.

MEANS FOR RESTORING VITAL POWER.

Means for improving the vital powers—Cod oil—Influence of oils in the animal economy—Healthy and unhealthy fats—Cream—Almonds, eggs, soups—Periods between meals depend on patient's condition—Rule for guidance—Raw meat, as Russian preserve—The medicinal value of alcohol—Case—Various forms of alcohol considered—Iron—This will produce salivation—Case—Bitters, their value considered—Carbonate and spirit of ammonia—Opium—Tannin.

IN estimating the means we possess of improving the constitutional powers, when from any cause they have been reduced, we must place foremost in the rank the hygienic measures we have already briefly alluded to. Change of air, a pure atmosphere, rest from labour, pleasant occupation, good diet, and, when possible, a fair amount of comfortable exercise in the open air.

Next to these, though by a long interval, come those medicines to which the name of tonics has been applied. We will not enter into the strict literal signification of the word, but merely state that we use it to designate a class of remedies whose employment seems to favour the patient's restoration to health and strength. As we have said before, they do not directly increase the patient's vital force, but they afford, in some way or other which we cannot explain,

a material assistance to the existing power, by means of which it is augmented towards the healthy standard.

Of all the medicinal tonics, none are equal to certain animal oils, and upon the whole the cod-liver oil may be considered the best.

It is somewhat interesting to speculate upon this fact, and inquire whether there are any circumstances which throw light upon it.

The first consideration that strikes us is, that there is scarcely an animal, however minute, that does not contain a notable quantity of oleaginous matter: from the gigantic whale and towering elephant to the tiny louse and the water-flea,—all are furnished with a considerable quantity of fat. Butter is a constituent of every form of milk we are acquainted with; it is essential to the infant. Still further, we see it in some measure connected with nutrition and food: when the stately stag is in its best condition it abounds with fat, and as from various causes its strength wanes, the quantity of its fat declines. In man, too, it is to be noted that consumption, a disease which more than any other evidences a want of vital power, manifests itself, almost uniformly, by emaciation sooner than by any other single sign; and that in advanced stages of this disease, one of the first signs of improvement is an increase in bulk. But there is one point of difficulty in pursuing this subject, namely, that there appear to be two distinct kinds of fat or oily matter, one of which appears to be the evidence of a bad condition rather than of good. Thus, as the goose of Strasburg loses health, his liver gains fat; and as the consumptive man loses fat and flesh from under his skin and elsewhere, he accumulates it in his liver, and sometimes in the kidneys, bones, and arteries. In the same way some fat people are very weak constitutionally, while others are active and strong.

In one case that came under my notice, a lady of immense size was suffering apparently from fatty heart, and was extraordinarily weak, yet under the use of cod-liver oil she became much stronger and at the same time stouter.

As yet the chemist has not been able to distinguish why one oil is healthy and another the reverse.

The beneficial influence of cod-liver oil on the debilitated human frame is very marked. The following case will serve to show its value as contrasted with other tonics :—Miss L. C., æt. 13, was suffering from erythema nodosum, painful spine, and general debility ; steel, quinine, porter, wine, and animal diet were tried fully, yet no improvement was apparent during six weeks ; at the end of that time cod-liver oil was commenced, and she was convalescent in a week. Similar cases are common.

I have no personal experience of other animal oils, with some few exceptions ; but I understand that whale and seal oil have been used with good results.

I can gain no reliable information respecting animal fats, such as suet, beef fat, lard, bacon, &c., when taken internally by individuals in delicate health, but I am acquainted with many who prefer the use of mutton-suet boiled with milk, and taken warm, to the use of cod oil.

As far as I can ascertain, the vegetable oils have little if any influence for good ; whenever I have tried them, they have acted as aperients and have done positive harm.

But the value of cod-liver oil as a tonic is necessarily limited by the powers of the stomach to digest it. The number of those who are unable to take it is considerable, amounting at least to one out of every four patients ; consequently these must be deprived of the influence of an animal oil, or some other means must be taken for introducing it, or some substitute adopted. At an early period the idea was sug-

gested that cod-liver oil would be as useful if introduced through the skin as when given by the stomach. Experience confirmed the notion; but patients and their friends complained of the abominable smell this plan entailed; consequently physicians tried to ascertain whether other oils would not answer equally well when rubbed through the skin. Experience upon this point is somewhat deficient, yet, as far as it has hitherto gone, it goes to prove that olive oil, almond oil, and lard are of equal efficacy with the fish oils. I have myself seen many, and known more instances, where inunction of lard or olive oil has been followed by the happiest results, and under circumstances where it was morally impossible to attribute the improvement to other causes.

In practice, however, it continually happens that one thing fails us after another, and it becomes necessary to fit "a new string to the bow." We need not go far to find a good substitute for cod-liver oil when it cannot be taken internally.

Cream is a fluid containing a large amount of animal oil, and would naturally suggest itself in the place of the more disagreeable fish oils. It has the peculiar advantage of being in a state of natural emulsion, the oily particles floating in a saccharine solution containing much casein. It has the rare merit of being palatable, even for children, and its nutritive properties are undoubted, seeing that delicate infants can be brought up on cream and water alone.

Though there is reason to believe that much of its nutrient property depends upon the oil it contains, we have not found that butter answers as well as cream. Many patients are unable to take much, if any, of the former, who can take the latter well.

In young persons, *e. g.* those under ten years of age,

cream alone may be administered ; but in elder individuals, or those to whom the flavour is disagreeable, it may be mixed, very advantageously, with certain materials, whose effects are either to make it more invigorating or more palatable. A medical friend tells me that his favourite addition is tincture of iodine, three or five drops for each dose. In my own practice I have never recommended anything beyond the addition of pounded blanched almonds, which converts the cream into a sort of cold custard, and leaves a pleasant flavour in the mouth, besides making it more nutritious.* An elderly patient who suffered much from indigestion and vomiting, could take this mixture better than any other thing he tried.

There are, however, cases in which the prostration of strength and the weakness of the stomach are such, that it is necessary to add some stimulant to the cream. The best, and certainly the most palatable, is a small quantity of brandy. This combination is generally well borne by the most fastidious stomachs ; and in cases of phthisis, marasmus, or simple debility, its value is very conspicuous.

Some few stomachs, however, reject it as being too rich ;

* A few years ago Liebig pointed out that the difference between finely-powdered almonds and water and milk was so inconsiderable, that it was scarcely to be detected by chemistry. Since that time a gentleman came to call upon me, who informed me that for some eight months or thereabouts he had subsisted entirely upon a daily allowance of a quarter of a pound of blanched almonds and a pint and a half of milk. His appearance betokened high health. He was in the habit of walking twelve miles daily, and was in every respect a vigorous man ; his age was about thirty. From these observations I have been led, on one or two occasions, when I have had long mountain or other pedestrian excursions, to take a few blanched almonds in my pocket, to eat on the way, and I have been surprised to find the amount of nourishment there is in even a small quantity of them.

in them it appears to favour sickness and bitter bilious eructations. When this is the case, rum and milk, a well-known and very popular mixture, may be used instead.

Whenever there is much debility, stimulants must be used freely with the food ; their effect is to give temporary power to the stomach, and to enable it to digest food which it might otherwise reject.

Next in value to cod oil and cream comes egg beaten up with wine or brandy, which may, in addition, be diluted with water, or mingled with milk or cream. This is generally very digestible, easily taken, even when there is no appetite for solid food ; it is palatable to the taste, and leaves no "stickiness" or clamminess in the mouth afterwards.

The preceding may be looked upon almost as much as articles of diet as medicine, and so deemed unworthy a place here. We do not think so, however, inasmuch as food itself has the same character as medicine ; it is simply "means to an end"—that end being health ; and food and drink thus come into the category of medicines, as soon as any patient is ill and low.

We have already indicated that there are various degrees in debility. In some the patient can digest solid food, and has an appetite for it ; in the majority, however, the appetite is wanting, and the loathing of animal food intense. Cod oil, &c., may be an appropriate medicine for the former ; for the latter, such medicines as cream, egg, and wine, &c., are more appropriate. Whenever, indeed, there is a distaste for solids, nutritious fluids must be adopted, and beef-tea, chicken, or Scotch broth, ox-tail, calf's-head, hare, or turtle soups, must be adopted, with or without wine or brandy, as the case may be. Calf's-foot jelly, isinglass, blancmange, &c., in a fluid state, are all useful ; and where the clamminess these leave in the mouth is complained of (and some-

times this is so disagreeable that patients refuse to continue diet), milk may be administered, in which beef fat, mutton suet, or sweet lard has been boiled, with a minute quantity of arrowroot, to thicken it, and encourage the separation of the animal oils.

In all cases where the debility to be overcome is great, a very close attention must be paid to the times at which nutrition must be given. There are few physicians who cannot recall instances where individuals have sunk into an eternal sleep, in consequence of having been allowed to sleep too long without nutrition ; and others where from some peculiar notions of parents, friends, or nurses, patients have been thrown seriously back by the withholding of food beyond a certain time.

To a man in health, who can eat a hearty breakfast or a large dinner, there is no difficulty in fasting for eight hours, or even more ; some few can even fast with impunity for twenty-four hours, and only take one solid meal in the day ; but to one who is in ill health, a fast of three hours is depressing, dangerous, and possibly fatal. In some cases food has to be given every half hour, sometimes even oftener, and the sole result to be noticed for many hours or days may be, that the patient gets no worse.

There is no general rule for the "times of administration" of food or medicine—each case stands on its own merits. The nearest approximation to a generalisation is this : the larger amount of food that can be taken at a time, the longer is the interval before more is required.

There is another article of diet we may mention here, which may well deserve the name of a medicine, inasmuch as it is unpalatable in idea, though not nauseous to the taste. It is one which has long been popular in Russia, and has recently been introduced into France. It consists of the

flesh of beef or mutton reduced to a pulp. The raw meat is thus prepared : all fibre, veins, arteries, and cellular tissue are carefully removed ; the flesh is then scraped with a knife, or rasped with a rough grater. The material thus prepared has an elegant appearance, looking like confection of roses reddened by acid. To prepare it for use, however, it is well to add to it some preserve—the syrup of orange, confection of dog-rose, or red currant jam. Thus mixed it is known in Paris as Damascus preserve ; it may be more correctly spoken of as Russian preserve. The material is extremely digestible ; very delicate infants have been brought up upon it, when they have been unable to take any other form of nourishment, including breast-milk. I have myself used it with great advantage, both in children and adults, where they have been unable to take solid cooked meat in any form. The quantity administered daily has been at first three dessert-spoonfuls. Nor is it without interest that I recall two cases to memory which seem to corroborate the value of this article. One was a man suffering from diabetes mellitus, who was getting steadily worse, in spite of every treatment. He informed me one day, that he had found that he was better for raw beefsteaks than anything else, and begged for a full supply, which he took with great relish for the rest of the time he remained in the Hospital. The second was a man far advanced in phthisis, who had been vomiting everything he took for about three weeks. On my repeating an oft-asked question, whether there was anything he could fancy for diet, his answer was, that he should particularly wish "to be allowed some *raw tripe* for dinner !" His request was granted, but he died ere he could avail himself of the permission.

All the things we have mentioned, to which, were we writing an elaborate treatise, many others might be added,

have a direct tendency to improve the vital powers when they are enfeebled. But, as is well known to all practitioners, they may be given with an unsparing hand, without the patient benefiting by them at all. It becomes necessary, therefore, that other materials be employed simultaneously with, or supplemental, to them.

The first we would mention, is one that we have before alluded to as an article of diet, but which requires a few additional observations as an article of the *Materia Medica*—viz. alcohol.

There can be little doubt in the minds of unbiassed and experienced physicians, that alcohol, in what may be termed medicinal doses, acts as a tonic as well as an article of food. We have already given some proofs of its value in the last respect; we now give some proofs of its tonic or strengthening properties. 1. A child has come under my notice who had *tabes mesenterica*. The medical attendant,* a remarkably observing and clever man, had done everything in his power for it, but the child steadily got worse; vomiting and purging and marasmus were the prominent symptoms. One evening the doctor called while the father was enjoying some whiskey toddy, and he administered some to the child. It was taken with a manifest relish, and apparent improvement. The hint was followed up, and for three months the child, about two years old, lived almost entirely on whiskey toddy. By the end of that time the symptoms had all given way, a healthy appetite returned, and the child recovered perfectly; and it is a remarkable and interesting fact that, during the period of returning health, the child enjoyed the mixture so much, that he would not go to sleep without a small bottle of it, which he nursed like a doll. But when recovery was quite complete, the child loathed the sight and

* Mr. Nisbet, of Egremont.

smell of the toddy, and even cried if he was in the room with it. Another child, two years old, had marasmus, for which all remedies had been tried without success ; as a last resource the doctor ordered it wine and water, or spirits and water well sweetened ; the child would not take them, however. Beer was then tried, but failed too. The parents were then recommended to try some particular Scotch ale ; this was relished, and the patient began to mend directly. For the first fortnight nothing was taken but the ale, and the daily allowance was a pint ; at the end of that time there was appetite for solid food, and in about six weeks the little patient was perfectly restored. As in the previous case, there was the utmost enjoyment expressed for the ale during recovery, and the child was so particular, that no other ale would it take ; as soon, however, as it was well, it disliked the ale so much that it could not bear the sight of the bottle.

The case of a Scotch lady has also been reported to me, who was said by many eminent surgeons to have cancer of the tongue, and to whom extirpation had been frequently proposed ; the lady firmly declined this, and at last abandoned the hope of cure. As she was a very abstemious woman, some friend suggested the use of whiskey toddy as a medicine ; the advice was adopted, and the lady was soon perfectly well.* 2. I have satisfactorily ascertained, from a

* Apropos of this case, I may mention some others, in which a similar disease has been recovered from. I was called in consultation to see a case, supposed by the medical attendant to be a cancerous affection of the tongue. I doubted greatly whether it was anything more than syphilitic ulceration ; and the patient having the benefit of the doubt, was treated by iodide of potassium and tonic medicines, with generous diet. The tongue was well in a fortnight.

Mr. W. had an affection of the tongue, said to be cancerous. For this he went to London, and saw many leading surgeons : amongst others, the late Mr. Bransby Cooper. All confirmed the diagnosis,

series of clinical observations in the wards of an hospital, that any aromatic or bitter tincture containing the usual

and recommended extirpation of the organ. He declined this, and placed himself under the care of a homœopathic physician. Of his plan of treatment I know nothing, but the gentleman recovered perfectly.

I was, on another occasion, consulted respecting the propriety of operation in a case of cancer of the lower lip; the patient was an elderly man, a fisherman. There was no doubt about the diagnosis, but it was agreed to leave the disease alone. It ceased growing shortly afterwards, and six years after the man was in good health, without any other trace of disease than simple induration of the lower lip.

Twelve years ago I was consulted by a lady, æt. 60, respecting a lump in the right mamma, which had all the character of scirrhus. Nothing was done to it beyond the continual application of belladonna plaister, and subsequently cotton wool to keep it warm. After a while the nipple became much retracted, and the extent of the hardness equalled the half of a small lemon. At the end of two years the growth began to wither, and a line of demarcation was drawn between it and the healthy mamma; this continued slowly to increase, until at the end of five years the whole mass dropped out, a perfectly black and shrivelled mass. The breast is now quite well, and resembles a fleshy ring. No bad symptoms have ever occurred. The lady at the present time seems a model of health and activity.

There is a case reported in one of the American journals, in which a cancerous affection, of many years' standing, of the face of a physician, in whose family the disease was hereditary, was completely cured by a bread and milk diet. I cannot at the moment, however, find the original report for reference.

These cases show clearly, either that the diagnosis of cancer is not so clear as is commonly supposed, or that the disease has not that uniformly fatal tendency that has been assigned to it. A few observations on this subject will be found elsewhere.

An elderly gentleman who had, in his younger days, lived very freely in England, went to reside in Jamaica. While there, he lived temperately, almost abstemiously, and continued to do so on his return to this country. At this period he suffered very

quantity of alcohol will operate as a tonic, increasing the strength, health, appetite, &c., quite irrespective of the vegetable which gives the name to the tincture. If there be any difference to be detected, it is in favour of the warm, spicy tinctures, such as cinnamon and cardamoms. 3. An aqueous infusion of any herb, used as a tonic, is not equal to the tincture of the same duly diluted with water. 4. Such tonics as steel and quinine are not so serviceable without alcohol as with it. I have repeatedly administered these united or separately, and have seen no good result from them until some tincture has been added. The immediate effect produced has been so well marked that there is no room left for doubt. 5. Persons apparently dying from loss of blood, or asthenia in any form, can be recovered by alcohol alone—we know of no substitute for it. 6. I have known individuals, who have been most conscientious abstainers from alcohol, make the most careful and determined efforts to get well without using it in any form; but, though prolonged for weeks, their efforts have been unsuccessful; a moderate and judicious amount of alcohol has then been taken, with immediate good effects. 7. From carefully conducted observations on children, in private practice, I have ascertained that

severely from prurigo senilis, for which he consulted a number of medical men, and visited sundry watering-places, without relief. Total abstinence from alcoholic drinks was most rigidly enjoined and carried out. In despair of success, and being perfectly miserable, he now abandoned all medicine, and took to “drinking” again as freely as in youth. To his great surprise he shortly found himself perfectly well, without a vestige of his old complaint, or any new one in its place.

My informant, Mr. Nisbet, whom I have before mentioned, told me that he had met with many cases similar to the above, in old publicans who had retired from business and become abstemious in old age. They suffered from prurigo severely until they resumed their ordinary allowance of alcohol.

wine is a very efficient substitute for such medicinal tonics as quina and steel; and that in a great number of cases porter is an equally good substitute for cod liver-oil. Lastly, the stomach will digest food, milk, cream, cod oil, &c., when it is administered with alcohol, when it is utterly unable to do so without such stimulant.

The amount of alcohol to be given for a dose, the choice of the alcoholic mixture, and the frequency of administration, must be left for the doctor's decision in each particular case: it is well, nevertheless, to add a few general remarks upon the subject.

1. The physician must keep his attention fixed upon the *effect produced*, rather than *on the amount* given.

2. It is not judicious to use the stronger preparations of alcohol when the weaker ones will answer as well.

3. The effects of spirits are more rapid and fugacious than those of wine, and those of wine than those of porter and ale.

4. It is rarely advisable to administer spirits or wine without combining them with fluid or other nutriment—*e. g.* cream, milk, egg, soup, bread and butter, &c.

5. The intervals between the administration of alcoholic doses should not exceed four hours, except during sleep.

6. Special wines and spirits serve special cases better than others. No wine arrests or relieves sickness better than champagne; and no spirit in this respect excels brandy. Whiskey I have known to injure the milk and produce vomiting in the infant. Gin serves specially for nurses, cases of bronchitis, and atonic dropsy. Port wine is useful in diarrhœa. All the dark wines are prejudicial in gouty subjects; and in them ale is better than porter. The French and Rhenish wines have not sufficient alcohol in them to be stimulants in atonic dyspepsia. Porter answers better than wine when there is emaciation and debility. In speaking on this subject to a friend, who occasionally has much bodily

fatigue from pedestrianising, and who generally has a great deal of harassing mental labour, he made a remark which, from my own experience, I can fully endorse, viz. that after mental labour there was craving for wine, but after corporeal exertion the longing was for ale or porter; in both cases a stimulant was wanted, but a larger expenditure of fluid had taken place in the latter than the former, and a compensating draught of fluid was as necessary for the body as the stimulant was grateful. He considered this explanation the true one, for if only wine could be got conveniently, when he wanted ale, he would mix it with water to dilute it largely.

7. Alcoholic drinks, when taken hot, with or without spices, are more stimulating than when taken cold. Whenever, therefore, the circulation is languid and the surface cold, as in chronic rheumatism, they may be administered this way with advantage.

Next in value in the list of those medicines which seem to have a decided influence in improving the condition of the vital powers is *iron* in many of its forms.

It has long been known that this metal exists in the frame, and physiologists have enforced the fact on the memories of students, by exhibiting in their lectures knitting needles, wire, &c., made from human blood. Chemists also have informed us that in certain diseases the normal quantity of iron in the blood has been found to be deficient. From these data the inference was natural, that ferruginous preparations would be of great service in those diseases and others allied to them. But long before chemistry was able to suggest this idea, iron had been empirically employed, and chalybeate waters had enjoyed a reputation superior to any other; and it is certain that this character was not undeserved.

Few persons, if any, have now any doubt of the value of

iron as a tonic ; but there is still much doubt respecting its effects, and the best mode of employing it. Some hold that it actually modifies the condition of the blood, and through that, the whole system ; others, that it simply acts like alcohol, quinine, and other tonics, and improves the general health and strength without any special primary action on individual parts. We have long been inclined to the latter opinion, but the subject would scarcely repay a controversy. As to the *best* mode of employing it much may be said. The question naturally hinges upon the word "best," for it has many significations. "What is the best preparation in a general sense" differs much from what is the best in a particular case : we have to consider circumstances, taste, and the nature of the complaint. We will give a few illustrations of our meaning.

An individual suffering from overwork and town influences requires a tonic, and steel is the one we prescribe ; every preparation is tried, and at last as they all fail he is sent into the country to some chalybeate spa, where, under the use of the water, he gets rapidly well. The dose of iron he takes is small, infinitely so compared with what he took before, yet it does what the other could not do. For such class of patients then we say that chalybeate spring waters are the best ferruginous medicine. But if the patient is unable to leave town, the use of such waters would be of no avail, and the steel must be employed in larger doses. The soluble preparations are more generally adopted than the insoluble ones, and the tincture of the sesquichloride stands at the head of the former, and it thus becomes the best preparation under these circumstances.

But some patients object to the acid taste and harshness that this tincture leaves in the mouth, and some children will not take it ; we have then to find out other preparations

which may replace it. The number of these is considerable; among the best are the saccharine carbonate, the vinum ferri, and the citrate of iron. Where pills are preferred the sulphate is a good preparation; and the most useful medicine I have met with in chlorosis is one which Dr. A. Guy told me of as having been hereditary in his family for three generations, namely, five grains of the *dried* sulphate of iron and five grains of extract of gentian, three times a day.

In cases of dropsy, whether from disease of the heart, loss of blood, or simple debility, I have known the potassio tartrate of iron succeed when other ferruginous preparations have failed.

Some practitioners, wishing to combine the good effect of iron with that produced by other tonics, &c., have given it in combination with quinine, iodine, valerianic acid, phosphoric acid, and the like; but although theory would seem to favour the idea, experience demonstrates that the value of the iron is not perceptibly augmented by such combinations.

But while speaking of the influence of iron on the constitution, we must not omit to notice one result occasionally following its use, viz. salivation. The following case came under my notice in 1853, and is of sufficient importance to be recorded fully. John G., æt. 45, had been suffering from gout, and was in such a debilitated state that tonics were administered. The tincture of sesquichloride of iron was selected, and twenty minims given three times a day. At the end of a fortnight he began to complain of a sore mouth and stiffness under and behind the lower jaw. As he had not ever taken any mercury little heed was paid to the symptoms, and he continued to take the steel. In a few days more, however, there could be no doubt that the man was salivated: the parotid and submaxillary glands were

swollen hard, and very tender, the mucous membrane of the mouth was pale, flabby, and ulcerated, the breath *very fetid*, the smell resembling the "fetor" said to be peculiar to mercurial salivation, and the amount of the saliva secreted was excessive. As the closest investigation could detect no probability that mercury had been administered, the fact was considered certain that the iron had caused the salivation. The idea was endorsed by the result: for a solution of tannic acid was used as a wash for the mouth, and was always expelled, after rinsing the mouth, *as ink*. The blackening of the tannin solution continued for six weeks.

Since that time I have met with four other instances where iron has produced salivation.

We must next say a few words about a class of medicines in very common use as tonics or invigorators, viz. bitters.

Of these we have a considerable number in the *Materia Medica*, of which the most prominent are the cinchona barks, the quassia wood, the strychnos nut, the gentian root, and cherayita stems. Other names will suggest themselves to the reader.

What is the true value of them? How much do we know of them?

We know that quinine, beeberine, salicine, are all very bitter, and that they will cure ague, and unquestionably act as a tonic. The beneficial influence of quinine on the vital powers is undoubted. Opium, too, is bitter, and it has, like quina, an influence over ague. Bitters, too, of various kinds have been popularly used to provoke an appetite by "whipping up" the flagging powers of the stomach.

Here, I believe, our knowledge ends.

With a view to test the subject more closely, I have experimented on various bitters in my own person, and closely compared in others the influence of such remedies as iodide

of potassium when used with bitters and without. I have taken infusion of gentian, &c., in doses of eight ounces at a time, and other infusions in like proportion, but in no case have I been able to recognise the smallest effect.

What is true of infusion is not, however, true of tinctures, whose virtues seem to depend more upon the alcohol they contain than upon the vegetable extractive it is mingled with. I find no perceptible difference between the tincture gentian and of tincture of cinnamon, cardamoms, cascarilla columba, or orange, with this sole exception, that some stomachs will endure spice and loathe bitters, and others act directly the reverse.

This estimate of the value of bitters is very contrary to that generally held, but it is, I believe, more trustworthy.

The next tonic I would refer to is one which is more commonly classed as a stimulant, viz. sesquicarbonate of ammonia. It has long been used in the later stages of bronchitis, typhus, or other disease, when the vital powers have been in immediate danger of failing; and in some cases it has been administered in combination with quinine. It occurred to me, that if it were useful when persons were dying it might be equally efficacious when their health was simply failing. I consequently tried it in a case of chronic rheumatism in an old man, to whom I had been for some weeks administering a variety of tonics. He found more advantage from it than from any other medicine. Encouraged by this result, I began to use it on a large scale, and soon found that it might fairly take a high rank amongst strengthening remedies. There was at first some difficulty about the dose; five grains agreed well with some, while others were made sick by it; three grains I ultimately found was the best *routine* dose. As I administered it with water alone, there was no doubt about

the effects being due to the ammonia, and not to the "vehicle" it was dissolved in.

The transition to ammonia with alcohol was very natural after this experience, and I instituted a series of experiments on the value of the common sal volatile (spt. ammon. aromat.), and soon found, that in bronchitis, atonic dyspepsia, the chronic catarrh of old age, and in general debility, the spirit of ammonia was superior to the simple sesqui-carbonate. The dose should vary from half a drachm to double or treble that quantity. It may be administered in milk with more satisfaction than in any other form.

There are many other drugs spoken of as tonics, such as the salts of manganese, zinc, the mineral acids, strychnine, &c. ; of these, as yet, my experience is too limited to enable me to give a very decided opinion. Each time I have tried them they have disappointed my expectations, and under these circumstances the encouragement to persevere is small.

But there are some other medicines, not usually classed as tonics, which deserve a close consideration. Amongst these may be mentioned tannin or tannic acid and gallic acid ; I was induced to try the efficacy of the former, in consequence of hearing that in Sweden the value of cinchona barks was tested by the tannin they contained rather than by the amount of quina in them. At first I administered the drug in combination with quinine, but found that the mixture was both unpalatable and indigestible. I subsequently used it alone ; and in one very remarkable case of phthisis, with profuse expectoration of blood, the man recovered under its use so completely that the cough and expectoration entirely ceased. Five grains was the dose used, and it was given three times a day ; at the end of three months, however, the influence of the medicine ceased, and the man slowly declined. After

death a cavity four inches by two was found in one lung, quite dry, and coated internally by a smooth membrane.

Since that time I have habitually used tannin as a strengthening remedy, and have found it very useful ; sometimes, curiously enough, it acts as an aperient, and has to be discontinued or combined with opium.

Gallic acid has appeared to me to be inferior to tannin, but it is very serviceable in albuminuria, and can be continued for a long period. In consequence of the influence turpentine has in preventing sea-scurvy, and curing it when present, and also in controlling hæmorrhage in incipient phthisis or in the hæmorrhagic diathesis, I have made some experiments upon it. In one instance, a case of dysentery, it seemed to act as a tonic, but I could not in any other instance satisfy myself that it was of any service. The dose I employed varied from half a drachm to a drachm daily.

Another medicine, whose influence for good is considerable, is chloroform in solution ; chloric ether as it has been called. The first case in which I employed it, was that of a seaman, recently arrived from the coast of Africa ; he was suffering from incessant vomiting, and his skin was harsh and yellow ; he had had both yellow fever and dysentery a few years ago, and had recently had what he termed African fever ; both the liver and spleen were slightly enlarged, the bowels were regular, the heart and pulse very feeble. After vainly trying to benefit him by other means, I ordered chloric ether and laudanum, simply to relieve the sickness ; this it effectually did, and I intended then to give quinine, but the man so urgently requested that he might continue his medicine without change, that I acceded to his request. The result justified his wishes, for he steadily improved, and went out of the house perfectly well at the end of six weeks.

It may be argued, however, that as the medicine contained

laudanum as well as chloric ether, it is possible that its beneficial effect might have been really due to the opium. It will therefore be well for us to see how far this idea is borne out by experience, and to inquire what is the influence of opium on the vital power?

The subject is full of difficulty; for, although there is no drug with which we are more familiar, its *modus operandi* has never been satisfactorily explained. We shall approach it best by considering the actual effects produced under different circumstances, and the analogy existing between it and other drugs whose place is recognised.

The first fact that strikes our notice, is the influence which opium has on a fasting man: under its use, the pangs of hunger are abated, if not entirely suspended, and there is reason to believe that life is prolonged in the same proportion, though there is no absolute proof of this.

Again, we see that opium relieves those pains which accompany a dying condition of the body, *e. g.* senile gangrene; it equally relieves the pain of tic where there is much debility.

There is no remedy so useful in allaying the effects of immoderate loss of blood, and its influence is seen in pulmonary hæmorrhage as well as in uterine flooding.

We have already seen how secretion is increased in quantity by an enfeebled condition of the vital powers, and how much debility promotes "irritability" of all organs. We may now notice that opium checks secretion, and diminishes irritability—presumptive evidence of its being favourable to vitality.

We have also adverted to the fact, that sleeplessness is produced by deficient vital power in the nervous system, and we know well the influence of opium in overcoming this condition in delirium tremens, typhus, and ordinary debility.

Still further ; I have been informed by those who have had personal knowledge of the fact, that opium taken shortly before death retards the loss of vital heat, and prevents post-mortem rigidity. In one instance, this occurrence, with a continuance of colour in the face, led to the belief that the individual was in a "trance," and not dead.

I have myself had considerable experience in the use of opium in consumption, and have seen many individuals improve greatly under it. In one very bad case, the patient's recovery could be attributed to nothing else.

Case.—Mrs. H., æt. 55, came under my care at the Northern Hospital for bronchitis ; there was much asthmatic wheezing, copious expectoration, great debility and perfect anorexia. She was treated by carbonate of ammonia with tincture of orange, and by compound styrax pill three times a day ; at the end of ten days she was sufficiently well to leave the house ; she took with her a box of pills. Three months afterwards she came to my house, looking well and rosy and much increased in flesh, and declaring herself stronger and better than she had been for years. She had been taking nothing whatever as medicine except the opiate pills, in whose influence for good she had unbounded faith.

Mrs. P., æt. 35, whose hair is prematurely grey, consulted me for a distressing fainting sensation, and a constant craving for food night and day. Digestion was perfect, and all the functions were regular ; the heart seemed to be feeble, and she was taking large quantities of wine, ale, or brandy, to stave off the faintnesses. Prior to my seeing her she had been using aperients largely ; I recommended a variety of tonics, an abstinence from purgatives, &c. She was too weak to go out into the air ; the cold douche was tried, and did good for a short period. At the end of a month her condition was worse than when I first saw her ; all

medicine was then abandoned, with the exception of a compound styrax pill every four hours : under its use the craving for food diminished ; the faintnesses were relieved ; she began to sleep soundly ; her spirits revived ; she was able to go out for fresh air. She then went home again, and continued to take the pills until she felt well enough in a fortnight's time to give them up.

I may add, that the lady felt fully persuaded that if she took opium it would kill her ; and this she repeated more than once while taking the styrax pills.

The reason I have adopted this preparation of opium in preference to any other is, that after long experiment I have found none which produces so little prejudicial effects. Patients take it without feeling headache or sickness, or having constipation of the bowels ; and, as in the last case, they may take it without knowing that it contains opium ; and this is no small recommendation, as some individuals have an almost unconquerable aversion to the idea of taking that drug.

In conversing on this subject with a friend who has had considerable experience with the insane, he assured me that he had come to consider that, with them, opium was as good a tonic as quinine.

The foregoing considerations lead us to the belief that opium acts beneficially on the vital force. We are strengthened in the conclusion by comparing it with alcohol, whose operation we have already referred to. The effects of a moderate dose of opium closely resembles that produced by a glass of punch or wine, and laudanum and alcohol are occasionally substituted for each other with advantage. Opium also resembles quinine in its occasional influence in cutting short an ague fit ; and as in the case above recorded, I have seen it act as a tonic after quinine, steel, and cod-oil had been used in vain.

Against all this may be objected the characters presented by opium eaters and smokers. Surely, it is argued, the drug cannot be favourable to vitality, when it withers the body and seems to transform it into a living corpse.

The argument, however, is untenable, for it has reference to the abuse of the drug, and not its careful employment. No one denies the beneficial influence of wine, ale, or spirits in certain doses ; but every one also knows how a debauch on alcohol is followed by as much subsequent suffering as a debauch on opium, and that there is little real difference between the habitual spirit drinker and the confirmed opium eater.

As regards duration of life, there seems to be no difference between the two.

We may say one more thing in conclusion—a consideration too hypothetical to have been embodied earlier. Inflammation is now recognised as an unusually rapid consumption or waste of tissue. Opium counteracts this to a considerable extent ; consequently, we infer that its influence is more favourable to life than the reverse.

Amongst the means employed for giving strength or tone to the system, baths of various kinds have long been popular, and sea-bathing is considered the best of all.

It is somewhat difficult to estimate the real place of these means in therapeutics, inasmuch as the benefit attributed to one thing, may, in reality, be due to another. Thus, the individuals who place implicit faith in a dip into the ocean during spring-tides, rarely take into consideration the change of air that such bathing necessitates ; and yet that this has a great deal to do with any improvement in the health is apparent, for those who do not bathe are quite as much benefited as those who do. Similar remarks apply to those who frequent certain watering-places for the benefit of bathing, and

who put their confidence in Bath, Clifton, Buxton, and other waters in England, and in the various spas of Germany and France.

Of course I do not include in this category such waters as those of Harrogate, or Aix-la-Chapelle, whose sulphurous ingredients give them special properties ; or those of Carlsbad and others, whose virtues are due to the quantity of free carbonic acid they contain.

Nor must it be forgotten, that when visits are made to watering-places, the pilgrims are not contented simply with the external use of baths, but that they use the water copiously as a drink ; one of the natural effects of which is, to promote rapid change of the particles composing our body.

The only way by which we can fairly ascertain the real value of baths as strengthening remedies is, to investigate their effects when used in towns by townspeople, and in country or sea-side places by residents.

Four kinds of baths are spoken of generally : plunge, shower, sitz, warm bath ; to which we may add simple sponging.

The influence of the plunge bath varies with the manner of its use : any one who simply dips the body, and then dresses, feels a sensation of warmth—a pleasant glow, and this is supposed to promote health. There is, however, grave reason to doubt the truth of the conclusion, for a similar glow can be produced from other causes, when no such advantage can be argued for. Thus, any one who will slap any part of the body vigorously once or twice, will experience as great a glow in the parts struck as will the bather, and he will see that the skin becomes as red in the part as it is all over the body after the plunge into cold water. It is certain that a larger amount of blood is thus brought into the skin, but that of itself has no definite effect upon the general

health. The plunge-bath, however, is much more frequently used as affording individuals facility for swimming, diving, &c. In this way it does good, by encouraging athletic sports, and strengthening the muscles by frequent practice. But if any one is delicate to start with, the exercise may be carried too far; and faintness, or actual vomiting, results. The shower bath appears to be of decided service in some affections of the nervous system, as in headache and hysteria; of its efficacy in preventing and controlling epistaxis, I have seen too many instances to doubt. Beyond this we are scarcely warranted in going. I have seen numerous instances in which shower-baths have done much harm, by the fright they occasion, by the coldness and languid circulation they produce in the weakly; and much discomfort is often complained of from the fatigue of undressing and dressing in a cold room. Carried to excess, as we have seen it on some occasions, it is depressing in its effects, and reduces the heart's power considerably.

The sponge bath is open to the same remarks, and we may say of it as we can say of the preceding, that it appears to be pleasant and invigorating to those who are strong, but it is positively debilitating to those who are already weak.

In proof of the preceding remarks, we may adduce the following cases:—Miss S., æt. 25, sent for me, in the absence of her own medical attendant, to consult me respecting a distressing faintness, languor, and coldness, which she experienced daily at the breakfast table. I ascertained that she was suffering from chronic phthisis, and was very weak. On inquiry into the history of her proceedings, I elicited the following facts:—It was winter, yet the lady had no fire in her room; on rising from bed, she stripped off all her night-gear, and standing up, sponged the whole body over with cold water; the chest was thus treated for a longer period

than the rest of the body ; the process lasted about ten minutes or so. The bath had been recommended to her when first she began to be ill, two years before, and she had used it daily ever since. After the bath, she dried herself diligently, and proceeded to dress. The articles of dress having been in the room all night, were of a temperature of about 45° ; and as she had no "glow" after the bath, she was almost as cold when dressed as she was before. She was so weak, that two hours elapsed ere she was ready to leave her room. Neither before nor during that period did she take any nutrition, but she did not feel faint until she came downstairs. It was clear that her symptoms arose from simple starvation by cold and want of food, and that the effect of the bath was to reduce the natural warmth of the body to a ruinous extent.

The use of the bath was now suspended ; a fire was recommended in the bed-room ; some warm rum-and-milk was taken a short time before she got up ; the dress was warmed ere it was donned, and the natural result was, an increased feeling of comfort, and less consciousness of faintness and debility. The lady was not strengthened, but the weakening process was arrested.

Miss B., æt. 7, came under my care, one very cold March, for extreme debility, which manifested itself by deadly coldness of the surface, blueness of the hands and arms, a marble-like pallor of the skin, &c. I found that she was habitually thinly clad, in the style so fashionable amongst many families, and that every night and morning she had a cold bath. I recommended the discontinuance of these, the use of warmer clothing, and every possible contrivance for keeping up the animal heat. Improvement was soon apparent, but so thoroughly did the child seem starved, that six weeks elapsed ere she was perfectly well and comfortable.

Mrs. P., æt. 35, and Miss M. C., æt. 30, were simultaneously under my care for extreme debility, accompanied by transitory hysterical attacks of fainting and unconsciousness, or talking nonsense ; they were too weak for a shower bath, and I recommended in its place cold sponging. The influence of this, for a few days, was extremely beneficial, and the attacks were suspended. At the end of a week, however, the sponging did more harm than good, and aggravated the symptoms on every occasion.

- Of the influence of sponging in relieving feverishness, I need not now speak.

The influence of warm or hot baths on the general health seems to be small : if prolonged, they produce prostration and temporary faintness. The influence of sea-bathing on the sea-side residents differs in no respect from that of fresh water bathing ; nor can the youth, or other dwellers in a town like Liverpool, where they can have salt or fresh water bathing, according to their fancy, find any difference between the effects of one bath and the other, as respects health. Swimming is more easy in the salt than in the fresh-water bath, but the skin feels most comfortable after the latter.

There is, however, one point connected with all baths which it is necessary to refer to. The idea of bathing implies a subsequent drying process, and this, a considerable amount of friction of the skin. It is assumed in this country, that cleanliness of the surface is essential to health, and, as a consequence, our youth are taught indiscriminately to be prodigal of cold water in washing the whole body frequently. In the main, the direction cannot be considered a bad one, for it does no very great harm, except to a few individuals. It is, nevertheless, true, that it is founded on a fallacy. Nature has covered us all over with hairs, and each hair is furnished by two oil-glands, for the purpose, apparently, of

keeping the hair well greased ; our skin, too, is profusely supplied with sweat-glands, each of which pours upon the surface of the body a thin film of oil, which keeps the skin smooth, supple, and soft. We may consider the presence of oil on the surface of the body to be a natural provision for a definite purpose, from the following considerations :—The negroes, and other aborigines dwelling in very hot climates, have universally a far more oily skin than the inhabitants of cold climates. Mansfield Parkyns, in his travels through Abyssinia, found that the best protection from the effects of solar heat was, to keep the skin constantly bathed with butter. The Jews, originally an Oriental race, had laws given to them, imposing the utmost cleanliness, yet the anointing with oil was a luxury. We find from the Gospels, that it was a mark of respect to any one to anoint their feet *after* they had been washed. We find in the Constantinopolitan baths, that anointing with oil habitually follows the bathing, drying, and shampooing. The same plan obtained in Pompeii and amongst the Greeks. If, then, the presence of oil be a provision of nature, and it is a practice amongst Oriental nations to supply it artificially when it has been forcibly removed by bathing and friction, are not we manifestly wrong in enjoining its removal as rapidly as it is formed ? The foregoing considerations have induced me to give very close attention to the effects of baths on the skin of those who indulge in them. In the majority of cases nothing particular is noticed ; but in those instances in which there is much irritability of the skin present, with much natural dryness, bathing, and its subsequent skin-friction, habitually makes it worse. One gentleman, whose surface seemed to be always desquamating, tried all forms of bathing, with only an aggravation of his suffering ; at last he gave up the use of water entirely, except to his hands and

face, and found great relief from the abstinence. An elderly lady informed me that she had been obliged to give up bathing completely, as it, and the subsequent friction, always induced a pruriginous eruption. Another lady came under my care for eczema of the face, which she attributed entirely to indulgence in sea-bathing. She informed me, too, that she had suffered much from a very irritable condition of the skin, after each bath, which she was at first unwilling to believe could come from a luxury she enjoyed so much ; at last she was compelled to give up her bathing, and from that period the whole skin had returned to health, except that of the face.

While on this subject, the pedestrian or other traveller may well remember his experience of baths and bathing, or washing after a day's toil. As long as he is perspiring, the skin is comfortable ; but when this secretion is washed away, and the surface dried, there is a sensation of heat, dryness, and harshness, which continues until the perspiration again breaks forth. In some this condition is sufficiently marked to give rise to the idea of erysipelas supervening, and I know two or three individuals to whom this has so frequently happened, that they shun all ablutions after great exposure to heat.

There is, again, another class of medicines to which it is necessary to revert, inasmuch as they are used for special purposes, and have from their apparently definite action received the name of *specifics*.

A consideration of this subject involves three points : the *modus operandi* of specifics ; the selection of medicines ; and the doses in which they should be used.

1. The *modus operandi* of specifics. Ere we enter on the inquiry, we must define the meaning of the term. A specific medicine is one which in the main is so definite in its effects

that we can rely upon it, and the term specific is used in therapeutics to mean a medicine whose effect is to produce a definite curative action upon any particular disease.

Thus, ergot of rye is said to have a *specific action* on the uterus during parturition and on the foetal offspring, and quinine and colchicum are spoken of as *specifics* for ague and gout.

Ere we enter upon the method of operating, we must satisfy ourselves of the real operations of medicines with specific actions.

Aconite, when taken in poisonous doses, affects the sensitive nervous system more conspicuously than any other part, and produces anæsthesia. Conia produces muscular paralysis. Strychnia produces exaltation of muscular irritability. Mercury produces salivation : Alcohol intoxication : Opium mental exaltation, contracted pupil, and relief from pain : Belladonna a peculiar sort of insanity, a dilated pupil, and dry throat. Quinine produces headache, singing in the ears, and deafness more or less permanent. Ergot of rye produces mortification of the limbs, and in the parturient female excessive uterine contraction.

All these being vegetable poisons, are not so readily traceable after death that we can say anything about the reason why their effects should be so specific. We take, therefore, the mineral poisons, whose effects are equally definite. The influence of lead is well marked upon some tissues, as, for example, the extensors of the wrist and the abdominal canal. The effect of mercury upon the salivary glands is equally decided. The influence of arsenic upon the stomach, bowels, and sometimes upon every organ of the body, is well known. Now, the chemist tells us that he finds a larger amount of the mineral in the parts chiefly affected than he does, *cæteris paribus*, elsewhere. Of this fact there can be no doubt.

There is still another class of poisons whose influence is as decided as the preceding, but whose nature we cannot demonstrate—the malarious miasms. These, like the rest, seem to have decided preferences for one part over another. Thus, hydrophobia affects chiefly the throat and nervous system. Measles chiefly affects the skin and air-passages. Scarlatina the skin, throat, and kidneys. Erysipelas the head and face. Small-pox the skin. Dysentery the large bowel. Ague the spleen. Syphilis the throat and skin; and gout the great toe.

From these considerations we draw the conclusions—1. That a larger quantity of any poison accumulates in one organ than another; or 2. That a poison in equal relative quantities in every part influences one organ far more than another.

The first implies some mysterious affinity between a certain organ and a certain material; the second that no such affinity exists. The evidence in favour of the first explanation preponderates.

We believe, then, that special substances have certain definite affinities to certain parts of the system, and when present that they modify very materially the manner in which the organ performs its function.

It has been assumed that a special morbid substance, when retained in any organ, may be so modified in that organ by another material or medicine, that the two neutralise each other, and that, as a consequence, the morbid phenomena will cease, the cause being taken away. Thus, mercury was supposed to neutralise the syphilitic poison; colchicum the gouty; quinine and arsenic the ague poison. And we may now frequently notice that the effect of alcohol is neutralised by opium; opium by strong coffee; prussic acid by ammonia; morphia by henbane. The rheumatic poison, if such really

exist, is supposed to be neutralised or destroyed by lime-juice, the typhoid by quina, and the erysipelatous by tincture of iron. The poisonous property of lead upon the bowels is wonderfully modified by the sulphate of alum, and under the influence of iodide of potassium, taken internally, lead and mercury are separated from tissues which previously retained them closely and prevented their expulsion from the body.

This being so, the name *specific* has been given to medicines which neutralise the effects of certain poisons, or which alter certain conditions of body, as those favouring purpura and scurvy.

But there is great doubt whether this explanation serves for every case or even the majority. For a long period Peruvian bark or quinine has been considered as a specific for ague. It is said *to destroy* the ague poison. *That it does not do so is unquestionable*; for we have before shown people suffer from ague even when they are in the condition to which the word cinchonism has been applied; others have relapses as soon as they suspend the drug. Some contract ague while taking quinine, and others have no effect produced by its operation. Moreover, it is to be noted that the good effects of quinine may be obtained from other bitter tonics and by arsenic and opium; and dysentery, a disease produced, as far as can be ascertained, by a poison identical with that producing ague, is wholly uninfluenced by quinine.

These considerations, then, drive us to the conclusion already referred to, that quinine neither destroys the poison nor promotes its elimination, but that it enables the system to tolerate its presence. When we examine other medicines supposed to be specific, other explanations suggest themselves. If we look at the influence of iodide of potassium over perioritis, skin disease, and sore throat; of mercury over an indurated chancre; of arsenic over eczema and other cutaneous

eruptions ; of turpentine over purpura and scurvy ; of ammonia and alcohol over bronchitis,—we find some of the drugs permeating and pervading the whole system, but operating more energetically upon the weak and diseased parts than on the healthy ones ; while others appear to concentrate themselves in one particular organ, and influence that chiefly or alone.

We consider, then, that the medicines called specifics operate in different ways.

2nd. Our next inquiry will be into, “what should guide us in our choice of a remedy for any specific disease ?” This leads us at once to the question of homœopathy and allopathy. The question is one involving a very interesting physiological and pathological principle. It is simply this. Is any organ, or the constitution generally, when under the influence of a poison or other agency more beneficially affected by another poison, similar in effect though not identical with the first, or by one whose effects are diametrically opposed to it ?

If the body were simply a chemical retort, an answer to this question would be easy ; as it is, it is very difficult. Take the most simple case. Potassa fusa, a fixed alkali, when freely applied to the skin, destroys it. This effect would not be neutralised by subsequently rubbing the spot with oil of vitriol, although the mixture resulting from the two is not caustic.

As we can predicate nothing with certainty respecting the influence of any drug upon any organ or upon the constitution, we are obliged in every instance to appeal to experience.

But experience at first sight seems to teach two distinct lessons. She tells us that a blister, which will produce an inflammation of the skin, and every part to which it is applied is, under certain circumstances, instrumental in

curing internal inflammations. She tells us that opium or alcohol in excess will produce delirium tremens, and that the same medicines in other doses seem to be instrumental in its cure. She tells us that arsenic and iodide of potassium, both of which produce inflammation of the skin, and sometimes even scales, papulæ, vesicles, or pustules, are very useful in the cure of such cutaneous inflammations as lepra, eczema, and rupia. She tells that an argentine solution, which will produce redness in a healthy eye, will cure ophthalmia, if it be present; that the inhalation of ether or chloroform* will relieve a person from the narcotism produced by opium; that turpentine, which at one time may produce strangury and bloody urine,† will,

* A young girl was brought into King's College Hospital about sixteen years ago, who had taken an ounce of laudanum twelve hours before her admission. I was then a clinical clerk, and took special interest in the case. The house-surgeon at first used the stomach pump, but nothing was found; he then injected an ounce of liquor ammonia in a pint of water. She was subsequently bled from the jugular to four ounces; had sinapisms applied to the legs, turpentine enemata to the rectum, the soles of the feet were slapped by a wet towel, and she was made to inhale oxygen; but she got steadily worse, and in six hours after her admission she seemed to be sinking rapidly. As I had, when a schoolboy, tried the effects of inhaling ether, I proposed the remedy for adoption; it was tried, and the result was an instant amelioration of the symptoms; the coma became less profound, and the pulse became perceptible at the wrist. The inhalation was kept up at intervals for two hours, and two ounces of spirit of sulphuric ether were inhaled; at the end of that time the circulation was vigorous; the breathing was strong and regular; the power of swallowing had returned; she was sensitive to "flecking" of the soles of the feet, and the comatose condition had merged into profound sleep. She took the poison on Saturday night, and awoke to consciousness on Wednesday morning. She suffered, however, for three months subsequently from the effects of the ammonia and turpentine and sinapisms.

† John P., æt. 30, a marine, came under my care at the Liver-

at another time and in another dose, cure hæmaturia ; that diarrhœa may be relieved by an aperient,* and even constipation be got over by opium.† An irritant which will produce inflammation in a healthy part, will actually bring the same vessels to a healthy state when they are weakened by disease.‡ These and a few other remarkable facts have led many to believe in the homœopathic dogma, *simila similibus curantur*.

On the other hand, there are many facts of a totally opposite tendency. Thus pain prevents sleep ; opium is somniferous ; and if severe pain is present, opium will give sleep,

pool Northern Hospital, with hæmaturia. He told me, that about two years previously, while carrying a box containing a sixty-eight pound shot, he fell down, and the box "at top of him," striking him in the left hypochondriac region. From that day he had passed much blood with his urine. He had been in various hospitals, without success. The constant drain had enfeebled him, but beyond this, and the hæmaturia, there were no tangible signs of disease. Being desirous to test the influence of turpentine (which is so useful a remedy in hæmorrhage generally), I ordered him twenty-four minims daily. The bleeding ceased at once ; but on the fourth day strangury was much complained of, and the drug was discontinued. In three days hæmaturia reappeared. The turpentine was again exhibited, in doses of five minims, three times a day. Under the use of this the bleeding disappeared ; no strangury was produced, and at the end of three weeks from the resumption of the turpentine, the man was discharged cured ; having been, for a week prior to his leaving us, without any medicine, or any return of the hæmaturia.

* *Vide* many interesting cases in Dr. G. Johnson's work on Diarrhœa and Epidemic Cholera.

† *i. e.* when the bowels are in a semi-inflamed condition, from the use of drastic purgatives or other irritants.

‡ *e. g.* the actual cautery, moxas, caustic issues, &c., have a beneficial influence on strumous inflammations in the neighbourhood of such joints as the wrist, ankle, knee, and elbow ; where the affected parts are near the surface.

provided a sufficient amount is given first to allay the pain, and, second, to produce sleep. On the other hand, if an individual is already under the influence of opium, its baneful influence may be counteracted by anything—*e. g.* galvanism, &c.—which would produce pain in a wakeful condition. Again, we know that fainting is staved off by stimulants; that hydrocyanic acid, snake poison, antimony, and other depressing agents, are counteracted by brandy and ammonia; that constipation is relieved more frequently by aperients than by opium; and that diarrhoea is more frequently cured by astringents than by castor oil. We see, too, that the arguments in favour of homœopathy are based upon a fallacious basis; that medicines in large quantity are as essentially distinct from the same when administered in a small quantity as a calf is from a cow, and a pint of ale from a pint of brandy; that the continued application of one irritant does not allay irritation produced by another irritant, any more than eating provokes an appetite;* that as, under no

* The best illustration of this is, that savine ointment will keep open a raw surface made by the application of cantharides; that turpentine aggravates the pain produced by a sinapism; *per contra*, the use of ice will not cure a chilblain, nor will the application of snow at zero do any good to a frostbite; boiling water will not diminish the pain of a burn, nor will roasting a scalded surface give the sufferer ease, unless it destroys effectually a part already only half dead.

We conclude, therefore, that in his search for a specific remedy for any particular disease or symptom, it is a sound practice for the physician to seek it amongst those things which would produce an *opposite* rather than an *analogous* effect; and a reference to a few cases will readily prove the value of this deduction. Thus, if an individual suffers from excessive perspiration, we should endeavour to cure it by such means as would dry the skin, *e. g.* coolness, abstinence from warm and copious libations, and the use of tonics, rather than such as would moisten it, *e. g.* antimonials, ipecacuan, warmth, and abundance of hot diluent drinks. If an individual were

condition whatever, opium produces pain, so its specific influence in painful diseases could never possibly be predicated on the homœopathic theory ; nor could the influence of col-

suffering from local plethora, we should endeavour to reduce it by local abstraction of blood rather than by inducing more blood to flow to the part. If there were pain, we should endeavour to allay it by an opiate rather than to cure the first suffering by establishing a greater one which would by its severity make the patient ignore the first. We should endeavour to cure scurvy by fresh vegetables rather than by stale provisions. If the uterus were acting excessively, as it often does when the "os" is "rigid," we endeavour to allay it by opium, belladonna, or venesection, rather than by ergot of rye. If a person is faint, we use alcohol in preference to antimony. For vomiting, chloroform, brandy, champagne, and creosote are better than ipecacuanha ; and for loss of muscular power, strychnia is more serviceable than conia. If we want to get over the effect of an irritant poison, *e. g.* corrosive sublimate, opium is better than cantharides ; and if, on the other hand, we want to get over the effect of a narcotic poison, strong green tea and coffee, which keep people awake, are superior to lactucarium, hops, or belladonna.

If an individual suffer from chordee, he is more readily relieved by camphor than by capsicum ; and a lady who is brought to the verge of a miscarriage by exercise on foot, is more readily cured by complete rest than by exercise on horseback. Examples such as these we need not multiply further : enough has been said to enable any one to recognise the relative values of the two opposing doctrines which are now most in vogue.

It will be seen by every thoughtful mind that there is the germ of truth in both doctrines, *i. e.* that both are founded upon a certain number of facts, but that the disciples of both have gone wrong in practice, by assuming that their respective *doctrines* were fundamental *truths*. Hence, the homœopaths have neglected the valuable assistance of such drugs as opium, and the allopaths have fearfully reduced their patients by the excessive use of antimony, bleeding, and mercurials, in fevers and inflammation.

I cannot forbear quoting in this place the remarks made by Hufeland respecting the doctrines of Hahnemann. They are evidence of great mental sagacity (I quote them from Fletcher's *Physiology*, edited by Drs. Drysdale and Russell, Edinburgh, 1842.) Hufeland

chicum in gout ever be surmised from any symptom it produces in a healthy individual.

But supposing that the value of any specific has been

says, The beneficial consequences to be expected from this system (homœopathy) are—

1. This system will make physicians more attentive to the somewhat neglected semiology.

2. It will make the young physicians more attentive to diet.

3. It will shake the belief of many physicians on the necessity for such immense doses of medicines as are at present given.

4. It will introduce more simplicity in the making of prescriptions.

5. It will lead to a more certain proving and acquaintance with medicines, which it has already done. (*Vide ante*, page 237, note.)

6. It will direct attention to the preparation of medicines.

7. *It will in no case do positive injury.*

8. It will give the system more time to rest, and to recover itself undisturbed.

9. It will immensely decrease the expense of the cure.

II. Injurious consequences :

1. It may be apt to lead the less educated physicians to a symptomatic treatment.

2. It will, if universally prevalent, injure the fundamental studies of medicine.

3. It may introduce the most dangerous carelessness.

4. . . . It will make the physician the dispenser, &c. . . .

5. It denies in its principles the efficiency of the *vis medicatrix naturæ*, &c.

Since Hufeland's time, it is unquestionable that the olden medical practice has been altered in the way he indicates, and that it is still undergoing change ; it is equally true that the professors of the new doctrine have, in the main, fallen into the errors Hufeland foresaw ; and we have ladies, clergymen, lawyers, traders, asserting their equality as physicians with the regular professors ; nor have the more shining lights amongst the homœopathists been able to retain an ordinary amount of confidence, without modifying materially both the principle and practice of their early days. We believe, that in the course of time homœopathy will die out, but it will not do so until thoroughly rational principles of medicine are

ascertained, whether by pure empiricism or in any other way, we have still to ascertain the quantity of it which is to be employed in any given case.

On this point there is much difference, both in principle and practice. Some specifics are used by practitioners as if it is almost impossible to use too much of them ; while others are used very sparingly. Thus, in acute rheumatism, the patient is recommended to take as much lime-juice as he can, while in gout the amount of colchicum given is reduced to the very smallest quantity available.

This difference, however, did not always exist, nor is it attended to, by all, even now, for many persons still use specifics as if it were impossible for the patient to have too much of a good thing. Hence we hear occasionally of individuals dying from an over-dose of colchicum, used for the relief of gout ; of skin diseases induced by the use of large quantities of iodide of potassium, employed for secondary syphilis ; and we have heard, in France, of a patient dying from an over-dose of quinine, given for the cure of a malarious disease. There are few who have not known instances of the abuse of mercury and arsenic.

In cases where specifics are employed, there is no general rule by which the amount of the dose can be regulated. Each stands on its own merits, and pure empiricism alone can teach the requisite quantity. Experience hitherto has demonstrated that lime-juice in rheumatism can scarcely be given in too large a quantity ; that ague requires about twenty grains of quinine per day, for a week together ; that two-grain doses of iodide of potassium suffice in periostitis ;

taught in our schools, and enforced in our practice. Competition amongst rival schools and professors, will, we think, do far more good to medicine than that spirit of ancient *Guildism* which would transform us into Medical Trade-Unionists.

that mercury in indurated chancres will produce its specific effect, without giving rise necessarily to salivation ; and that colchicum in gout does more good when it does not produce vomiting and purging, than when it does ; while for the relief of pain, the dose of opium has, during its continuance, steadily to be augmented. So it is with all medicines—the amount must ever be proportionate to the individual, and the effect to be produced.

CHAPTER XVIII.

COUNTER-IRRITANTS.

Are there local means for improving the vital condition of parts of the body?—Counter-irritants—Popular notion respecting them—The question put—*Pros* and *cons*—The action of irritants—Proof of cutaneous absorption—Irritants applied to surface affect deeply-seated parts—Blisters, &c., really useful—Under what circumstances—Rules for guidance—Superiority of definite ideas over superficial notions.

WE have hitherto been speaking of medicines, which, when taken internally, seem to have an influence in increasing or improving the vital force generally. The subject is not yet exhausted, but it would swell out the book to an unnecessary size were we to dwell upon it at greater length. We propose now to investigate whether there are any means for restoring or improving the vitality of particular parts. This will lead us to discuss the subject of counter-irritation generally, and its true position in the medical art.

We commence our examination by a consideration of the condition of certain parts when their vitality is low, and the effect that remedies have over them when in that state.

I think we may fairly assume, after what has gone before, that there is deficient vitality in any part which is on its road to death, as contradistinguished from a state of health. An ulcer of the leg and the parts around,—a chilblain, produced by a degree of cold, which, if more intense, would have produced mortification—an organ, or any part, in a state of chronic inflammation—the throat in diphtheria, the skin in

erysipelas, a swelled gland in a scrofulous child, a strumous ulcer of the larynx, and the conjunctiva in scrofulous ophthalmia, are all of them proofs of deficient local vitality.

If we inquire what there is in common to all these, we shall find that there is, in all, a deficient circulation through the blood-vessels, and an increase in the quantity of the blood contained in the part. The capillaries are increased in size, and healthy nutrition is diminished.

This being so, we infer, that if we can reduce the enlarged capillaries to their healthy size, and restore the circulation to its natural state, we shall *pro tanto* improve the condition of the part. We can effect this purpose in two ways—one, by using mechanical contrivances; the other, by employing chemical stimulants.

Experience tells us, that the condition of an ulcerated leg is improved, and the part cured, by the patient laying it up on a level with his body, so as to favour the return of venous blood. It may frequently be cured by “strapping” alone, which, to a great extent, empties the vessels of their superfluous blood, and prevents its re-accumulation.

In my own practice, I have known steady pressure by india-rubber cure a white swelling of the knee. The same will promote the cure of chronic, and even acute orchitis. Pressure, too, has been considered serviceable in cases of cancer of the mamma. The mechanical pressure produced by the gradual drying of collodion, will, in the majority of cases, cure erythema or erysipelas at once, and there are some cases recorded where a similar application has rendered small-pox pustules abortive. Mechanical pressure will kill a chilblain; and a head aching with the intensity so common after losses of blood, is comforted by the use of a tight bandage round the temples.

But there are parts to which such mechanical contrivances

are inapplicable : we cannot compress an inflamed lung, or even an inflamed urethra, or vagina in gonorrhœa ; nor can we by any contrivance compress the conjunctiva in strumous ophthalmia.

We must then examine whether there are other means by which the same object can be effected. Two readily present themselves to our notice. One, a class of drugs which, when applied to the skin, have a tendency to shrivel it up, and make leather of it, and go by the name of "astringents ;" the other, a class which, when applied to the healthy skin, irritate and inflame it, which are classed as stimulants, acrids, or irritants.

The former have not much influence for good, and though occasionally used, are little trusted to.

The latter are of very general application. What do we know of them ? We know that when applied to such transparent parts as the web of a frog's foot, or a bat's wing, they first produce a contraction of the capillaries, then the blood in them subsequently becomes stationary, and ultimately, there is a great distension of the vessels, a great increase in the quantity of blood in them, and an almost complete stoppage of the usual blood current through them. We know, that if used in excess, acrids will absolutely destroy the parts to which they are applied ; when applied in moderate quantity to parts already inflamed and weakened, we know that they produce severe pain for a short time, sometimes an increased discharge, and then we commonly see that the part shows a tendency to improvement. The vessels are swollen and contain less blood. This improvement is commonly transient, but in some instances it continues until the part has recovered its healthy condition.

It is somewhat doubtful whether we must attribute this to a change in the *blood-vessels*, or in the different condition of

the *solid tissues*; but we accept the fact, that local stimulants, within certain limits, help, temporarily, to restore vitality to weakened parts, just as much as general stimulants, like alcohol and ammonia, give temporary power to the whole frame.

A host of illustrations might be brought up to prove this; we pass them by to remark, that all stimulants have not an equal beneficial effect. Sulphate of zinc is preferred before sulphate of copper, and nitrate of silver to cantharides. This leads us to infer, that the nature of the stimulant must be considered as well as its irritant property, and to conclude that when a good effect is produced it is brought about by some other influence than that of simply provoking capillary contraction.

Be this as it may, all allow that local stimuli affect beneficially those parts which, from any cause, have had their vitality impaired.

We shall next investigate the bearing of this fact upon the doctrine of *counter-irritation*. I cannot do this better than by reproducing a short essay read before a branch meeting of the British Medical Association and printed in the *British Medical Journal*, July 24th, 1858:—

There is at the present day a wide-spread doubt respecting the doctrine of counter-irritation generally, and the use of blisters particularly. It is argued, and very justly, that if blisters act simply as derivatives or revulsives, it would be the most judicious plan to apply them at a considerable distance from the diseased spots; and yet, as a general rule, experience proves that their value is in proportion to the *nearness* of the counter-irritant to the part affected. But still greater doubts are entertained about the doctrine, “that the supervention of one disease is efficacious in curing another.” In endeavouring to clear up these doubts, we must inquire into

the following points :—1. Is the dogma above referred to *true* ? 2. Do blisters, &c., really do good in internal diseases ? 3. Do they act beneficially because they are counter-irritants ; or can their effects be more rationally accounted for in another way ? 4. Are there any rules to guide us for their application ?

That the dogma is true *to a certain extent*, there can be no reasonable denial. We are many of us familiar with the phenomena of metastasis in disease. I myself have seen a white swelling of the knee get suddenly well, while the lungs have as rapidly become affected fatally ; both phenomena taking place in the same fortnight. Hydrocephalus may be replaced by cervical abscesses. I have seen erysipelas in the foot get well *pari passu* with the invasion of phrenitis ; then the erysipelas has reappeared, but in the calf of the leg, the head symptoms getting well ; the disease has again left the leg, and invaded the peritoneum ; and has again left this to settle over the shin-bone. I have seen recovery from jaundice followed by a cutaneous eruption, and gout in the stomach replaced by gout in the toe. Swelled testicle may supervene on cessation of gonorrhœal discharge ; and suction of the mamma in a woman, recently confined, will produce uterine contraction ; pneumonia will sometimes terminate in some critical discharge ;* and a monthly hæmoptysis may replace the usual uterine flow. Other instances will occur to many of my readers.

On the contrary, however, there is abundant proof that the supervention of a second disease may occur without any beneficial influence over a preceding one. Thus, ulceration of the bowels will not cure pulmonary consumption ;

* *Vide* Dr. Boling's remarks on the use of antimony in pneumonia, p. 229, *ante*.

gout in the right will not ameliorate gout in the left foot ; diabetes will not cure ascites from diseased liver ; injury or traction on the mamma will not produce contraction of the uterus before the normal time for parturition ; erysipelas of the skin of the face will not prevent its affecting the brain. I have known epileptic patients to be terribly burned or scalded without benefit to the complaint. Sore-throat will not cure syphilitic lepra, nor will an irritant to the urethra cure swelled testicle ; pruritus valvæ is compatible with increasing uterine disease, and nettle-rash with ulcer of the stomach, and we may add, that setons, moxas, issues, once so common and so vigorously supported on theoretical grounds, are now, when common sense and close observation are in the ascendant, rarely employed, few persons, if any, being able to rely upon them.

Although we do not hold that the dogma is universally or even generally true, we will grant for the sake of argument, that there is a limited amount of truth in it, and we then ask if it can explain the *modus operandi* of counter-irritants ? Does it explain why a blister will increase an acute disease, and cure a chronic one ? Why a blister to the side in chronic pleurisy will do more good than a brisk cathartic, *i. e.* a blister to the bowels ? Why a blister to the head in typhoid coma will rouse a patient who was utterly insensible to the presence of a bed-sore ? And lastly, if the doctrine be true, ought it not to lead us to use counter-irritants in every disease, no matter what its nature ?—a plan the absurdity of which none of us could fail to see.

There being, then, grave reasons for considering the ordinary doctrines respecting counter-irritants, or revulsives, to be untenable, it becomes necessary to inquire whether their operation may not be explained in some other way.

The present doctrine is mysterious, and makes great demands upon our medical faith, or rather credulity. In seeking another, we must carefully follow the dictates of observation, analogy, reason, and experience.

I propose to commence by a consideration of the action of certain agents when applied to the skin. We shall then be in a position to deduce some law or principle of action applicable to counter-irritants generally, and to show the practical superiority of the new doctrine over the old.

Without further preface, then, we inquire, what is the action of certain well-known agents when applied to the skin? We begin with arsenic, whose presence can be so well detected by the chemist. Experience tells us that, in the form of arsenical paste, it produces a deep slough of the part to which it is applied; and that, notwithstanding the influence it has upon this tissue, a portion finds its way through the skin, and is thus absorbed into the system, the largest portion remaining in the solid nearest to the slough, while a smaller portion passes into the blood, and with it to all parts of the body, sometimes in a fatally poisonous quantity.

The effects of the poison are most intense in the immediate vicinity of the application, but are severe elsewhere; where a smaller quantity of arsenic is employed, its influence is felt only in the part and its immediate vicinity. Thus Taylor relates a case of a man who accidentally used some arsenical ointment to his anus for piles; next day, both the anus and scrotum were inflamed, many pustules were formed, and the matter they contained yielded arsenious acid on analysis. Pereira relates another, where a woman used an arsenical ointment to the scalp. It produced great swelling of the head; and in about six or seven days, enlargement of the ears, and of the glands of the jaw and neck. The face was in a sort of erysipelatous inflammation; and, in addition,

there were vertigo, fainting, vomiting, ardor urinæ, &c. In a few days more, the hands and feet were covered with pimples, but she recovered ultimately.

Here, then, we have distinct proof of an irritant being absorbed, and operating *principally* in the vicinity of the original application, and more moderately elsewhere. We see another illustration of the same fact in those cases where local palsy arises from local contract with lead, without there being any other distinct sign of the operation of the poison on the system generally.

Taylor records cases where bichloride of mercury, topically applied, has produced violent local symptoms in the first place, and severe intestinal disease in the second. Pereira gives others where the nitrate of mercury, used locally as a caustic, has been absorbed, with fatal effects on the alimentary canal. Tartar emetic, in the same way, when applied to the skin, produced first a local effect ; but, in some few instances, it produces a secondary effect, such as nausea and vomiting.

We do not, however, confine our observations to caustics and irritants : we may refer to milder remedies, which, when applied to the skin, have firstly a definite action on the neighbouring parts, and secondly on the system generally.

Dr. Ward, of Manchester, in 1809, called attention to the ease with which opium might be introduced into the system, and produce its characteristic effects by means of friction on the skin. I have myself had much experience of laudanum morphia and other epithems ;* and have repeatedly noticed,

* A. B., æt. 4 ; had intense ear-ache, with scarlatina ; pain cured by the local use of morphia ointment (gr. iv. to ʒj), and child narcotised—no internal medicine used.

C. D., man, 30 ; lead colic, very severe ; morphia by the mouth useless ; relief by morphia lotion (gr. iv. to ʒj) ; man intermitted its use occasionally, to ascertain the real value of the application.

first a local, subsequently a general effect. The late Mr. Shaw of Cheltenham was in the habit of treating sciatica by the application of a plaister composed of opium, belladonna, colchicum, and resin, to the whole of the lower extremity; and he invariably found that it relieved the local pain in the first

E. F., man, 45; the same experience as the preceding.

G. H., lady, 60; intense spasmodic pain of stomach from indigestion; all remedies taken internally failed; complete relief always followed the application of an epithem of pure laudanum to the epigastrium in about thirty or forty minutes.

I. J., lady, 35; had dysphagia from myalgia of pharyngeal muscles; relief from the use of morphia ointment was complete.

K. L., boy, æt. 14; inflammatory pleurodyne; pain checked completely by an epithem of pure laudanum.

M. N., boy, æt. 7; vomiting for three days; signs of intestinal obstruction; epithem of laudanum; immediate relief; bowels opened next day without medicine.

O. P., man, 64; intense sciatica; cured by painting the limb over the painful spot with tincture of aconite; no internal medicine employed.

Q. R., lad, 12; very severe frontal tic; complete relief from morphia ointment; recurrence of pain from exposure; influence of local narcotics gone.

S. T., man, 64; intense pubic myalgia; relieved in two hours by a belladonna ointment.

U. V., woman, 18; severe pain in spinous ligaments from gibbous distortion of back; relief first from morphia locally applied, then from belladonna.

W. X., girl, æt. 19; intense general head-ache; not relieved by internal medicines; cured by the use of morphia lotion to scalp in three days; lotion produced a slight cutaneous eruption, like that produced by the use of linseed meal poultices.

Y. Z. Value of turpentine cutaneously applied. Lady, æt. 30. Hæmaturia, excessive nausea and vomiting; some malignant disease of kidney expected; all internal remedies useless, and produced vomiting. Turpentine liniment rubbed over the back twice daily; hæmaturia cured in thirty-six hours, and all other symptoms abated.

place, and affected the system in the second. Applied near the eye, belladonna produces a local effect only, as the absorbing surface is small, and the part soon dries ; but when applied to the os uteri on a larger surface, and kept constantly moist, constitutional effects often follow the local ones.

I have been informed of one instance in which a young man was affected with very severe characteristic symptoms of poisoning by belladonna, in consequence of the profuse application of the drug to the penis and scrotum to relieve the pain of chordee.

I next pass on to a substance which we can trace by the eye—nitrate of silver. I know a gentleman whose face has been rendered of a blue or slate colour by the continued application of very strong argentine solutions to the unbroken fauces : the hands do not partake of the same tint.

There can be no doubt of the facility with which mercury may be introduced into the system through the skin, as inunction is habitually resorted to whenever a very rapid salivation is required.

I have already adverted to instances in which the action of lead, locally applied, has been manifested by local palsy, without any general effect upon the system. There are many others in which its cutaneous absorption has been followed by general effects.

From these facts, I consider that we may enunciate the following law, viz. :—*Any material capable of being absorbed through the skin acts primarily and most energetically on the spot to which it is applied, and on the parts in its vicinity ; and secondly, and more mildly, on the system generally.*

We may next inquire whether the most popular counter-irritants form any exception to it. I will begin with cantharidine. There is abundant proof of its local vesicating

powers. There is tolerably good proof also that it is absorbed, and produces irritating effects on the neighbouring tissues. Thus we learn from experiment,* that blisters applied to the thorax and abdomen of dogs and rabbits will produce redness and absolute inflammation of the pleura and peritoneum, in patches distinctly corresponding to the vesicated surface of the skin. My friend Dr. Cameron has seen, after death, vascularity of the pleura in men, corresponding with blisters applied to the side a short time before death. He has met with cases in which a friction-sound has followed their application to the thorax within twenty-four hours after their use, no such sound having been audible before. Another physician has seen a patch of lung inflamed of the precise dimensions of a blister applied to the side. I myself know an individual in whom the use of a blister is always followed by crops of boils, which begin in the neighbourhood of the vesication, and spread far and wide. Pereira has seen eczema and ecthyma from a similar cause. Sometimes the absorbed vesicant produces extensive inflammation and gangrene of the skin—an occurrence most common in children and other delicate persons in whom the skin is thin, and cutaneous absorption active. Of the ultimate absorption of the cantharidine into the system, and its influence on the kidneys, I need not speak, as the facts are more or less familiar to us all.

Croton oil, like cantharides, has a local and general effect, producing in the first place cutaneous inflammation, and in the second free purgation; though this secondary result is not common. In like manner, iodine paint has a direct local action on the part to which it is applied; and its

* Dr. Nottingham, of this town, tells me that he made a series of experiments, many years ago, which distinctly proved this. He has recently repeated them with like results.

presence may subsequently be detected in the urine, as I have ascertained by direct experiments carried on under my direction by Mr. Davies, the late junior house-surgeon of the Liverpool Northern Hospital. The same may be said of turpentine epithems: the material is absorbed, and acts directly upon the parts below (as on the intestines, when it is applied to the abdomen for meteorismus), and may subsequently be found in the breath and urine. Ammonia operates in the same way; mustard we cannot well trace, though there is no doubt of its absorption through the skin.

From these considerations, we infer—1. That the counter-irritants commonly in use are *direct irritants to the part to which they are applied*; 2. *That their acrid principle is absorbed, and acts in the milder form of a stimulant in the immediate neighbourhood of its introduction*; and 3. That it enters the circulation, and affects distant organs.

To make our meaning clear, let us take nitrate of silver for an example. When rubbed for a long period on the well-wetted skin, it produces a slough; or, when used more sparingly, as in erysipelas, it acts primarily as a *vesicant*; but a portion of it is absorbed, and diluted by the cutaneous fluids; thus the inflamed skin, smeared over by the caustic, becomes permeated by a material analogous, say, to a five or ten grain solution of the caustic.

By this it will be seen that we attribute the effects produced by blisters *to the amount and influence of the material absorbed, and not to the vesication, "derivation," "counter-irritation," "revulsion," "diseased action," &c., which they cause on the surface of the body.* We infer that, *if the irritant absorbed meet with a recently or acutely inflamed tissue, it will increase the mischief*: while, on the other hand, *if it meet with a tissue in a state of atonic inflammation, it will do good.*

I believe that counter-irritants operate on deep-seated tissues in the same way as stimulating lotions, &c., do upon superficial parts. Thus, where the vessels of the face are in a state of active inflammation, as in *eczema faciei*, a weak solution of the bichloride of mercury will aggravate the evil greatly ; but where the vessels are in a state of passive congestion, as in chilblain, the same solution is of signal service.

In a healthy eye, the daily use of *vinum opii*, or other irritant, would produce inflammation. In the same eye, in the early stage of ophthalmia, a stimulant would increase the mischief ; while at a later stage the surgeon would use it, with full confidence of success, to bring back the organ to its original healthy condition.

Again, we know that if we use a blister to an acute bubo, we increase the intensity of the inflammation ; whereas the same remedy applied to one in a chronic condition will effect, in many instances, its speedy cure. The same may be said of iodine paint.

If we turn to surgical authorities for their experience of inflammatory affections near the surface, we read similar observations. Is the knee-joint *acutely* inflamed ?—blisters are said to be “inadmissible.” Is the disease *chronic* ?—we then read, “Blisters are as serviceable in the chronic as they are detrimental in the acute disease.”

Other examples might be cited, drawn from experience in such diseases as gonorrhœa, *eczema*, *ecthyma*, gout, abscess, ulcer, and the like ; but I think it scarcely necessary to adduce more evidence to prove that the stimulation which is prejudicial in the early stage of inflammation may be, and generally is, of the greatest service in the latter stage ; and that this is equally true, whether the stimulant be *directly* applied by the hand of the surgeon, or *indirectly* by *cutaneous absorption*.

Let us now run rapidly over a few diseases in which blisters are empirically employed, and endeavour to see whether these remarks are applicable to them.

1. Blisters near the eye do harm in the acute stages of iritis, ophthalmia, and sclerotitis. They do good in the later stages, when the disease is chronic, provided they are not placed too near the globe.

2. Blisters to the throat are almost invariably prejudicial in the early stages of croup.

But such stimulating epithems as turpentine, are of great service when a patient is suffering from such an atonic condition of the throat, &c., as is found in diphtheria.

3. Blisters do harm in the early stages of pleurisy, pneumonia, and pericarditis. They do good in the latter stages*—at that period, in fact, *in which, could we use direct means, we should employ a solution of sulphate of zinc or of nitrate of silver to the inflamed surface.*

4. Blisters occasionally do good in bronchitis. When they do, the advantage gained is not immediate; it rarely begins until twenty-four hours after the blister has risen, and when the cantharidine has had ample time for absorption and for circulation through the blood-vessels.

This view of the action of blisters in bronchitis is borne out by the advantage derived occasionally in that complaint by the internal administration of such stimuli as turpentine, balsams, warm gums, essential oils, arsenic, iodide of potas-

* It has been said that this is a truth of the homœopathic dogma,
 “*Simila similibus curantur.*”

This is, however, a very narrow view of the question; for it is clear that if the vesicant acted simply “homœopathically,” it ought to be more useful in the early stage of inflammation than in the latter; we know that it is not so. The speciousness of the argument has, however, made more converts than one.

sium, and other drugs, which permeate the system, and have locally stimulating effects. A blister will do as much harm in bronchitis in the early stage, as will alcohol, copaiba, and myrrh; and as much good in the later, as will wine, ammoniacum, ammonia, and polygala.

5. Blisters are positively injurious in peritonitis, and in all its stages: we have seen that they will actually produce the disease in dogs and rabbits.

6. They are equally injurious in recent gonorrhœa and orchitis. They are very serviceable in chronic clap and orchitis.

7. Blisters to the sacrum, and copaiba internally, have a very beneficial influence upon leucorrhœa.

8. Blisters to the head have a decidedly stimulating effect on the brain in the coma attending typhus or hydrocephalus.

In other words, *blisters are prejudicial when the absorption of their cantharidine or stimulating principle brings it into contact with an actively inflamed tissue. They do good whenever that principle meets with an organ in a state of chronic inflammation, such as would be treated by direct stimulation, were it on the surface of the skin.*

We may now say a few words respecting the influence of blisters in relieving simple pain. Their effect is very problematical—1st. Because the number of cases in which such relief is given are infinitely small; 2ndly. Because when relief occurs, it is or may be referrible to some other cause. Thus, for example, I have repeatedly seen blisters applied to the side for pleurodyne which has been mistaken for pleurisy; and as the result has been satisfactory both to the patient and the doctor, the vesicant has had the credit of the cure. But when a blister is so applied, it necessitates the patient lying in bed, and giving absolute rest of the side; and this it is to which the cure is really due. That this

explanation is the true one may readily be proved by any careful observer, for if, instead of applying a blister in these cases, he will strap the side firmly with *two* layers (for *one* does not give sufficient support, and allows too much play for the thoracic muscles) of adhesive plaister, he will cure the pain, even without enforcing rest in bed.

A blister applied for the cure of myalgic pains rarely, if ever, does good, unless it compels the patient to lie in bed. I have, however, seen muscular cramp (phantom tumours) chased from spot to spot all over the abdomen by the application of cantharides; in which case we have a right to assume that the stimulating principle removed that debilitated condition of the muscular fibre upon which the cramp attended. I have only been able to satisfy myself of a blister having relieved local pain in one instance. The case was one of neuralgia of the scalp, occurring in a patient who was very weak and low from secondary syphilis. The blister used was only an inch in diameter; it was renewed three times ere the pain went.

If blisters have any influence in removing serous effusions, and of this I entertain no doubt, it is in consequence of their stimulating effect on the diseased membrane, which, *under the influence of debility*, poured out the secretion. A proof of this is to be sought in the beneficial influence of iodide of potassium and other irritants used internally in chronic pleurisy, ascites, and ovarian dropsy.

If there be any real foundation for the foregoing conclusions, we ought to be able to apply them to other counter-irritants besides blisters. Let us give to each a few words.

Boiling water vesicates the skin readily, but experience proves it as a general rule void of therapeutic power. Why? Because its influence is confined entirely to the spot to which it is applied.

The actual cautery rarely if ever does good, *unless where it is used for diseases which have their seat so near the surface of the body that the stimulating effect of the heat reaches them readily.* Whenever the diseased portions are deep-seated, it is a matter of great doubt whether the actual cautery is of any more use than an issue or seton would be ; and that, to say the least, is very problematical.

The potential cautery, or caustic issue, is by the majority preferred to the actual cautery, or to the use of a seton. We explain this, by supposing that a large portion of the caustic is absorbed, and acts as a direct stimulant to a greater depth than either of the other two forms of counter-irritation.

I have, however, heard another explanation given respecting the *modus operandi* of caustic issues, from more than one observer. They say, it is now established as a fact, that whenever such issues do good in internal diseases, it is not during the time when the issue is recent, but at the period when it is healing. Consequently it is argued, that the issue does not act either as a local stimulant, or a counter-irritant, but that when it heals, there is a propensity in any neighbouring diseased tissue to heal too. Whichever explanation of the use of issues is adopted, it removes them from the category of true revulsives.

Turpentine is an especial favourite in tympanitis. It is applied extensively to the distended abdomen in fever and other affections, and generally with success. Why ? Because it is absorbed through the skin, and acts as a local stimulant upon the atonic bowels, without producing at the same time distressing cutaneous soreness, or without disordering the stomach, as it is apt to do ^{*} when administered by the mouth. Its prolonged use produces purging.

Iodine, in its various forms, is a counter-irritant of great

efficacy, and is useful in direct proportion to the nearness with which it can be applied to the diseased parts. It is especially serviceable in enlarged bursæ and ganglia, in buboes, in nodes, and in rheumatic affections of the knee, ankle, and wrist-joints. That it is absorbed through the skin, and enters the circulation, we have already demonstrated. Equally certain is it that its valuable properties are independent of its producing vesication.

Ammoniacal, terebinthinate, antimonial, crotonic, or other stimulating embrocations, liniments, or ointments, are only serviceable where there is a sluggish or atonic condition in the circulation in the parts below those to which they are applied. Thus, in acute gout, "linimentum ammoniæ" and friction is intolerably painful; yet, when the gout is chronic, they are not only serviceable, but pleasant. So in rheumatic pains, where the joints are hot and burning, no such liniments can be borne; and yet, where the joints are cold and the circulation very languid, their stimulating property gives great relief. This explanation receives corroboration from the fact, that the patient experiences in the latter part of his complaint as much relief from internal warmth and stimulation as from external.

From this point a very interesting branch inquiry springs, which well deserves attention. If it be true that the influence of counter-irritants depends upon the absorption of the stimulating material, and its direct action on the parts below, it follows that an introduction of the same material into the system by the mouth would have a corresponding effect, provided it could be used *in such quantities that the amount so introduced into the affected part would equal that introduced by direct absorption.*

We have shown that such is really the case in bronchitis, where certain stimulants taken by the mouth are equal in

value to that absorbed from a blister. There are, however, very few other instances in which it is possible to introduce by the mouth the required local quantity, on account of the immediate operation of the irritant upon the stomach ; but we constantly find medicines used internally, whose action corresponds to the counter-irritants used externally. Thus, while the surgeon vesicates the penis externally for the cure of gleet, he gives cubebs, copaiba, &c., internally ; while he applies iodine paint to a diseased joint, he gives the same remedy by the mouth ; while he employs turpentine epithems to the abdomen for tympanitis, he uses it internally as an enema, and gives at the same time some more palatable essential oil by the mouth. We apply a blister for chronic pleurisy, and with it as strong a dose as possible of iodide of potassium, of whose stimulating properties no one who has noticed its influence on the nostrils can have any doubt.*

Again, if it be true that chronic inflammations are benefited by the action of stimulants absorbed through the skin, we ought to find that a similar effect can be brought about by the introduction of an equal quantity of the material into the part—*viâ* the stomach and blood. Practically, we do so.

* Why it is that we use a stimulant to force on *absorption* when too large a secretion is present, is a curious problem ; inasmuch as when secretion is absent, as in sluggishness of the liver, mercury is given with a view to stimulate it to increased *secretion*. Such incongruity of practice ought to arrest our attention, and lead us to suspect some fallacy. The fact recently brought to light, viz., that mercury diminishes the secretion of bile instead of promoting it, gives us a clue to what the fallacy is ; and the remarks we have already made at pages 206 and 209 about stimuli checking secretion, help us on.

I think we cannot yet fully explain why local stimulation produces absorption ; but we must accept the fact, however, as certain, that it does do so.

We find that iodide of potassium, when taken internally to excess, produces a condition in the mucous membrane and in the skin allied to inflammation : in other words, it produces a stimulating effect. As a stimulant we find it doing good in secondary syphilis, when the symptoms are characterised by great debility, ulceration, &c. It is equally useful in skin diseases accompanied by want of tone ; and, on the other hand, it is prejudicial whenever there is an acute or recent inflammatory condition present. Arsenic, another local stimulant capable of absorption, and whose presence may be demonstrated in every part of the body after a few doses have been taken, acts much in the same way as the iodide of potassium. Copaiba and the turpentine generally are used on the same principle in bronchitis and gonorrhœa ; the stimulating portion being absorbed, and acting locally on every part of the body, including that diseased.

In like manner cantharides have been given internally for such diseases as would be treated with stimulating lotions, if they were seated near the surface ; as, for example, catarrh of the bladder, and seminal impotence from deficient secretive power.

The next point to which we must turn our attention is, the *duration* of the good effected by a blister, when a definitively good result follows.

Those who have much experience with external inflammations, such as ophthalmia, tonsillitis, gonorrhœa, and ulcers generally, are fully alive to the fact that the application of a stimulant *once only* is not sufficient for a cure. They can see day by day the enlarged vessels or thickened membrane reduce in size, so long as the daily stimulant is used ; but when this is suspended, the progress towards health is often suspended too. Vinum opii has daily to be used to the eye, turpentine to the abdomen, zinc or other solution to the

urethra, and gargles to the throat to ensure perfect success. Each application does good, but no individual one effects the cure. This is not, however, universally true; for we do find occasionally, that one single application of a powerful stimulant suffices to bring back the vessels to a healthy state. Now, is not this precisely what occurs when the stimulation is applied to internal organs by the medium of cutaneous absorption? It is, I believe, a well-established fact, that in chronic inflammation of the knee-joint, a *series* of blisters are as useful as are a *series* of dressings to an ulcerated leg: each successive one does good, but none positively cures. It is the same in chronic pleurisy, gleet, or gonorrhœa. The same may be said of the use of repeated vesication in consumption. Each blister is of service, but one is supplemental to another. At the same time it is to be observed that, after one stimulation by a blister, the diseased parts may commence a change which will continue until it reaches health, just as one single injection into a hydrocele will frequently eventuate in a radical cure, though many such injections are occasionally needed.

But blisters are exceedingly sore and painful applications, producing far more lasting inconvenience than the simple application of caustic to an ulcer; and they consequently have a limit to their utility, that limit being the patient's endurance. We are too apt to reason thus:—"I have used a blister once, and it seemed to do good; but the patient was, soon afterwards, almost as bad as ever, and therefore I will not try another." We do not, however, argue thus when we dress a sore with "*unguentum resinæ*," or apply zinc solution to an inflamed eye; and yet the cases are strictly parallel. The parallelism of the two being assumed, let us try whether we can extract therefrom a rule of guidance. If we ourselves had an ulcer, every application

to which was followed by severe pain and inconvenience for a period of at least three days, and yet produced only a temporary good, should we pertinaciously continue to apply the dressing? or should we endeavour to effect a cure by other and less severe means? For my part, I should prefer the milder plan.

And if blisters, to effect a cure of some internal inflammation or the like, demand a frequent repetition, ought we not to judge in a similar way? Should we not prefer to use milder remedies before going to those of greater severity? If so, a blister, instead of being the first, will be one of the last of the shafts fired by the doctor; he will exhaust his other remedial armoury ere he has recourse to vesication, instead of resorting to the former only when he loses confidence in the latter.

If the views we have been endeavouring to enunciate are true, corollaries of great practical importance may be drawn from them. If it be true that counter-irritants or blisters act as direct local stimulants in internal inflammations, and are beneficial only when those inflammations are asthenic or chronic; and if it be true (as experience shows) that such inflammations, &c., on the surface of the body, are rendered worse by low diet and depressing remedies, while they are improved by generous diet and tonic medicines—are we not driven to the conclusion, *that the use of counter-irritants is incompatible with the antiphlogistic regimen; and that to use a blister externally, without a judiciously stimulating plan internally, is contrary to sound, rational, and philosophic medicine?*

What is true of blisters is equally true of caustics (when used to form issues), and of rubefacients; but it is unnecessary to pursue the subject further. We may fairly then conclude—

1. That there is no essential difference, except in degree, between the action of caustics and counter-irritants generally, when applied to the unbroken skin.

2. All caustics, irritants, and other materials applied to the skin, are absorbed in greater or less quantity. They act primarily on the parts to which they are so applied ; secondly, on the neighbourhood ; thirdly, on the system.

3. That blisters, &c., are only useful in those cases in which stimulants would be locally applied by the surgeon, if the parts diseased were on the surface of the body, or within reach of his hand.

4. That blisters, &c., are not essentially different in their *modus operandi* from such stimulants as iodide of potassium, arsenic, copaiba, the warm balsams, essential oils, resins, &c., except in degree. They only differ in the manner of their introduction.

5. That blisters are useful (in appropriate chronic cases) in proportion to the nearness of the diseased organ to the blistered surface.

6. That as a general rule blisters have only a temporary influence ; and that where they are really necessary and useful they require to be repeated.

7. That the application of a vesicating irritant or stimulating material externally involves the idea of there being local or systemic debility in the sufferer, to correct which, such stimulant is applied.

8. That counter-irritants of all kinds are physiologically incompatible with low diet, antimonials, purgatives, or other depressing remedies ; inasmuch as it is manifestly absurd to stimulate locally, and yet depress generally.

9. That the law to guide us in our use of blisters is this : —Whenever we should use a stimulant to an internal organ, *if we could reach it with our hand directly*, we may expect

to find a good result from the use of such counter-irritants as cantharides, *which will reach it indirectly.*

Startling as these views may appear to many, I believe that they will be found more trustworthy than the older doctrines, which referred the curative value of derivatives, revulsives, cauteries, issues, irritants, rubefacients, and the like, to the power they possessed of producing a new disease on the surface of the body, and thus destroying the old. The fundamental point of such doctrine was, that the supervention of one diseased action prevented the continuance of another. This dogma was the father of homœopathy; notwithstanding which, we still respect it as if it were founded on the everlasting hills of truth. It is high time to cast it away, as being devoid of truth, and contradicted by daily experience.

Here, again, we alight upon the fact that the influence of a plan of treatment is capable of explanation by referring to the effect it has upon the vital powers, and that such explanation is far more consonant with sound sense than are theories which start from false facts and are bolstered up by false experience.* Following out these views, any one

* In connexion with this subject, Dr. Noble stated at the meeting where the preceding essay was read, that he had seen an instance in which a seton in the skin had produced adhesion between the pulmonary and costal pleura, at a spot corresponding to the track of the tape. This shows that a *mechanical* irritant may produce effects similar to a *chemical* one.

I have also been favoured with the following observations by Dr. Sandwith, of Beverley:—"One of the purest local counter-irritants is the flesh-brush, which I know from personal experience to be singularly efficacious. Thirty years ago I was crippled with rheumatism of the shoulder; the deltoid muscle felt extremely cold, and the slightest motion produced excruciating pain; when a succession of liniments had been used without relief, a few applications of the flesh-brush did the business.

can soon learn to appraise blisters at their full value, and he will not have his confidence in their efficacy shaken—as too many have had—by employing them under circumstances when there was no reasonable hope to be entertained that they would do good.

“It fell to my lot, many years ago, to make a complete cure of a case of white swelling of the knee, by friction; the joint was bent and immovable, enlarged, with two or three superficial ulcers, and the leg and thigh wasted. Having got the ulcers healed, I recommended hand rubbing. The father of the boy being a schoolmaster, took the lad into the school, and had his knee rubbed by the other boys in succession, the day through; after three months the knee was perfectly cured.”

These observations perfectly accord with the conclusions I have endeavoured to draw, viz., that the so-called counter-irritants do not act on a derivative or revulsive principle, but by improving the condition of the circulation in or through a part, and increasing the vital power in the tissue, which has been impaired by accident or other cause.

CHAPTER XIX.

HYGIENIC MEANS CONSIDERED.

The importance of the preceding considerations demonstrated by reference to present plans of practice as compared to those of olden date—Fevers—Typhus—Yellow fever—Apoplexy—Chorea—Cases—Hydrocephalus—Case—Convulsions—Chloroform—Cases—Hysteria—Spinal irritation—Pneumonia, and other inflammations—Mercury, colchicum, &c.

ERE we close our observations on the importance of judiciously supporting the constitutional powers of the patient in all cases of illness, it will be useful to contrast the practice now generally adopted by the thoughtful and observant of our own day and in our own country, with that which was prevalent in former times in Britain, and is yet common in Italy and other foreign countries.

To begin with fevers.—Dr. John Armstrong, less than fifty years ago, strongly urged that patients with typhus should be bled freely; averring that this diminished the violence of the symptoms, and contributed directly to recovery. To within a very recent period his views were adopted in a modified degree by the majority of the profession. They have not, it is true, drawn blood, but instead thereof, they have used antimony, purgatives, or other depressing drugs. Twenty years have scarcely passed since a distinguished physician in Liverpool died prematurely in

fever, from his unlimited use of purgatives ; and, within a more recent period, Dr. Southwood Smith recommended venesection on a large scale in typhus. Now, on the contrary, quinine, the most powerful of our tonics, is very commonly employed, and wine or other stimulants are given according to circumstances ; while the greatest care is taken not to depress the strength ; and any one who adopts this plan judiciously, and not by routine, looks in vain for those fierce and terrible symptoms so graphically described by the old authors.

Turning to Williams's account of the treatment of miasmatic fevers, we find that the ancients bled for intermittents. Even so late as in the Walcheren expedition venesection was resorted to ; at Gibraltar, in 1828, the same was tried ; and elsewhere a similar practice was adopted by first-rate medical authorities up to 1830. When this plan was abandoned, mercury was employed in its place, and the doses used were enormous, "6000 grains of this metal being given in one case by Dr. Chisholm." The mortality under this plan was very great, and quite equalled that following bleeding. Now, on the contrary, large doses of quina are used, and the contrast between the present per centage of deaths, and that under the old system, is immense. Dr. Williams says, "The deaths which had been to the admissions as 449 to 4053, or about *one in nine*, and in 1833 as 1526 to 6074, or about *one in four and a half*, were reduced in 1834-5 to about *one in twenty-two*—the deaths being to the admissions as 538 to 11,593."

In erysipelas, the older authors recommended bleeding, low diet, calomel purges ; and, as a consequence, they spoke of the disease as being a fearfully formidable one. Now, when it is treated upon different principles by steel, wine, and other roborants, its fatality has become wonderfully diminished.

We have already adverted to the facts that small-pox was at one time treated by stifling heat, and subsequently by venesection. The present plan differs from both these, and its comparative success is conspicuous.

In days only just gone by, a threatening of apoplexy was rendered, pretty certainly, a "stroke," by a diligent use of the lancet, the cupping-glass, the calomel purge, and low diet. Now, on the contrary, these are very rarely used, and the disease is staved off by a close attention to the powers of life.

Chorea was once treated by purgatives habitually. Epilepsy was in the same category, and infantile diseases were met by leeches to the head, lancets to the gums, and calomel to the bowels. A more correct modern experience treats these complaints by such tonics or other means as are likely to improve the constitutional vigour: and no one who has watched the effects of each plan can have any doubt of the superiority of the modern. Water in the head we have already referred to, and have shown how far more successful a roborant system is than a depressing one in its treatment.

The following cases illustrate the truth of these remarks:—

1. Mary Ann R., æt. 13, had an attack of chorea, for which she was admitted into a hospital. The disease was of a month's standing, and had been produced by fright. The body was incessantly in motion, the spasms were affecting the chest and glottis, and causing a peculiar cry. As she was known once to have passed worms, aperient medicine was ordered; and, as it acted but indifferently on the bowels, larger doses were administered. No other remedies were employed. The constant motion prevented sleep, and ultimately encoriated the nates. On the second day after her admission she died of exhaustion.

2. Jane S., æt. 17, after pricking her finger one day, had

a set of symptoms of peculiar character, which resembled those of tetanus and chorea, but were identical with neither. There was an habitual movement of the body and extremities, combined with strong, firm, muscular rigidity. She was a stout young woman, and well nourished. After a variety of remedies had been used without relief, a tobacco enema (an extraordinarily depressing agent) was employed. Under its influence the motions ceased for a few hours. On their recommencement the tobacco was, at her solicitation, again employed. The result, however, was almost immediate death from exhaustion.*

3. Miss B., æt. 13, had an attack of chorea, equalling in severity that of Mary Ann R. The jerking of the body, tongue, limbs, &c., was extraordinary; her mother could not keep the child on her knee, and the motions prevented sleep at night. Tincture of the sesquichloride of iron was prescribed in very large doses, frequently repeated, and a highly nutritious and stimulating diet recommended; in three days the child was well enough to do anything. A very occasional jerk alone showed that she was not absolutely cured.†

The following is the latest case of water in the head which has come under my notice. Miss J., æt. 2, the youngest of six children, each of whom have been affected by that complaint, had preliminary symptoms in May. By change of air, these were apparently cured. In the middle

* Both these cases were witnessed by the author, but he is not in any manner responsible for their treatment.

† Dr. Todd was the first to point out this line of practice in the publication of a case similar to the foregoing, which was treated in a similar way. No. 3 occurred shortly after the Doctor's case was reported, and the treatment was copied from Dr. Todd's, with the sole exception that the hydrocyanic acid used by the Doctor in his case was omitted in that of Miss B.

of August, however, she had a mild attack of diarrhœa, and next day was very sick ; in the evening she became insensible, and had general convulsions. At this period the surface of the cranium was pungently hot to the hand, while the face and the rest of the body were pale and cold. The patient was treated by cold water to the head, and chloroform inhalation, cautiously repeated from time to time ; warmth to the feet ; and a wine-whey injection, containing laudanum ; wine and water was given as soon as the child could swallow. In twelve hours the child seemed to be sleeping naturally, and in sixteen hours from the first convulsion the child was playing about as if nothing ailed her at all. She continued well for two days, and then anorexia, fretfulness, pain in the head, sudden screaming, prostration, and pervigilio, led to the belief that another attack was impending. Steel was given freely, and chloroform used to procure sleep ; the plan succeeded perfectly, even though the child was crying vigorously during its administration. The night was passed comfortably, ample food taken, and next day the child was sent again into the country.

In a fortnight she was as bad as ever, and was then removed from a sea-side to an inland locality. She improved again, at once, and after three months came home in, apparently, perfect health.

In nothing, perhaps, is the present plan of treatment more conspicuously successful than in that formidable set of symptoms classed as convulsions. If we turn to any medical authority ten years old, we find that convulsions in children were attributed to teething, and were treated by lancing the gums, leeches to the head, calomel, or other purges ; sometimes by general bleeding, and blisters or other counter-irritants to the head, neck, arms, &c. The mortality from the disease under this plan was great, the prognosis being

always more or less grave. Now, however, that a different plan is coming into general use, the mortality has greatly diminished, and many a case, once considered hopeless, is almost magically restored under the influence of chloroform.

Dr. Simpson was the first to record a case of infantile convulsions thus treated. The child was not a week old, and had been under his care and that of another physician for two days, during which time the convulsions were incessant. As a last resort, the inhalation of chloroform was tried with complete success; with necessary intervals for feeding, its influence was kept up for two days, and the child then was quite well,

The following case, which came under my own eye early in 1859, well shows the value of this remedy.

Miss J., æt. 11, a tall overgrown girl, who had, as a child, suffered first from hydrocephalus and subsequently from cervical abscesses, had a very mild attack of scarlatina, which was followed by hæmaturia and sickness; this gave way in a day or two, and she improved very much for a fortnight. At the end of the fourth week of the fever, she was taken ill once again with sickness, and vomited throughout the day everything she took. The urine was neither bloody or albuminous, however. At about 6 o'clock it was first noticed that blood was contained in the urine, and that this was very scanty; the sickness continued, and, after a distressing fit of retching, about 7 P.M., she began to talk wildly, and in a few minutes more she had an epileptic fit, of extreme severity. She was now seen by two medical men, and a sheet wrung out of hot water was placed round the loins, the feet were fomented, and ammonia used to the nostrils. I saw the case shortly after 10 P.M. She was still in strong epileptic convulsions, the face being much distorted, the lip cut by the teeth, and the lips foaming.

The pulse was irregular, the skin clammy and pale, and the face somewhat livid, though pallid. In consultation, the case was considered almost hopeless, and a vigorously counter-irritant plan, with smart catharsis and leeches to the loins, was strongly urged. The author, however, being very averse to such severe remedies, determined to try first the effect of chloroform inhalation. The effect was magical; in less than half a minute the convulsions ceased, and the child lay as if asleep. In two minutes more, however, the fits returned, and the chloroform was used again with the same results. Its use, at intervals, was continued for two hours, when it was altogether abandoned. In four hours from its employment the patient was perfectly recovered from the epileptic attack; and it may be further noted, that there was no return of the vomiting; that the child gradually improved; that the urine continued bloody for two months; that purgative aperient medicines, though indispensable, always produced vomiting, and that beyond a change of air, and a half-weekly aperient, no treatment was adopted.*

The advantage of chloroform inhalation over the old plans of leeches, bleeding, calomel, anti-spasmodics, counter-irritants, &c., is equally conspicuous in puerperal convulsions, general epilepsy, mania, and a variety of other nervous diseases.

* For the benefit of those who may be induced to use chloroform inhalations in convulsions, I may mention, that the respiratory muscles are often affected (apparently by the chloroform) after the general convulsions cease. The rhythm of breathing seems gone, and so long intervals elapse sometimes between one respiration and another, as to lead to the fear of death having occurred. Whenever this occurs, respiration may be induced, either by pressure on the lower ribs, suddenly removing the hands; or, as another author has suggested, by bringing the patient's arms together and pressing them on the stomach, and then throwing them upwards and outwards, as in the act of yawning or stretching.

Delirium tremens, once treated by venesection, purgatives, antimony, and still commonly treated by opium, is now successfully managed by Dr. Laycock in the Edinburgh Infirmary, and by some friends of the author's, with food instead of physic—opium even being eschewed. The mortality under the opiate plan, Dr. Laycock shows to be more than ten times greater than under a clever system of expectancy, which includes the administration of *aqua pura* in a draught of *aqua fontis*, mixed at the bedside as an opiate.

With such facts as these before me, how could I doubt the assertion of a homœopathist, who told me that he had cured a very bad case of the disease by one drop of tincture of henbane, given every four hours ; which would be to the full as potent as the twenty minims of *aqua pura* adopted by Dr. Laycock, and the bread-pills with which an old "accident ward" nurse of my acquaintance used, habitually, during twenty years, to make her patients sleep, and with never-failing success ?

Let us next point to the views once entertained of hysteria and spinal irritation, and the treatment adopted by physicians. Of the frightful suffering entailed upon unfortunate patients we have many illustrations in Griffin's and Teale's books, and there are few physicians of twenty years' standing who cannot recall cases where an improvement of symptoms has been commensurate with an abandonment of medical treatment, and this not because all medical treatment was bad, but because a wrong plan was adopted.

There is scarcely a book in our medical literature more melancholy to read than Dr. R. Lee's Treatise on the Employment of the Speculum.* In it we have a record of three hundred cases, chiefly of debility, treated as dependent on

* Of course it will be seen that this remark refers to the things exposed, and not to the master-hand which exposed them.

disease of the womb, in scarcely one of which any good was done by special treatment. It makes our blood boil to find that in the nineteenth century, when all boast of such a vast increase of knowledge, and good feeling for suffering humanity, that such an amount of ignorance, or interested misrepresentation, such as is evidenced by Dr. Lee's histories, could exist in Britain's metropolis. No one with the ordinary feelings of humanity can come to any other conclusion than that the patients there described would have been infinitely more comfortable under the do-nothing system of Hahnemann, than under the fierce cauterisations of the fanatics of the speculum, whose doings Dr. Lee exposes ; and yet we are called upon invariably to support these against homœopaths, because the latter are medical heretics !

We denounce, with the direst anathemas, those who, in our estimation, let their patients remain miserable or die ; yet we cover with the shield of charity those who help to augment their patients' sufferings, if they do not hasten their dissolution. Surely such one-sided toleration must be radically bad.

The change which has taken place in the treatment of lunatics in general, and especially maniacs, is especially striking. Once it was thought that their ravings were the result of some fiery process going on in the brain, which, at any price, must be extinguished, and venesection, antimony, low diet, circular swings, cold douche, &c., were employed ; and thus, as Dr. Conolly reports, many a hopeful case became hopeless. Now, on the contrary, the maniacal fury is looked upon as the result of cerebral debility, and is treated accordingly ; with an improved dietary in asylums, and a liberal use of cod-liver oil, the same authority reports that the success in treating insanity is far greater now than it ever was before.

There is scarcely a single disease in which the contrast

between the present and the past plan of treatment is more apparent than in pulmonary consumption; and Liverpool may feel proud satisfaction in knowing that Dr. Turnbull, whom she may claim as her own, has been one of the foremost pioneers of progress.

In days gone by, phthisis was looked upon as a disease; its seat was undoubted; its cause was the formation of tubercles; the complaint was fearful in its ravages; and a remedy for it was eagerly and unceasingly sought for.

But no remedy was found: consequently, the dogma that consumption was incurable was gradually nurtured into a fundamental truth.

Hence arose another dogma, viz. that any one who stated that consumption was curable could not recognise the complaint, *i. e.* that the curability of consumption was an idea as absurd as that of attributing responsibility to lunatics.

At the present day we fancy that we can see why and how these doctrines arose. We see that phthisis was looked upon as a disease to be conquered—just as we looked upon the sepoys rising in rebellion—it was attacked by every material in the medical armoury. Bleeding, mercury, low diet, emetics, setons, issues, moxas, blisters, incision, creosote, iodine, tar, and a host of other things were tried generally and locally—with what results we know.

But, at the present day, we recognise in phthisis not a disease of the lungs, but an enfeebled condition of the system, and, instead of endeavouring to cure the complaint, we try to restore the general health; well knowing, that if we can do that, the lungs will partake of the benefit, and become healed by the ordinary processes of nature.

Take again the old plans of treating pneumonia, pleurisy, bronchitis, and other inflammations, where the routine practice was to bleed, cup, antimonialise, or salivate, to a greater

or less extent, every individual—how severe and fatal were the disease, and how rarely did the patients recover under many weeks! Under the old plan the mortality in the Infirmary at Edinburgh from pneumonia, taking an average of twenty-five years, was 36 per cent., and Dr. Bennett gives other statistics from France and Italy, to show that a mortality, varying from 15 to 33 per cent., was a common one. Dr. Dick, of Vienna, gives, as a result of 380 cases treated by venesection, tartar emetic, and diet, thus: venesection, mortality 20 per cent., tartar emetic 20, and diet 7 per cent. Dr. Bennett's plan, now very generally adopted, is thus described, "never to attempt cutting the disease short, or to weaken the pulse and the vital powers." The result of this plan has been a mortality, a trifle *less* than 5 per cent.

So it is with many other diseases. Surgeons now look back with feelings almost akin to horror, at the fearful doses of mercury once given for syphilis, and the consequences which such treatment entailed. Physicians of the present day deprecate the large doses of colchicum once given for gout, and shun equally the strong pills and black draughts which were given to cure constipation, and the aloetic purges and local leeching, once in vogue, for the cure of amenorrhœa.

With all this change, an equal alteration has occurred in the general tone of our thoughts and conversation. The time was when all diseases were supposed to arise from eating and drinking too much, when to work hard and live sparsely was considered the prime rule for health, and when all complaints required a rigidly low diet.

Now, on the contrary, we see that it is poor living, poverty, and starvation, that encourage the onset of disease, and that its hold is firm, or otherwise, according to the weakness or strength of the patient.

How any other ideas could ever have prevailed it is difficult to understand, repugnant as they are to experience and common sense. The man who wants his horse to work well, feeds him well ; while he, whose proportion of work equals that of his beast, actually starves himself that he may do it properly !

With changes in practice such as we have indicated above, who can say that the science of medicine is not in a transition state, emerging from the darkness of false facts, false theory, fallacious experience, and unreasoning dogmatism, and passing towards the light of reason, truth, and common sense ? And when such changes are going on, why should we attempt to crush all who venture to explore a new track for themselves, or abuse them as impostors, quacks, or charlatans ? Shall we declare that the old school of Hippocrates, and the modern teachings of Copland, Watson, Alison, Abercrombie, &c., are to be the *ne plus ultra* of medicine ? In an age when all is progressing, is our art and science to be the only one to stand still ? We answer unhesitatingly, No ! *Excelsior* must be our motto ; we must ever strive after improvement, and in that strife we must abandon every reed we break, instead of trying to bolster it into a staff. Each theory repugnant to common sense must be abandoned ; all practice which proves faulty must be given up ; nothing must be adopted but what stands the test of most rigid examination ; and the standard by which all our doings must be measured is, the life, health, and comfort of our patients. Books will ever be necessary to put us into a certain track, and will support the student until he can walk alone ; but they ought never to be anchors for chaining their readers to the author's dogmas. As such a temporary aid we consider the preceding pages, and our end will be attained if we have succeeded in showing, that there is a basis on which a theory and practice

of medicine may be founded of greater soundness than has hitherto been attempted—upon that foundation each one must build for himself.

We find that the practice of surgeons upon many points has altered quite as much as that of physicians. Thus, we find Mr. White Cooper remarking, in a recent treatise upon Wounds of the Eye, “It was formerly the practice to deplete largely, and to confine to the most limited liquid-diet old persons who had undergone operations on the eye, or who were suffering from wounds of that organ; the phantom of inflammation seems to have been ever present before our predecessors. This much is certain, that the opposite plan of treatment is generally adopted at the present day with the happiest results; and of those cases which take an unfavourable turn, for one patient who is attacked with acute inflammation after extraction, six or more suffer from non-union of the section from deficiency of power.”

In the few cases of iritis (whether syphilitic or otherwise) I have had under my care during the last three years, I have entirely given up the use of mercury; they have been treated by local bleeding, strong lead lotion constantly applied to the closed lids, and belladonna to the eyebrow, and at the end of the third or fourth day a small blister, the size of a shilling, on the temple. The diet is generous, and quinine given internally; all the cases have recovered, and with far greater rapidity and completeness than I was in the habit of meeting when I treated them on the older plan. It will doubtless occur to many that the treatment of this disease by turpentine—a powerful, general, and local stimulant—has been advocated by more than one observer.

It only remains for us now to recapitulate the propositions we have been attempting to demonstrate. We believe—

1. That the phenomena of life are due to a definite *force*.

2. That the vital force is not identical or correlative with any other known force.

3. That it is a force acting in a definite direction, which direction differs in genera, species, and individuals.

4. That the vital force manifests itself in two forms: conservative, *i. e.* resisting injuries;—reparative, *i. e.* repairing damages.

5. That in healthy human beings, under favourable circumstances, the amount of vital force in each is equal.

6. That vital force cannot be increased beyond the natural standard.

7. That it may be deteriorated, reduced, or depressed.

8. That when it is so depressed, there is alteration of structure and function in one or more parts of the body.

9. That the presence of disease implies impairment of vital force.

10. That vital force may be regained, or restored to its healthy standard.

11. That repair of injuries and recovery from disease can only take place through the instrumentality of the vital power.

12. That the reparation will be fast or slow, according to the amount of vital force in the system, or in a part.

13. That any plan of medication which produces a steady diminution of vital power must necessarily be bad.

14. That all treatment must have for its end and aim the restoration of the patient to the standard of health.

15. That these principles ought to underlie all medical theory and practice.

16. That in following up these principles, the physician must closely ascertain what are depressing agents, and those which have an opposite tendency, generally and locally.

17. That vital force cannot be directly increased or augmented.

18. That food and physic are only "means to an end."

19. That it is unphilosophical to employ means to restore the vital force in a part, if we are doing anything to depress it as whole, and *vice versa*.

20. That there cannot be deficiency of vital force in one organ without a corresponding deficiency in other parts, except from some purely local and temporary cause.

21. That where there is evidence of deficient vital power in the nervous system, and in the heart, lungs, stomach, liver, &c., it is unphilosophical to assume that one organ is diseased because the other is; inasmuch as all of them are affected from one general cause, *i. e.* deficient vital power.

22. That the old plan of medication has been faulty.

1st. Because it has aimed at the removal of special symptoms, without regard to the general condition of the system.

2nd. Because it has treated phenomena as due to excess of power, when they have been produced by the opposite condition.

3rd. Because this mistake has led to a greater deterioration of the vital power than was already present.

23. That a plan of medication, which does nothing to depress the vital power, is practically superior to one that does depress it.

24. That homœopathy, with its infinitesimal doses, in its early days was such a plan, and, consequently, that its success was comparatively great; but that it is untenable as a system:

1st. Because it ignores the principle of life as the chief power in the body.

2nd. Because it attributes powers to substances and to quantities which are absolutely inert.

3rd. Because it excludes "systematically" from its

arsenals agents of known power in restoring strength to the constitution.

4th. Because it attributes to an irrational cause effects which must be attributed to a rational one.

25. That thoughtful physicians of the present day have shown a steady tendency towards the improvement of their science, and that that improvement has been manifested by a departure from the frightfully depressing means, once so popular, and an adoption of a plan of an opposite nature; by a desire to conserve the health, by keeping up the systemic powers, rather than by an attempt to re-invigorate a jaded constitution by refreshing draughts of senna-tea, and banquets of barley-gruel.

26. Lastly ; and it is this conclusion which has induced us to give the title we have done to this essay—

That the theory and practice of medicine ought to be based upon alteration in *power* or vital *force*, rather than in changes of *structure*.

We may sum up our idea of the correct principle of treatment thus:—In the early stage of any disease, when fever is present, the mildest medicines are the best, as the condition is a natural one, essential to the complaint, and having in previously healthy persons a constant tendency to abate after a definite period ; under no circumstances should means be adopted to cure this fever which would of themselves suffice to make a healthy man seriously ill. As soon as the intensity of the symptoms subsides, and before the fever itself has gone, the plan of treatment is to be entirely changed. One day may be given to ascertain the condition of the vital power, and the direction it is taking ; after that the physician will encourage the restorative powers of the system with medicinal or hygienic dietetic agents until health is restored.

Special diseases require special plans of treatment, yet the preceding principle is applicable to all.

APPENDIX.

I.

ON FLATULENCE : ITS SIGNIFICANCE AS A SYMPTOM, AND ITS TREATMENT.

THERE are many symptoms of disease constantly presenting themselves to our notice, which, from their persistence, severity, or importance, come at last to be considered as entirely apart from the diseases they commonly indicate. Headache has thus been for a long period treated as a substantive complaint. Amenorrhœa has been considered in the same light. Diarrhœa, indigestion, neuralgia, pleurodyne, and latterly cough, though all symptoms of a particular state of the system, or of certain organs, find a place in nosological arrangements side by side with pneumonia, pleuritis, and the like.

In the same manner flatulence, flatus, tympanitis, meteorismus, or simple wind on the stomach, though it is only a symptom of a certain state of things, is of sufficient importance to be considered as an individual disease. We meet with patients whose sole complaint it is, and who long as earnestly for its cure as they would for the subsidence of a pneumonia, and I have myself recently had some patients under my care in which the complaint has been as distressing and almost as intractable as excessive ovarian dropsy.

It was in consequence of the difficulty I experienced in the

management of these cases that I turned my attention specially to investigate the subject; and having as I thought attained some definite and useful knowledge of it, I venture to lay before the Profession the results obtained. I propose to consider—

1. The composition of the gas secreted.
2. Its origin.
3. The circumstances under which it is formed, *i. e.* the causes.
4. Its accompaniments.
5. The treatment which the foregoing considerations indicate.

1. Respecting the composition of the wind little need be said, for it in no way affects the general question. It has been ascertained to consist of nitrogen, oxygen, and carbonic acid, combined in proportions nearly the same as are found in atmospheric air; but it is also very frequently found to contain in addition carburetted and sulphuretted hydrogen; the amount of the latter being at times considerable. The composition of the gas is to a great extent determined by the ingesta, as well as by the condition of the stomach or bowels at the time. Thus, for example, I know individuals who are unable to eat a hard-boiled cold egg without having immediate eructations of air, tainted with sulphuretted hydrogen, though the same persons can take raw eggs without any such result; and generally can take them lightly boiled, too, with impunity. Cabbage, cauliflower, beans, and peas, have a similar effect upon many; and with some the use of tainted food, such as game overkept, or the like, produces the same effect.

2. The origin of the gaseous matter is of more importance than its composition. A short consideration of the subject suffices to show that it may have at least four different sources.

1. The air may be swallowed with or in our food and drink.
2. It may be produced by a fermentative process in the alimentary material taken, or in the contents of the intestines generally.
3. It may be secreted by the mucous membrane.
4. Or it may arise from a putrefactive process in the substance of the intestinal canal itself, or its contents.

(1.) That a small quantity of air only is taken with our food any one may readily convince himself, by trying to imbibe as

much as he can that way, either by gulping air down with his solid pudding, or swallowing the froth of a bottle of porter "well up." He will then find that the difficulty of swallowing the air is so great, that it is almost absurd to suppose that much can ever be taken accidentally. He will be still further satisfied on this point, if he kills many of the lower animals shortly after a meal; and by noticing in his own person how soon air swallowed in froth is rejected by the stomach after it has been taken. But, granting for the sake of argument that some air may be so introduced, it is tolerably clear that it will not be in sufficient amount to distend the stomach painfully, or to pass into the bowel.

(2.) That an immense amount may be generated by the fermentative process in the stomach there can be no doubt. This has been, over and over again, proved by the experience of graziers, who have lost many valuable cows by the enormous flatulent distension of the stomach, consequent upon eating largely of clover under certain circumstances; and by the fact that many individuals vomit the food they have taken in a fermenting condition—a process that has been known to continue a long time after the material has been ejected. But, even in these cases, it is not the food alone which is at fault, but some particular condition of stomach superadded; for it is affirmed as a fact, that the clover may be eaten with impunity, if the cattle shall have previously eaten a small quantity of hay; and the materials which ferment in one person may be taken with impunity by another, or by the same individual at another time.

(3.) The third source of the flatus is the mucous membrane. That some membranes are able to secrete air rapidly, and as rapidly to absorb it, has been proved by experiments on the swimming bladder of the fish; and that the mucous membrane of the intestines can do so equally, is inferred from the extraordinary rapidity with which an enormous quantity is formed and reabsorbed;* and specially from the phenomena of rectal flatulency. By the period that the fæces have reached

* Case.—Dr. George Johnson told me that he was once called to see a young woman who appeared to be in great suffering from hysterical spasms. The most prominent symptom was sudden and enormous tympanitis, alter-

the anus in a solid state, they have generally lost all their fermentative propensity; and as we can demonstrate, they remain for a considerable time after their expulsion without undergoing any gaseous change. Nevertheless, while they remain in the rectum, they may, and often do, give rise to voluminous gaseous emanations, which, from their sudden formation, we presume could have no other origin than the mucous membrane. We may also refer to the flatulence which so commonly comes on in weakly persons after prolonged fasting, as a further proof of its being due (occasionally?) to the mucous membrane alone.

(4.) That meteorism is also due to putrefactive changes, there can be no doubt in the mind of any one accustomed to post-mortem examinations. He well knows that during life flatulent intestines are not universal; whereas he only perhaps once in a lifetime meets with a corpse whose bowels are not enormously dilated with wind.

We come, then, to the conclusion, that in tympanitis the mucous membrane of the stomach and bowels plays a more important part than either the accidental swallowing of air, or the use of certain articles of diet. It next remains for us to investigate the circumstances under which the mucous membrane secretes air.

3. The mucous membrane of the stomach secretes air after it has been empty for a considerable time, prolonged fasting being generally accompanied by painful flatulence. This, however, is not universally true, for a perfectly healthy man can endure privation of food without generating flatus at all. The distension is almost in direct proportion to the debility of the system generally, or of the stomach individually, many patients being unable to fast for so short a period as four hours without suffering from flatus severely. This condition is frequently relieved by taking food, but it frequently happens that the presence of food under these circumstances provokes vomiting, or painful spasm.

The intestines, like the stomach, secrete air when an individual nating with as sudden and complete flattening of the abdomen; no wind passing either by the mouth or the anus. The phenomena occurred many times in his presence.

has been long fasting, and sometimes to such an extent, that the patient, when dressed, seems to be extremely corpulent. I had not long ago an instructive example of this. A lady at fifty-four, or thereabouts, had been under my care for excessive tympanitis, from which she slowly recovered. After having enjoyed perfectly good health for some months, she heard that a son, in a distant country, was threatened with what she considered to be extreme danger. She could hear no more tidings for a month, and was so devoured with anxiety, that she could eat nothing: a little wine and water was all she took. In the course of two or three days the abdomen began to swell again, and by the end of the month was enormously distended with flatus. At the end of that time good news relieved her mind, but the tympanitis remained, and she was again many weeks ere she recovered her usual shape. During the progress of the cure, little or no wind was passed upwards or downwards, although the passage of flatus had been one of the most distressing symptoms during the advance of the malady. In this, and similar cases, it is evident that the flatus was not due to food; that it was formed in the bowels; and that the cure depended, not on the expulsion of the wind, but on its absorption.

We see phenomena of a similar kind in typhus, or other diseases of a low type. In them tympanitis comes on as the patient's strength fails, and the distension of the abdomen thus becomes a fair indication of the extent of the patient's debility.

We can scarcely fail to associate this in our own minds with the flatus constantly formed in the bowels shortly after death, before all vitality in the body has been lost, and certainly long before putrefaction has set in; and if there be any real analogy between them, we cannot resist the conclusion, that one of the causes of the generation of flatus is, that the mucous membrane is *beginning to die*, or is, at any rate, in a condition practically resembling that.

If that be the case, we shall certainly be able in every instance where flatulence is present, to find some cause which operates in a depressing manner on the stomach or bowels, or system generally. As far as my experience goes, we do so.

It is produced by fasting,—by loss of blood,—by purging,—by prolonged vomiting,—by the enervating effects of intoxication,—by the weakening influence of excessive muscular action,—*e. g.* after parturition,—by the influence of influenza, or common “cold,”—by the results produced from tobacco in persons unaccustomed to it, or unable to use it comfortably,—it is common in hysteria,—in chorea,—and it is present more or less in cases of low fevers, peritonitis, ascites, &c.

In many of these instances, however, it is not particularly noticed by the patient until food is taken, and then only under certain circumstances. Thus, a lady who came under my care some time ago, would have an attack of painful flatulent distension of the stomach in an evening, whenever she had an unusually harassing day. The time of the invasion was generally determined by taking tea or solid food, yet, if none were taken, the attack was only deferred for an hour or two. During one illness, the stomach was so extraordinarily sensitive, that the exertion of talking, &c., consequent on the presence of many visitors in the sick-room, was enough to determine the coming on of the complaint, which could, however, generally be staved off by the liberal use of champagne.

In cases such as this, we find the flatulence increased greatly by the use of food, but even here there is room for amplification, for the stomach, which will secrete vast quantities of air, on the introduction of meat or potatoe, &c., will digest quietly dry bread or biscuit; and another which will be painfully flatulent after gruel and other slops, will be comfortable after the use of such food as partridge, chicken; or beef and porter will promote digestion in many cases where ale will provoke flatus.

This phenomenon we attempt to explain by saying, that every stomach has its own peculiar powers, and what is digestible in one person, or at one time, is the reverse in another person, or at another time; and that it is certain, that food which the stomach cannot digest becomes more or less of an irritant. It is argued, too, and with justice, that stomachs, when they are weak, have the same idiosyncrasies as when they were strong; and that there is nothing extraordinary in champagne throwing off an attack of flatus, as we are most

of us familiar with the fact, that condiments, such as mustard, pepper, cayenne, wines, and brandy bitters, are constantly used, to give a temporary stimulus to a weakly stomach.

We arrive then at the conclusion, that an enfeebled stomach produces wind when it is irritated by the presence of indigestible food, an effect which passes away when its powers are regained.

I must, however, here note that the same effects which produce wind on the stomach in one individual, produce spasm, vomiting, heartburn, or simple gastralgia in another, and that one or all of these may alternate with flatulence in the same person.

Now it is strictly rational to believe that the mucous membrane of the bowel will act much in the same way, with respect to flatus, as the mucous membrane of the stomach, and we shall therefore expect to find that flatulent distension of the intestines will be determined to a great extent by their vital condition, and by the matter introduced into them. We have already seen how meteorism is produced by low fevers and other depressed states of the system: we now regard it as produced by irritants. The question here arises, what is an irritant to the bowels? It is difficult to give a categorical answer; for as happens in the stomach, what is a stimulant to one person or at one time, is an irritant to another, or at another time. Thus an aperient is by many considered as a medicine, which stimulates the mucous membrane of the bowels to increased secretion, and the muscular coat to energetic action; while others explain the phenomena, by saying, that the medicines are purgative by their irritating action, &c.

Nor is this difficulty theoretical only, for we actually find in practice, that purgatives will, on some occasions, relieve the very meteorism which at others they produce or greatly aggravate. Bearing in mind the distinction between a *stimulant*—a medicament, that is, which gives for a period, more or less additional functional power—and an *irritant*—a medicament, that is, which provokes an immediate or exaggerated functional operation,—we ask whether the frequent use of a stimulant may not convert it into an irritant?

When we inquire closely into the nature of excitement, or the operation of a stimulant, we are compelled to consider it as a financier would a draft upon capital. Ordinary revenue failing for the purpose for which the money is required, a portion is withdrawn from the principal, and such withdrawal cannot take place without a small permanent diminution of revenue, or an appropriation of a considerable amount of revenue, to refund the capital. We put this into medical language by saying, that stimulation is followed by a corresponding amount of depression. Frequent stimulation, then, we necessarily conclude is followed by corresponding frequency of depression or cumulative debility.

But we know, from long experience, that any organ in a depressed condition is far more irritable than the same in health; and, consequently, that the purge, which was a stimulant to healthy bowel, becomes an irritant to the one enfeebled by the effects of frequent excitement.

A purgative, then, by frequent repetition, may actually produce the same result it was originally intended to relieve and cure.

If there be any truth in this deduction, we shall find in practice that aperients are, under certain circumstances, followed by, or actually produce, flatulent distension of the bowels; these circumstances being the presence of general or local debility, and an irritable condition of the bowel, from whatever cause arising. That the deduction is correct, the following cases will prove:—W. J. H., a consumptive young man travelling for his health, was generally in a comfortable condition as long as he was quiet at any one place. But going from one locality to another, whenever it involved a long day's journey, always involved an attack of flatulent distension of the stomach and bowels, attended with a paroxysm of asthma. The first plan of relief adopted was to apportion the food to the digestive power of the stomach, and nothing was taken beyond omelettes and coffee. For a time the plan succeeded; but as he was then travelling for many days successively, this meagre fare—*plus* the fatigue—so reduced his digestive power that even this light food acted as an irritant. With this state of the stomach the bowels sympathised, and became daily more

distended with air, and to relieve this he had recourse to aperient medicine. For twelve or fourteen hours the effect of the medicine was satisfactory, but it was invariably followed by increased flatulence during the three following days. Again aperients were resorted to, but then their good effects were limited to one or two hours, and the distension became greater than ever, and if a third dose was then taken no good result whatever, even for an hour, could be detected, although there was a manifest increase of tympanitis. A different plan was now adopted: a generous diet was used, and the digestion habitually assisted by brandy or port wine, while a residence at Nice gave a vast improvement to the constitutional powers. With improved health, and an abstinence from all medicine, the stomach and bowels recovered their tone; no flatus was generated, and ordinary journeys were borne with comfort. On one occasion, however, he was in the carriage during the whole night, and this after a hard day, followed by a good dinner at a late hour; the road was in a frightfully bad state, and the jolting for the first ten hours tremendous and continual; no sleep was procured, and twenty-one hours elapsed ere the journey was over, or any food taken. The fatigue was now excessive, and flatulence was complained of, which became excessive after a mouthful of food had been swallowed. This state of things continued for four-and-twenty hours, and then passed away. From this period the general health was uninterruptedly good for many months, and no flatus was complained of. At last, however, after a number of "dinings out," the flatulence returned, and he had recourse once more to aperients for its relief. As before, the pills gave him a day's comfort, but this was succeeded by an increase of tympanitis for the three days following; he then again took medicine, which aggravated the complaint to such a degree that he became seriously alarmed, and sent again for me. I recommended simply the use of the fetid spirit of ammonia hourly, the use of egg and wine, jelly, beef-tea, and the like, and a complete abstinence from aperients; in four days the flatulence had entirely gone; the bowels acted comfortably, and my patient considered himself well enough to go hence to Malvern from home. As before, however, the journey was too much

for him, and he had an attack of flatulence at night. He has since died of phthisis.

The next case points to the same state of things.

Mrs. C., aged about 48, was affected by frequent attacks of constipation of the bowels, for which she was in the habit of taking aperient medicine. At last, the bowels remained unopened for many days, and signs of obstruction set in. Nothing could be detected by an anal examination, and aperients were used freely. At first mild ones were adopted, and their strength gradually increased, until she was taking one or two drops of croton oil. It was, however, noticed that the sole effects of the medicine was to bring on excessive and distressing tympanitis; they were, therefore, abandoned altogether, and the flatulence at once subsided. The bowels, however, continued obstinate, and after a short period death occurred from perforation. The disease was then ascertained to be scirrhus stricture of the descending colon.

Not many months ago I had the opportunity of seeing a little child who had a most unusual amount of tympanitis. As far as I could gather, he had been treated at the first successfully by mercurial aperients, and these were continued subsequently with the view of improving the vitiated secretions. But, as often happens, the secretions became more and more vitiated, and the flatulence was distinctly increased after every powder.

It is, then, clear that purgatives will, and often do, act as irritants to the bowels, and produce a secretion of flatus in them, in precisely the same manner as indigestible food produces "wind on the stomach."

A similar effect is produced on the bowel whatever the nature of the irritant may be, and a continuous natural purging is as commonly attended with or followed by a large formation of flatus, as is purging from the use of drugs.

4. We now come to speak of the accompaniments of flatus. This need not detain us long. Some are distinctly referrible to the same condition of the stomach and bowels upon which the flatulence itself depends; others to the mechanical effect produced by the distension; and some are due to the same condition of the whole system, which has favoured the formation of the tympanitis. Thus, as we have seen that wind on the stomach

is due to deficient functional vigour (by which I mean, deficient power to perform its natural function), so we may anticipate finding it accompanied with many other marks of dyspepsia. And as we have seen that tympanitis is promoted by intestinal debility, so we may reasonably expect it to be accompanied by constipation or torpidity of the bowels, by some vitiated condition of the usual feculent secretions, by torpidity of the liver, impaired expulsive power in the rectum, and probably piles or fissure in the rectum or about the anus. We might naturally conceive, that as the flatus closely resembles in its chemical composition our atmospheric air, that the fæces lying in contact with it in the bowel would undergo the same changes within the bowel as they do after they are expelled. And as we know that these external changes are attended with the extrication of a large amount of ammonia, and still further, that endosmose may take place through membranes, we might, I say, reasonably infer that decomposition would ensue, ammonia be formed, and this be absorbed into the system to the material injury to the blood. But it is remarkable that our experience of facts does not endorse this conclusion, for the motions are not passed in a decomposing condition, and we have no proof whatever of the absorption into the system of any intestinal gas, not even sulphuretted hydrogen. It is, however, to be remarked, that the fæces passed by our tympanitic patients do in reality decompose sooner than those passed by parties in a state of health; but this is due to the secretions having the same deficiency of vitality as have the organs producing them. The urine of a typhoid patient will decompose with as great rapidity as his fæces, and these scarcely change more rapidly than does the whole body after death. But the influence of vitality upon secretions we have already referred to.

The mechanical effects of tympanitis are many of them peculiarly distressing. In one patient it will produce asthma, from its pressure upon the lower lobes of the lung, the part with which the male chiefly breathes; and here we may remark, *en passant*, that tympanitis does not generally, if ever, produce the same effect upon respiration in a woman as in a man; for man breathes chiefly by the diaphragm, the woman by the ribs and shoulders. Woman's frame is prepared before-

hand for vast abdominal distension (*i. e.* during pregnancy); man's is not. As tympanitic and even dropsical distension in a woman does not materially differ from uterine enlargement, we have women tolerating with ease to themselves a meteorism which would materially interfere with the respiration of man.

The heart is equally affected with the breathing, and angina pectoris, palpitation, and other cardiac diseases, are aggravated by the mechanical results of tympany. The enormous size which the abdomen sometimes acquires, is such as to interfere materially with the patient's movements; and one lady whose case I have adverted to, was so bad, that she was unable to put on her own stockings.

Many phenomena accompany tympanitis, because all the organs of the body are more or less in the same condition as the stomach and bowels. As the latter cannot perform their special functions correctly, so the brain, the lungs, the heart, the liver, uterus, kidneys, testes, &c., cannot perform theirs; and we have low spirits, melancholy, drowsiness or pervigilio, head-ache, palpitation, dyspnœa, leucorrhœa, menorrhagia, chlorosis or sexual frigidity. Tympanitis may be the disease of which the patient makes most complaint; but, after all, it is no more than one of a number of other symptoms, all of which point to the same conclusion.

5. If this be so, we shall have little difficulty in determining what is the most correct plan of treatment in this complaint; and, as in so many other instances, we shall find that practice has gone ahead of theory, but that in consequence of an insufficient reading of experience, practice has not been an absolutely certain guide.

As flatulence depends upon the condition of the alimentary canal, the materials that are in it, and upon both of these combined; so our treatment must be directed to the ameliorating that condition, and proportioning the ingesta, dietetic or medicinal, to the chylopoietic powers.

If the flatulence depend upon some transient cause, *e. g.* the use of cigars the day before, the results of a debauch, of over-fatigue, of mental excitement, prolonged fasting, excessive muscular exertion, and the like, no treatment is necessary beyond quiet, mild diet, and some such gentle stimulant as

sal volatile, or fetid spirit of ammonia; and an abstinence from emetics, purgatives, or any powerful stimulant, such as raw brandy. For immediate comfort, opiate epithems or frictions externally, assafoetida or galbanum pills internally, generally suffice; soda, when there is acidity, with bismuth when there is much pain; and carminative aperients when there is constipation. All these, however, are only of temporary use, and must ever be considered as mere auxiliaries.

After the attack has ceased, the stomach must be very carefully treated for at least three days, after which time it may be expected to have recovered its tone.

All special remedies, however, as far as my experience has gone, lose their influence after a short time; and it is reasonable to conclude that they do so by the complaint having become constitutional, and not simply local.

In addition, however, to these, experience has demonstrated that advantages may be gained by the external application of such stimulants to the skin, as turpentine, combined with the application of the same material to the bowels internally, in the form of enema; in the one case, absorption taking place through the skin, the other through the mucous membrane. Oil of rue appears to have as high a character in this way as turpentine.

But the same remarks apply to these as to purgatives, for if the stimulation be carried beyond a certain point, the turpentine acts as a purgative, and the purging so diminishes the intestinal power that the turpentine acts as an irritant and increases the formation of wind.

In all cases, however, where the tympanitis is more or less habitual, these temporary remedies, intended for patching up a weak part, rather than for renovating the whole machine, are of little value, comparatively; and must ever be subservient to those general measures which are calculated to improve the general health. The diet must be managed in close accordance with the digestive powers and idiosyncrasies of the stomach, rather than according to the theoretical views of chemists, or the dogmas of such stomach physiologists as Dr. Beaumont, whose conclusions are based upon observations of one individual man. With attention to diet, there must be the most

sedulous care of the constitutional power; what power is present must be carefully husbanded, and it must be augmented by every available resource. Steel, quinine, cod oil, glycerine, and other tonics; wine, ale, and such other stimulants as agree: bearing ever in mind, that even medicine may be prejudicial, if not judiciously administered. Change of air often forms a necessary ingredient in the treatment, and does more good than anything else.

The duration of the treatment required is sometimes very considerable. I once had under my care, a lady who was two months before any very decided improvement could be detected; but at the end of that time, it was very apparent, and in another month the flatulence was entirely cured. As no flatus had been passed either by the mouth or anus, it is fair to conclude that it was all absorbed by the intestines.

Another case that came under my notice, received no advantage from simple tonic treatment; and though she resided at the top of a hill in a healthy district, she was obliged to go to the sea-side for change. A vast improvement was apparent during the first fortnight, and her shape was entirely restored by the end of the month.

We thus once more find ourselves landed on the same place on which we have so frequently before alighted, namely: that the best method to cure disease, in whatever organ arising, is to bring back the whole system into a state of health, and that any other method ignoring this fact, or not including it, must necessarily fail.

II.

WHAT IS THE CONDITION OF INDIVIDUALS MOST PRONE TO INFLAMMATION?

WE do not answer this question by a reference to medical authorities, but we turn to hospital, dispensary, parish, and private practice—a wide field of experience. We find that

inflammatory diseases are common in the poverty-stricken and miserable inhabitants of courts and alleys,—in the children of strumous, consumptive, and syphilitic parents; and that it is intractable and destructive according to the previous depressing agencies to which the victim has been exposed. Thus we find water in the head, or acute inflammation of the brain, common amongst strumous children: ophthalmia is equally common in the same class. Bronchitis early attacks those of consumptive tendency; pneumonia carries off those who have been brought low by scarlatina or measles; the same disease is a frequent harbinger of phthisis; pleurisy is frequent in the tubercular diathesis; and it is rare to find quinsey in an individual whose constitution is untainted. In the same way we recognise peritonitis as a consequence of the strumous diathesis in some instances, and as resulting from the imbibition of the erysipelatous poison in others, a poison now recognised as of a peculiarly depressing character. Typhus rarely ends without some local inflammation, and the victims of scarlet fever suffer from inflammations of the severest types. Small-pox terminates frequently in destructive pneumonia; malaria produces inflammation of the cæcum, colon, and liver. Phlegmons are the result of long anxiety, watching, and fatigue, and carbuncle is often the harbinger of general decay; in fine, those who are the weakest constitutionally, are the most obnoxious to inflammations.

Again, when inflammation comes on in a man hitherto strong, it is either the result of direct violence which has produced severe injury, and consequent local diminution of vital power, or it supervenes upon some depressing cause acting generally, and others acting locally. Thus, I have seen a man suffer from pneumonia, from the effect of a long racing match against time, followed by subsequent sauntering in the cold air on a rainy day. The fatigue and chill reduced the vital powers generally—the excessive use of the lungs injured for a time their nutrition; *pneumonia* followed, and, in its wake, *acute consumption*. A treatment, however, was employed, in accordance with the views I advocate, and the man recovered perfectly, though with great difficulty.

We next interrogate the strong, the healthy, the well-fed;

we find that in them inflammation is most rare. It is true, indeed, that every now and then we meet with a youth who has severe phlegmonous inflammation, and abscess, from an indulgence in cayenne pepper and other heating spices. It is true that we may have gouty inflammation in a wine bibber and a free liver; but still we know that the individuals in whom these occurrences take place are not in a state of *perfect* health. They have modified in some way that relation between the blood and the organs which is necessary to perfect health, and are, for a time, though in a different manner, the victims of deteriorated vitality; putting aside these exceptions, we recognise, as a rule, that inflammation is rare in the healthy and well fed.

Leaving the human species for a moment, let us examine whether we can find any facts to aid us amongst the lower animals. Unquestionably we do, for we see glanders or inflammation of the nostrils, &c., produced by excessive overcrowding and other depressing agencies in the horse; just as typhus, ophthalmia, bronchitis, quincy, and the like, may be produced in man under similar circumstances. Talking on this subject with a medical friend, he told the following anecdote:—"I, at one time," said he, "found my horses constantly laid up with one or other disease, mostly inflammation, and they always looked out of condition, for I was obliged to work them very hard. One day an old 'Vet.' said, 'Doctor, you must be paying a good sum to your veterinary surgeon every year.' 'Yes, I am; I rarely pay him less than twenty pounds,' was the reply. 'I'll tell you how to save it,' rejoined the old one; 'give your horses twenty pounds' worth more oats in a year;' I took his advice," he added, "and now my horses are never ill, and never out of condition." What is true of a horse is equally true of a man; the worse he is fed, and the more he is worked, the more liable he is to inflammation, and to every other kind of disease. We next consult the Hospital Register, and find that bronchitis is always more prevalent in cold and moist weather than in warm and dry, and attacks poor old men in preference to the young and robust. We know from our own feelings that the cold, &c., depresses the circulating power,

and we can readily see from experience, that age has not the vital force of youth.

If the occurrence of inflammation, as a general rule, is fostered by debility, we must next inquire whether the process itself has a tendency to restore the body to a healthy condition, or to depreciate its vitality still further.

At the outset of this inquiry we have our attention riveted on the word itself—Inflammation; what does it mean? We pin our faith sufficiently upon the doctrines promulgated by the chemists to believe that our bodies are in reality undergoing a process of combustion, similar in kind, though infinitely less in degree, to the combustion of coal and wood in our fires. Now the idea of combustion implies consumption of fuel; and increased combustion, increased consumption. The word inflammation implies combustion, to say the least of it. It does not require a mathematical education to know that, if additional combustion be added to what is already going on, the consumption of fuel will be necessarily increased. Increased combustion implies increased heat, and *vice versâ*. Now we know that if combustion be always going on without fresh supplies of combustibles, the fire will ultimately go out. We know that the fire (without supply) will go out the sooner, in proportion to the intensity of the combustion. We know that under ordinary circumstances our food keeps up the combustible supply for the body, and that the fire and its food being duly balanced, the heat is continuously kept up; but if the combustion is increased in intensity, and the supply of fuel diminished, it follows that the fire threatens to go out early.

These considerations naturally suggest a number of inquiries, *e. g.* is the natural or ordinary combustion (or *eremacausis*, as Liebig calls it) suspended during the existence of inflammation?

Is there evidence of increased combustion, and of increased consumption of corporal fuel?

It is clear that if the combustion has been greater than usual, the body will have decreased in weight, or something analogous thereto, unless the supply of food, &c., has been greater than usual. If not exceeding the average, the body

will remain much as usual, the quantity of food being constant.

The condition, then, of the body during and subsequently to the attack of inflammation, will help us to determine whether the disease is likely to improve the constitution, or to deteriorate it still further.

A reference to experience shows us that in inflammation, and in inflammatory fever, there are increase of heat, loss of appetite, and a positive diminution of weight and strength. There is then reason from analogy to believe that inflammation is in reality, as its name implies, a more rapid burning up of the body, or some of its parts, than takes place in health. It is out of the question dogmatically to assert, with these facts before us, that the process can be one calculated to promote the restoration of the body to health. We do not, however, content ourselves with this reasoning alone: we endeavour to drive it still further. If it be true that inflammation involves a more rapid burning up of the body than usual, we ought to be able to find some analogy between its effects and those of common starvation, in which the combustion exceeds the supply of combustibles, and where, in reality, we have a state of things resembling, in more ways than one, that accompanying the disease in question. We turn, then, to the blood; and knowing that the chemists have diligently examined the state of that fluid under a variety of conditions, we tabulate their results. These we reserve for a fresh chapter, concluding the present one with a reference to the authority of Paget. We find him remarking, page 339, vol. i.—“All the changes I shall have to describe are characteristic of defect of the normal nutrition in the parts; they are examples of local death, or of some of the varieties of degeneration, modified, and peculiarly accelerated by the circumstances in which they occur. The degenerations are observed most evidently in the process of softening of inflamed parts.” Again,—“The degeneration which would be progressive in the healthy state, but which would then be unobserved, being constantly repaired, is still progressive to the inflamed state of the part, and is the more rapid because of the suspension or impairment of the proper conditions of nutrition.”

Inflammation, then, not only is one of the results of debility and diseased nutrition, but, when present, it has a direct tendency to increase the debility, by the more rapid consumption of the tissues, and by preventing the possibility of new supplies being taken to repair the increased waste.

III.

THE CONDITION OF THE BLOOD IN CASES OF INFLAMMATION AND OTHER DISEASES, ETC.

THE idea of inflammation being an excessive and unusually rapid consumption of animal fuel, necessarily involves a comparison with phthisis and other diseases, in which there is a waste of tissue, and with excessive fatigue or starvation—in all we have a diminution of tissue, and a greater amount of combustion than of supply. They differ from inflammation in degree, but not in kind. They involve a slow process of decay; inflammation a rapid one. Unable for ourselves, as physicians, to analyse the blood, we turn to the report of the chemists, who aim at accuracy, and have no particular medical doctrine to uphold.

We find them reporting—and I quote from analyses to be found in the few first volumes of “Ranking’s Abstract of the Medical Sciences,” where there are reprints from Simon’s, Andral and Gavarret’s, Becquerel’s, Rodier’s, and Beclard’s works—

1. That there is a larger proportion of fibrine in venous than in arterial blood.

2. That the quantity of fibrine is augmented at least to 90 per cent. by fasting; while the quantity of red particles are diminished from the same cause, though not to a corresponding degree. During old age and great weakness the fibrine is found to be increased 200 per cent.

After carefully tabulating the results, we find that increase of fibrine is invariably attended with a diminution of blood

globules; and arranging the diseases according to the increase in the amount of fibrine, we have the following very instructive list:—

In a case of leucocythemia in an old man (reported in Bennett's book), treated with calomel, the fibrine was found to be 1100 per cent. in excess! In one case of cancer, with intense anæmia, it was 700 per cent. in excess. Its average in cancer was 600 per cent.; the red globules was reduced to 74 per cent. In a case of phthisis the excess was 580 per cent., but it was reduced to 250 by cod-liver oil. The average excess was 300.

	Excess of fibrine.	Blood globules reduced.
Acute rheumatism . . .	190 to 550 per cent. . . .	30 per cent.
Pneumonia	500 „ . . .	80 „
Bright's disease	450 „ . . .	53 „
Cholera	440 „ . . .	0 „
Glanders	400 „ . . .	10 „
Bronchitis	300 „ . . .	30 „
Infantile convulsions . .	250 „ . . .	25 „
Scarlatina	240 „ . . .	0 „
Sea scurvy	240 „ . . .	50 „
Leucocythemia generally	230 „ . . .	30 „
Hemiplegia	200 „ . . .	
Typhus	150 „ . . .	
Erysipelas	150 „ . . .	25 „
Quinsey	125 „ . . .	
Lead cachexy	120 „ . . .	70 „
Pleurisy	100 „ . . .	
Puerperal convulsions . .	100 „ . . .	
Puerperal phlebitis . . .	90 „ . . .	40 „
Peritonitis	90 „ . . .	40 „
Pregnancy	90 „ . . .	
Spinal irritation	90 „ . . .	
Variola	80 „ . . .	
Chlorosis	75 „ . . .	80 „
Disease of spinal cord . .	75 „ . . .	

Variation compatible with apparent health, 60 per cent.

If this table be of any value, it necessarily leads us to the

conclusion that in some way or other pneumonia and rheumatic fever are allied to phthisis and other diseases, whose chief characters are excessive debility. It is evident from experience that the connexion is not in their symptoms; and it is difficult to see any other, than that there is in all an unusually rapid combustion with deficiency of supply.

If there be any truth in this idea, it will not be difficult to devise an inductive experiment. If it be true that pneumonia and acute rheumatism are diseases accompanied by excessive waste of tissue, and consequent debility, if we can increase the waste and debility still further, we shall augment the gravity of the disease, and increase its mortality. We find accounts of this experiment in authors who, taking another view of those complaints, have advocated bleeding and other powerful depressing agents. The result is, that large venesection prolongs the duration of acute rheumatism, and makes the supervention of cardiac inflammation fearfully certain, and a similar treatment in pneumonia generally gives a mortality of thirty per cent., against a mortality of six or seven per cent. under a milder plan!

Again, if inflammation mean a more rapid combustion of the body, and if that combustion be marked by an increase of fibrine in the blood, it will follow that the tendency of a direct abstraction of a large quantity of the combustible material, will practically have the same effect as if that material had been otherwise consumed. We have experiments ready made to our hand by those who have adopted bleeding as a part of their battery against disease. It is found that bleeding in any large quantity has the effect of increasing the fibrine in the blood, in the same proportion, or thereabouts, as it would have been increased by three or four additional days of disease.

If there be any trust, then, to be placed in the teachings of chemistry, we can only compare fibrine to the *ashes* of the furnace of normal and inflammatory combustion, and not to *fuel*, as used to be the fashion in days not long gone by.

We do this the more readily, because in diseases like ophthalmia, boils, and others, where the inflammation is limited, the excess of fibrine is not greater than is commensurate with apparent health.

Analysis of the blood, therefore, endorses the conclusion which other considerations have led us to draw, that inflammation is essentially a debilitating process, and that when suffering from it the individual may be compared to one who has "consumption."

THE END.

