

The laws of vital force, in health and disease, or, The true basis of medical science / by E. Haughton.

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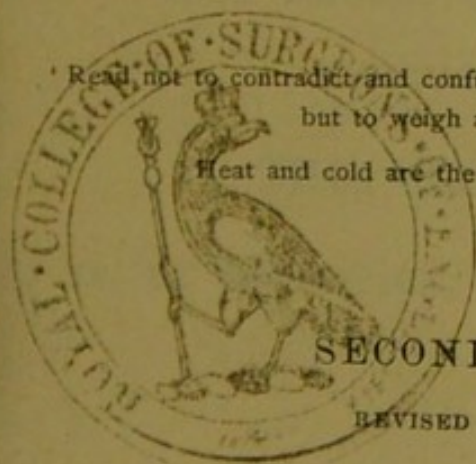
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THE
LAWS OF VITAL FORCE,
IN
HEALTH AND DISEASE;
OR
THE TRUE BASIS OF MEDICAL SCIENCE.

BY
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'Read, not to contradict and confute,—not to believe and take for granted,—
but to weigh and consider.'—*Bacon*.

'Heat and cold are the two hands of nature.'—*Buffon*.

SECOND EDITION.

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TO THE RIGHT HONORABLE
THE VISCOUNT POWERSCOURT,
IN GRATEFUL ACKNOWLEDGMENT OF ENCOURAGEMENT
GIVEN ON THE PUBLICATION OF
THE FIRST EDITION OF THIS LITTLE WORK,
MORE THAN SIX YEARS AGO,
(WHEN THE PRINCIPLES WHICH IT ADVOCATES
WERE WHOLLY UNRECOGNIZED BY THE
MEDICAL PROFESSION,)
THIS SECOND EDITION
IS, BY PERMISSION, RESPECTFULLY DEDICATED.

PREFACE.

THE human mind is so constituted that there are few great truths which it can see in all their relations; and from this cause arise partial systems, pretentious dogmas, and every species of fanaticism.

He, therefore, who would discover new truths, must examine the facts submitted to his judgment from several points of view, and not attempt to generalise until he has ascertained that his first impressions are in harmony with other principles whose truth is admitted by the universal consent of mankind.

The author believes that such has been the process by which he arrived at the leading ideas which he has endeavoured to convey in the following pages. He has no ambition to assist in the formation of a new and exclusive medical sect: on the contrary, he conceives that the exercise of 'the right of private

judgment' is not more the privilege than the duty of every one who undertakes the responsibilities of medical practice. Nor will it be found, when skill has done its utmost, that the resources of the art of healing are too numerous or too well understood. Hippocrates has well said that 'Experience is fallacious;' and the daily recurrence of contrary testimony with respect to simple matters of fact, shows that observation, which is not directed and controlled by reason, is quite unfit to be trusted in questions relating to medical science.

As an instance of delusive experience, the reader is reminded of the great variety of drugs which were had recourse to during the last outbreak of cholera. Whilst the virulence of the epidemic poison continued unabated, no medicine was successful; but, after the virus had almost worn itself out, the pages of our medical journals were filled with accounts of wonderful cures, apparently wrought by the very same drugs which before had so signally failed.

The admitted unsatisfactory state of medical science must be the author's apology for this endeavour to apply the doctrine of 'the conservation of force' to practical therapeutics; whilst in seeking to establish

the threefold type of all perverted or morbid vital action, he has the encouragement of knowing that his views have merely gone through the usual stages which have been the lot of every addition to science that is really worthy of the name!

The Physician alluded to in the first page of Part I, is Sir John Forbes, M.D.; and we now are able to quote the yet recent statement of a not less competent authority, viz., Sir Thomas Watson, M.D., Bart., Physician-Extraordinary to the Queen, &c., &c., who in his address to the Clinical Society (of which he is President) made use of the following remarkable words, viz.: 'Our profession is continually fluctuating on a sea of doubts about questions of the gravest importance. Of this the evidence is plentiful and constant. * * * I say this uncertainty, this unseemly variation and instability of opinions, is a standing reproach to the calling we profess. It has shaken the faith of many men, of men both able and thoughtful, and driven them to ask themselves whether any kind of medication, other than the *vis medicatrix naturae*, is of any real efficacy or value. * * *

'There *are* cures as well as recoveries, and there are remedies that are equal to the cure. Still, of *therapeutics*,

as a trustworthy science, it is certain that we have, as yet, only the expectation !'

In the face of such a description of medical knowledge, it would be inopportune for the author to enter into detail as to the practical use of remedies ; more especially as he is profoundly convinced that, although all agencies *may* be employed scientifically, all are not equally safe, efficacious, or expedient. Moreover, the best interests of society have rendered necessary a division of labour in the several departments of medicine ; and it is probable that, in the present state of public knowledge, these departments are more efficient when kept entirely separate. To discuss this point, however, is foreign from his present purpose, which is to promote Unity, defend Liberty, and inculcate Charity.

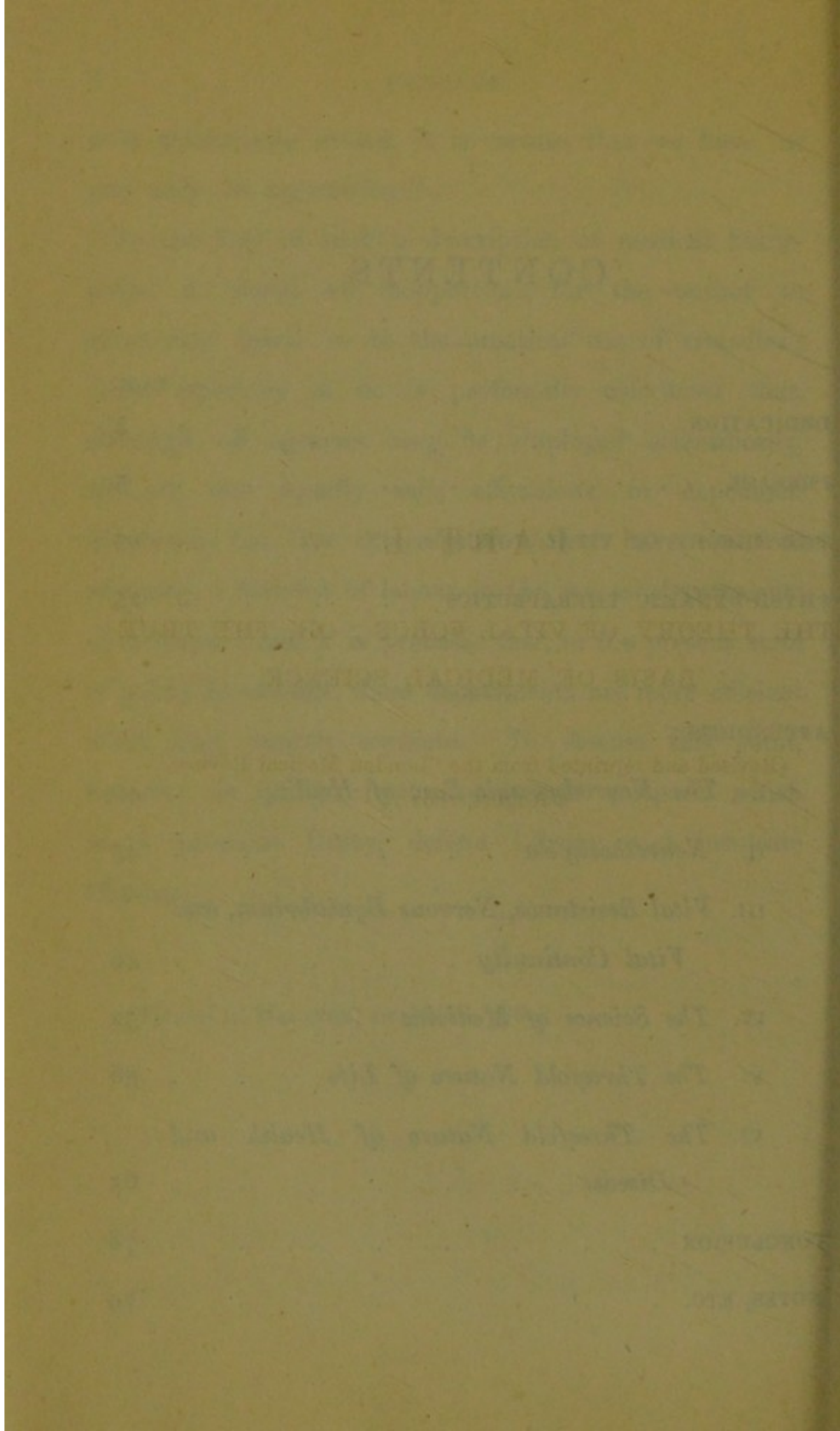
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PART I.

THE THEORY OF VITAL FORCE ; OR, THE TRUE
BASIS OF MEDICAL SCIENCE.

(Revised and reprinted from the 'London Medical Review,'
August, 1862.)

PART I.

ON THE THEORY OF VITAL FORCE.

THERE is nothing more disheartening to a student of medicine than to listen to a statement of the opinions ultimately arrived at by those who have retired from medical practice after having attained eminence as practical physicians. All unite in admitting that it is the custom to give too much medicine, and to give it too frequently; but all are equally opposed to the various exclusive dogmas and medical sects which have from time to time sprung up to 'strut and fret their hour upon the stage.' It is but recently that a distinguished physician and editor of the first medical review in the world, after practising the art of medicine for half a century, openly declared that a very large proportion of the recoveries which take place in ordinary practice do so *in spite of* the treatment adopted, and that many cases prove fatal in consequence of the medicine given. It is not wonderful that this should be the case, when we consider that medicine alone of all the sciences has no settled fundamental principles.

Few medical treatises are agreed in their definitions of health and disease; and many of them speak of disease as a distinct 'entity,' to be driven out of, or expelled from the body. One distinguished physiologist actually speaks of Life as 'the sum of those functions by which Death is resisted;' yet it is easy to show that vitality may exist without any functions whatever being performed, as in the case of a seed, (some grains of wheat having actually germinated after having remained dormant for thousands of years in the coffin of an Egyptian mummy); and it is likewise apparent that death is simply a negative expression, implying the absence of life, which has a positive existence.

We know that life cannot be generated by a fortuitous concourse of atoms, because it only manifests itself through organised structures, all exhibiting evident proofs of design. This is just as true of the smallest object in creation as the largest. Thus we find

'The shapely limb and lubricated joint
Within the small dimensions of a point;
Muscle and nerve miraculously spun,
His mighty work who speaks and it is done.'

Life, then, is not a property of matter, but something superadded thereto, whose amount may be increased by generation through organised structures, and by means of the various forces of nature; but certain conditions are essential to its continuance, although in themselves incapable of originating it.

According to the Mosaic account of the Creation,

when God made the world, he rested, or ceased from active operation : and this is strictly in accordance with the teaching of modern science. Matter is now known to be indestructible, and there is every reason to believe that the same is true of Force. All the physical forces can be proved to be correlated to one another ; and the forces by which life is maintained are plainly convertible into the various physical agencies by which the other operations of nature are conducted. My belief is that there is but one kind of force in existence, and that is the volition of God, acting according to fixed laws, and once for all set in motion at the creation of the world*. On the common hypothesis that animals originate force, the gross amount of power operating in nature must be constantly increasing ; and assuming the doctrine of the conservation of force to be true, there would, on the supposition above mentioned, be nothing to prevent the chemical action and heat in the world from accumulating to such a degree as possibly to destroy all the organisms which are upon its surface†. The former theory has moreover the advantage over every other of not ascribing to God either the monstrosities of physical generation, or the perversions of the moral nature of man ; and therefore accords with the Scriptures, which describe God as having made ‘man’ (or the whole human race) in creating our first parents, and setting in motion those various natural forces which were requisite for the continuance

* Note A, p. 79.

† Note B, p. 79.

of the species, as well as for the other operations of nature.

The main idea which I have here sought to bring out clearly is, that in the building up of organisms, the ordinary physical forces are made use of; and that almost the whole of hygiene and therapeutics consists in a knowledge of how these forces operate upon the body, and how remedies can be best applied in accordance with its natural constitution. It is only by going back to the first generation of living organisms that we can obtain clear ideas of either life, health, or disease. Thus it is plain that the minute germs from which living creatures spring are not repositories of force; and that they are rather acted upon by surrounding forces (in accordance with their original constitution) than themselves active in controlling external agencies. In other words, they bring no force into the world, nor, when they cease to exist as organisms, do they carry any force out of it. It would be perhaps tedious to enter into an elaborate description of the way in which force operates upon the materials of which this world is composed, so as to produce the wonderful results which are implied by the term 'organisation.' But it is necessary to throw out a few suggestions, which may make the subsequent argument a little plainer.

Perhaps the lowest organisms merely represent force in combination with inorganic matter; and the nobler ones complicated reservoirs of force in combination with highly *organised* matter. For instance,

the power of generating nerve-force, or that vital energy which the nervous system stores, distributes, and conducts, exists in the human body as the result of the assimilation of organised food and the presence of a circulating fluid constantly renewed. The quantity of nerve-force capable of being thus generated will depend upon the perfection of the machinery of the body, and the outward conditions in which such machinery is placed.

Great exertions exhaust the body, because the withdrawal of nerve-force faster than it can be manufactured, deranges its delicate machinery, and renders many functions inefficiently performed for want of a due supply of this animal electricity. Many persons have fallen into the error of confounding nerve-force with electricity; but it has been proved to be quite distinct from it, although (under certain conditions) capable of producing it, or being converted into it.

Although the metaphysician may shrink from considering the human body in the light of a machine, yet it is capable of the most complete demonstration that even the human will is not a generator of force, and is never exercised at all without a stimulus of some kind or other previously operating upon the nervous centres, either through the medium of the senses, or by means of chains of thought naturally leading to the ideas upon which it is exercised. The function of the human will is to guide and direct, but not to originate, power. This is the prerogative of the Creator alone; and the sooner physicians

accept the dogma that the human body is in most respects only a complicated machine, the sooner will medicine attain to the position which it ought to occupy. The body has often been compared to a locomotive steam-engine, in order to illustrate the chemical changes which take place within it; but I imagine that the close analogy which exists between them in the actual generation of force is, as yet, but little recognised. The primary source of mechanical power is, in both cases, external to the machine; and the body not merely carries its fuel along with it, but also the elements of chemical and vital action, which, as well as the tissues, again return to the inorganic kingdom as fast as they are set free in the evolution of force.

All vital action depends upon *power* acting through an organism; and life is the condition which determines whether the external forces shall produce physical or vital changes.

When this action is sufficient in amount, equably distributed, and regular in its periodic intervals of action and repose, the condition is healthy life.

When the amount of force is insufficient, the intervals become irregular; and, *vice versâ*, when this regularity is interfered with, the power of appropriating force diminishes. The result is diseased life. From this we see that disease is really a minor degree of life, and death is the total absence of life.

The whole art of curing disease, then, consists in increasing the working power of the human machine,

and preserving the equability and regularity of its action.

If a handful of gravel be thrown among the cranks of a steam-engine, the motion is impeded and becomes irregular. This is what takes place in diseases caused by impurity in the articles used as human food. When the food is deficient in quantity or nutriment, a loss of power is the result; with its attendant irregularity, as a necessary consequence.

Again, if the nervous system receives a shock, there is an undue expenditure of force in a direction where it is not required, with an abstraction of the energy necessary to regularity of action; and a simultaneous loss of power and perversion of function takes place.

How very simple! you will say,—was not all this known before?

Yet nothing can be more certain than that none of the medical systems that the world has ever witnessed are based upon any such foundation. The above principle allows of the use of every remedy; and, according to it, the action of a therapeutic agent may sometimes be antipathic, sometimes counter-irritant, and sometimes re-active, or homœopathic; whilst it freely acknowledges the depurative properties of the vapour-bath, and the therapeutic efficacy of the water-cure. It does not, however, accord with the employment of infinitesimal doses of medicine, inasmuch as, were the human organism sufficiently sensitive to be acted upon by them, it

would be in hourly danger from morbid agents which float in the atmosphere in far more appreciable quantities. The homœopathic dogma is founded upon the well-known law of reaction in the living body; and if this reaction was always sufficient, and never excessive in amount, the rule ‘*similia similibus curantur*’ might lay claim to the dignity of a general principle. Unfortunately, however, reaction cannot be produced in many cases, owing to the diminished sensitiveness to medicinal agents produced by disease; and in others would be extremely undesirable. If a man is suffering from loss of vital heat, there is much to fear in the sudden or excessive application of high temperature; but the indication is clearly to increase the heat of the body without rousing excessive reaction. The treatment is therefore *anti-pathic*, or the cautious and slow application of warmth. But if, on the other hand, he has received a severe burn or scald, the best treatment is generally the use of hot-water or hot-air baths, which are similar in nature to the cause of the injury, and whose object is equally to prevent reaction. The water-cure is an instance of the third, or allopathic principle,—*whenever critical action of any kind is produced*. The object here is to rouse as much reaction as possible, in order to enable the system to dislodge morbid accumulations (or, as the phrase is, ‘inflammatory matter’), and to remove them from the body. In like manner, most remedies are capable of being employed on different principles. Alcohol, for in-

stance (when given as a palliative), acts isopathically in *delirium tremens*, antipathically in exhaustion, and allopathically in dyspepsia. None of these actions, however, represent any increase of vital power, which never can be *directly* increased except by strictly natural agencies.

Nor has any medicine (not chemically corrosive) the slightest *dynamical* action independently of the vital powers (though it may have in connection with them). It cannot act except on a nervous expansion, and often not even on that, when its sensibility has been diminished by repeated excitation. ‘*Medicina non agit in cadaver.*’

Heat, on the contrary, is necessary to vital actions of every kind; and when its internal generation is not sufficiently great, the external application of warmth is a manifest gain to the system without loss of vital energy. But the warmth produced by alcohol, or any other stimulant, is accompanied by the positive destruction of nervous tissue, and is therefore attended by subsequent depression. There would be no injury inflicted upon the system by any amount of wear and tear, if it followed *the natural law of equable distribution* and rapid renewal. But how different is the effect of natural efforts, and the unequal drain produced by the partial operation of stimulants acting solely or chiefly upon the nervous system! The most active assimilation cannot supply such *highly elaborated* tissue as fast as it is required; and the body becomes prematurely worn out, before

half of its powers have been called into operation. Nature has given us no faculty which she did not intend us to use, and it therefore follows, on the above principle, that a certain amount of bodily labour is essential to a healthy condition of the mind and the organ through which its operations are conducted.

It will be seen from the preceding observations that the notion of every man becoming his own doctor is quite ridiculous; and that no one knows how to use any remedy whatever until he first makes himself acquainted with the laws of that body to which it is to be applied. Every remedy is capable of application in some case or other, and is therefore good in itself; but no remedy is good unless prescribed in accordance with the actual condition of the patient. No prescription is worth anything more from having formerly been of use, unless it can be ascertained that the conditions are precisely similar to those under which it was prescribed; nor is the empiric who cannot give a good reason for his rule, worthy of the slightest confidence because in certain cases his nostrum may happen to have been appropriate.

If this attempt to generalize and simplify the first principles of medicine has any effect in moderating that sectarian spirit which is the true ‘opprobrium medicinæ,’ I shall have attained the object of my ambition in writing this article, and shall consider myself sufficiently rewarded.

PART II.

PHYSIODYNAMIC THERAPEUTICS ;

OR, THE USE OF NATURAL AGENCIES IN THE TREATMENT OF DISEASE.

(Revised and reprinted from the 'London Medical Review,'
September, 1862.)

It is a well-known fact that the medical profession has been the subject of much criticism and attack in recent years. This is due to many causes, but one of the most important is the fact that the public has become more educated and more critical than in former times. They are no longer willing to accept the word of the doctor without question, and they are beginning to demand a more rational and scientific basis for the treatment of disease. This is a good thing, and it is one which the medical profession should welcome.

The first of these causes is the fact that the public has become more educated and more critical than in former times. They are no longer willing to accept the word of the doctor without question, and they are beginning to demand a more rational and scientific basis for the treatment of disease. This is a good thing, and it is one which the medical profession should welcome.

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PART II.

ON PHYSIODYNAMIC THERAPEUTICS.

‘The nervous system forms the portal as well as the herald of all diseased action ; and no altered action of whatever description can be instituted but by its medium.’—TRAVERS on *Constitutional Irritation*, vol. ii. p. 438. (1835.)

IN my previous article on Vital Force I mentioned three principles or modes of cure which are commonly practised, and which Hahnemann asserted to be the only methods of treating disease that could possibly be employed. I trust, however, to be able to show that he was mistaken in this dictum ; and that there are three additional rules of action, which are not merely better than any of the others, but which are quite sufficient for the treatment of all morbid affections. The three first methods are the antipathic, the allopathic (or counter-irritant), and the homœopathic ; which all refer to the treatment of ever-varying symptoms rather than constitutional tendencies, and have, therefore, no claim to the title of general principles.

The educated physician knows very well that

dropsy, for instance, is generally but a symptom of organic disease ; and that it may be removed without removing its tendency to return. And he also knows that the flying pains of hysteria depend upon no local lesion. Their removal, therefore, can only be effected by treatment directed especially to the nervous system.

These examples will sufficiently illustrate my position, that the treatment of symptoms seldom reaches the essence of the malady ; and is only likely to be really curative when the symptoms fairly represent or constitute the disease.

If I am right in maintaining that (at least in one of its most important aspects) *disease is merely a minor degree of life*, it is evident that rational therapeutics must be based on the endeavour to increase vitality ; and that whatever does not, directly or indirectly, do this, is not worthy of the name of remedy at all.

It is quite true that when any function becomes irregular, whatever even temporarily restores its periodic action is a gain to the system. And it often happens that such temporary assistance enables nature to resume her accustomed regularity. But it ought to be distinctly understood that there is no drug in existence which is capable of communicating working power to the system ; on the contrary, *medicinal action in most instances is little else than the resistance offered by nature to the introduction of a foreign substance into the body* ; and such resistance always

implies the waste or expenditure of a certain modicum of vital force*.

Yet the relief which some drugs afford is due to the fact that the excessive resistance which they have roused is followed by subsequent reaction. It must, however, be borne in mind that no remedy is capable of keeping up continuous reaction, and that there is no poison, however deadly, which, when by degrees accustomed to it, the system will not cease to resent. Because nature is so economical of vital force, that she only sickens to give warning; and when her voice is disregarded, she submits in silence, because the presumption is, either that the injurious influence is unavoidable, or that the ignorance and perversity which afflict her are so deeply rooted that further protestation would be in vain. As examples of this

* The inflammation caused by the presence of a particle of dirt in the eye is a familiar instance of vital resistance in which nobody supposes that there is any dynamic action. In the same way the Schneiderian membrane rejects snuff, and the mucous lining of the trachea and bronchi reject chlorine. In the case of a narcotic, the stupefaction arises from interference with function, produced by what I must call vital incompatibility; and the different manner in which the same substance *is acted upon* by the different tissues with which it comes in contact, is a clear proof that it has not necessarily any appreciable amount of 'force' within itself. It is also interesting to observe that some poisons kill by exhausting the body of vital power, and others by entirely stopping its evolution. This, no doubt, implies a certain amount of inherent force, but it bears no proportion to the actual result; just as no one supposes that the stoker, who effects such results by turning a stop-cock, exerts an amount of *force* worth estimating in the movements of a railway train.

great law of nature, I may remind the reader how the body becomes accustomed to the habitual use of arsenic, nicotine, theine, opium, and other poisons, when taken in small quantities; and how even tartar emetic fails to excite nausea when its use has been sufficiently long continued.

When a patient is sinking from exhaustion, it is true that we may rouse the powers which exist in the body by alcoholic stimulation; but every sign of life which is thus elicited leaves in the body *just so much less vitality* than it had before, unless advantage is taken of the temporarily-increased evolution of vital force, by the application of other remedies, or the alteration of surrounding conditions. Yet it is not denied that by the use of tonics we may direct the energies of the system specially to the digestion of food; but it is also indisputable that there is no tonic (which has ever yet been discovered) whose long-continued and regular employment does not tend to induce *debility*, just because it has robbed the rest of the system of its proper quantum of nervous force, in order to give the stomach more than could be spared under the circumstances. Loss of appetite generally means deficient vitality, and indigestion generally results from the *unequal distribution* of vitality. ‡

It is, therefore, in vain to direct treatment against the stomach in such a case, because it is either perfectly healthy, or was so until it suffered from the ‘*nimia diligentia medici.*’

The real cause is often an anxious mind, or over-worked brain, that consumes the lion's share of all the vital force which is produced in the system, leaving so much less for the functions of the stomach, liver, heart, lungs, and other organs.

When we speak of organic disease, we mean pathological change, for diseases very seldom commence in causes affecting only individual organs; and our whole nosological system will probably be revised if the theory of vital force is finally adopted; for I think it can be proved that almost every disease originates in one or other of two ways—*either loss of vitality, or interruption of function.*

(*Ex. gr.*) If a man gets thoroughly drenched by rain, and is obliged to sit for some hours in his wet clothes, the constant evaporation from the surface of his body causes the loss of so much animal heat that the system is temporarily drained of its normal amount of vitality.

The result may be, in one person a common cold, in another typhoid fever, in a third rheumatism, in a fourth pneumonia, or (if there be a strong strumous tendency, or constitutional bias), pulmonary consumption may be the ultimate result.

But, on the other hand, there may be no loss of vitality in the first instance, and the illness may be caused by the swallowing of unwholesome food, tending to interfere with some vital process, and thus diminishing the power of generating force within the body.

Why, or how life causes the forces of chemical action, heat, and electricity to favour the growth of structure, we cannot tell; but we know that the oxygen which is taken in by the lungs is the material agent by which most vital changes are effected, and that its union with the carbon and hydrogen of our food is much promoted by heat and electricity. That the force which the body actually has within it is perpetually renewed from without, as well as the materials of which it is composed, is an opinion which has been some time before the profession; as may be seen by the following extract from a communication by Dr. W. B. Carpenter to the Royal Society in the year 1850, viz.: 'Thus then the forces on which the animal is essentially dependent are the affinities which hold together the elements of its food, and which are the embodiments, so to speak, of the light and heat by whose agency they were combined.' . . . 'On the whole, there is strong reason to believe that the entire amount of force of all kinds (as of materials) received by an animal during a given period, is given back by it during that period, his condition at the end of the term being the same as at the beginning, and all that has been expended in the building up of the organism is given back by its decay after death.'

This subject has been entered into in more detail by Prof. J. Le Conte (of the United States of America); but is so abstruse and metaphysical that it would be impossible here to do more than allude to it. Indeed,

so interwoven is it with many modern discoveries, that *the truth of the principles of healing now advocated could not have been fully apprehended before the time in which we live.* Many distinguished men have been for some time, and still are, engaged in the endeavour to solve the connection between vital and physical phenomena. But the author cannot undertake to judge between them, or to estimate the comparative value of their respective researches. And he must leave it to others to decide how far his humble efforts have conduced to bring about the present important change in the theory and practice of medicine.

The constant tendency of all vital action to intermit, both in plants and animals, has often been remarked; and disease is always distinguished by a want of regularity in the periodic time of one or many functions of the body. Hence it may be combatted by interfering with irregular intermittent action, just as effectually as by stimulating functions that are slowly performed.

Ague, for instance, may be cured (and has repeatedly been cured) by using the cold shower-bath just at the time when the hot stage would have commenced, had it not been checked by the anti-periodic action of the shock*.

The idea that there exists any medicinal substance capable of directly and infallibly increasing vitality is perfectly Utopian, and, ever since the days of alchemy, has met with well-deserved ridicule; but,

* Note C, p. 79.

although there is no substance which is capable of doing this, there are several imponderable agents which can be proved to be essential to life, and which may, not unreasonably, be supposed to be capable of increasing vitality.

These agents are: Heat, Electricity, Chemical Affinity, and Mechanical Force. Each of these is capable of generating any or all of the others; and besides these, there are several other forces with which they are correlated, and which exercise a powerful influence upon the body*.

The celebrated S. T. Coleridge has put on record a wonderful theory, which (although somewhat fantastical) is very ingenious, and shows that he had in view the *unity of force*.

He says, 'I affirm that a power acting exclusively in length, is (wherever it is found) magnetism; that a power which acts both in length and breadth, and only in length and breadth, is (wherever it be found) electricity; and, finally, that a power, which, together with length and breadth, includes depth likewise, is (wherever it may be found) constructive agency.' When the fact of the transmutation of several of the forces into each other has once been grasped by the mind, it is easily conceived that any one of the agencies of nature may be made to supplement and assist all the others; and that whatever is most generally available will be the most suitable for the treatment of disease. As an instance of the metamorphosis of power, we may mention *the Osmotic force*,

* Note D, p. 80.

which was formerly thought to be totally distinct from the non-vital agencies, but which is now believed to be simply the transformation of chemical affinity into mechanical power.

If we were asked to classify the agencies which increase vitality according to their relative importance, we would place them in the following order, viz.: Heat, Electricity, Chemical Action, Mechanical Motion, and Light.

In using these agents for the cure of disease we should be careful to imitate, as much as possible, the methods ordinarily pursued by nature; for it follows from what has gone before, that they can only act on living things in accordance with their primary constitution, unless their action is to be a destructive rather than of a constructive character.

Empirical practice has ever been distinguished by its avowed antagonism to the efforts of nature, whilst scientific medicine, on the contrary, endeavours in most instances to go as much as possible in the same direction.

If, then, we search for the natural mode of disengaging electricity, we shall find that the greater proportion of that force, as it exists in nature, is produced in the three following ways, viz. *by friction, by evaporation, and by change of temperature.* Now, when we consider that the simplest bath cannot be administered without every one of these sources of electricity being present, it will serve to show us how great must be the value of baths as therapeutic

agents, and to account for the otherwise unaccountable results of empirical Hydropathy*. Yet there are many baths employed at hydropathic establishments which have not hitherto found their way (in this country) into general use, although freely used in the United States of America. In the words of the *British Medical Journal*, 'We have laughed at and condemned hydrotherapeia and the Turkish bath, for example; and yet, as we all know, not only the public, but members of the profession, derive, and have derived, great benefit from the use of these things.' . . . 'We ransack the whole world for remedies, and fill our journals with experiments upon the effects of the last worm powder from Abyssinia, or a specific salve for cancer curing, or any other novelty in the way of drugs; but *through some incomprehensible obliquity of vision*, of such manifestly powerful therapeutic agents as hydrotherapeia and

* The *direct* increase of vitality caused by the development of animal heat and electricity, is, of course, only one out of many physiological effects which baths are capable of producing. As many varieties are already in operation, it would be out of place to attempt here to describe them; but it may be well to disabuse the mind of the reader of the idea that their beneficial influence is chiefly owing to an improvement in the condition of the skin. In the sanitary use of baths this is true; but in a therapeutic point of view it is quite otherwise. The primary influence being upon the nervous system; and the secondary effects being exerted upon the functions of circulation, nutrition, and depuration, thereby accelerating *renewal of tissue*, which is the next best thing to the renewal of life.

the Turkish bath, we wash our hands as of things not belonging to the practice of legitimate medicine.'

For my part, I have long ago made up my mind that the rational and scientific use of temperature, friction, and water in various forms, is the true basis of the healing art, and that all other remedies are properly supplemental to these natural agencies, and by no means to be placed on a par with them. Medicines, no doubt, are generally the readiest and often the *only available* remedies; but in all health-establishments, whether for rich or poor (and especially in the treatment of chronic disease), *they may be in great part dispensed with when proper appliances are at hand* for more permanently beneficial treatment.

The principal indications of the art of healing may thus be classified :—

1. To increase general vitality, or the power of evolving vital force.
2. To restore equilibrium in its distribution.
3. To obviate local complications.
4. To check abnormal periodic action.
5. To stimulate sluggish functions; and
6. To remove noxious or unassimilable substances from the body.

Each item of this classification might have volumes written upon it, and might be subdivided almost indefinitely; but it is unnecessary here to enlarge upon them, as *the weakness of medicine lies entirely in the want of first principles*, and cannot be attributed

to want of carefulness, industry, or intelligence in its practitioners.

If my zeal does not mislead me, I imagine that the theory of vital force is the *key* to unlock all the mysteries of animal life, and that it will be as useful in the *diagnosis* as in the treatment of disease. Thus, when we consider that the amount of nerve-force generated in the body at any given time is necessarily limited, it follows that just in proportion as one function consumes more than its fair share, there will be so much less left for conducting the other operations of the system. This may be seen by observing its ordinary distribution, viz. :—

Some is required for the maintenance of animal heat.

Some for the carrying on, so to speak, of the purely organic functions.

Some for bodily labour and mechanical movements; and

Some for the work of the brain and nervous system, in willing, reasoning, sensation, and perception.

From this we perceive how intense mental emotion may prostrate the body as completely as the exertion of electrical power does the gymnotus or torpedo; and how the function of respiration may be interfered with by influences apparently most unlike one another.

What is there in common between bad ventilation and disappointed hopes, or between scarlet fever and intemperance? Nothing whatever, but that they all

debilitate; yet there is not one of them that has not been the origin of pulmonary consumption from this circumstance alone.

We now understand the reason why the sharp, fussy man of business, the abstracted theologian, and the eager politician suffer more from so-called disorders of the stomach and liver than the gluttonous Esquimaux who fills himself with raw whale's blubber, train oil, *et hoc genus omne**.

When Medicine has been firmly established upon the basis of Physiology and Natural Science, it will become itself a Science in something more than the name, because it will then be founded on eternal truths that cannot be overthrown. Perhaps some of the most fundamental are the following, viz.:—

1. That life is a dynamic *condition* and not a *power*, and that its presence or absence determines the manner in which external forces shall operate†.

2. That the body derives all its working power from without; and neither brings force into the world at its conception, nor carries any out of it at its dissolution.

3. That the materials of which living things are made either lie in the ground or float in the air, and are absolutely indestructible‡.

* Note E, p. 81.

† It cannot be denied that vitality, or passive life, exists as a condition in a dormant seed, a frozen toad, or in suspended animation; but there is in each of these cases a *total absence of vital force*, until developed by the influence of one or more of the natural forces, which *alone* are capable of developing it.

‡ Note F, p. 81.

4. That every living creature requires the constant renewal of the matter of which it is composed, and of the forces on which it is dependent for all *evidence* of life.

5. That in the beginning, God made matter—organization*—and the laws of generation, but does not now, so far as can be known, create individual organisms. Any other hypothesis would make Him the *direct author* of moral evil and physical deformity.

6. That physical imperfection in animals results from want of obedience to natural law, whether on the part of the individual, his progenitors, or the conditions in which he exists.

7. That the natural body is corruptible, because the manifestation of its life depends on perpetual change.

8. That it is (in its material relations) only a complicated piece of mechanism, whose proper condition is denoted by sufficiency of working power, regularity of periodic action, and equable distribution of force to all its parts.

9. That disease consists in diminished evolution of vital force, accompanied by loss of 'nervous equilibrium,' or its proportionate distribution to the organs, and irregularity in their intervals of action and repose.

* This hypothesis includes the idea of the creation of *distinct species*, and is not to be confounded with the very different theory introduced by Freke, and revived by Darwin; which further coincides with the theory of 'Topsy'; and is now the only one tolerated in some 'scientific circles.' It is indeed a pitiable culmination of 'science falsely so-called.'—Vide Note G, p. 81.

10. That nervous equilibrium may be restored by regulation of personal habits,—by the aid of physical agencies,—or by the administration of medicines; but that the *direct* tendency of the latter is always to consume vital force.

11. That vitality may be increased directly by natural agencies, or indirectly by regulation of function; and, finally,

12. THAT DISEASE CAN BE REMOVED ONLY BY INCREASING VITALITY, BY RESTORING NERVOUS EQUILIBRIUM*, AND BY REGULATING PERIODIC ACTION.

Doubtless this simple formula (like every other great general law) may easily be represented as a useless truism; nevertheless, it appears to be so simple, just because it is so great in its universality of application, and in the results which may be expected from its general adoption.

Even now, when the leading ideas of this little work have lost much of their novelty, and seem to be the property of every one except the author, he does not the less rejoice in the new and glorious era which is approaching in medical science, and which has for the last fifteen years been anxiously looked forward to by many distinguished philosophers†.

* Note H, p. 82.

† Note I, p. 83.

APPENDIX I.

THE NEURODYNAMIC LAW OF HEALING ; OR, MEDICINE UPON THE BASIS OF PHYSIOLOGY.

(Reprinted from the 'Journal of Health' for June, 1864.)

THE human body may be compared to a clock. It is a piece of mechanism, the result of design, and its condition for the time being will be the joint product of its original structure and the circumstances in which it is placed. A good clock will presently become a bad one if kept in a damp place, set on a wrong level, or otherwise maltreated. It wants the conditions which it requires for its regular action. Just so in the human body: it may be originally sound; the inherited constitution may be good; but the outward conditions may be unfavourable to health. It is true that the mechanism of the body is infinitely more complete than that of the clock. It is the work of a Being of perfect wisdom, who, when He had made it, 'saw that it was very good;' but there are certain points of similarity in the two machines which will serve to illustrate the first principles of the science of Therapeutics. The first thing we observe in each is that motion of various kinds goes on in its different parts, and we know that every kind of motion requires force or power to produce it. In the clock the source of the power is evident—the weight is attracted to the earth by the force of gravi-

tation, and acts upon all the rest of the works. In the body it is not so easy to discover the source of power. Here physiology is far in advance of medicine, for whilst men of science speak of the dynamical condition of the organism, a large proportion of physicians talk of an unknown and unknowable 'something,' which they are pleased to call 'the vital principle.' This is simply theorising; for what proof have we that there is any such thing as a vital motive principle? The notion has long ago been rejected by every physiologist in the world who has any reputation to lose; but it is still the magical touchstone whereby certain self-styled practical men cut every Gordian knot which they are not able to untie. The affinities which bind together the elements of our food are genuine sources of power, and whenever they are set free, either during conversion into blood or by the subsequent destruction of tissue, we know very well that they contribute towards vital activity, and we have reason to believe that under the modified form of vital or nervous force they produce almost all the varied changes which we observe to take place in living animal bodies. Whilst, therefore, we have one source of power in the clock, we have also in the living body one proximate cause of vital activity as the resultant of various physical forces, which have been converted into vital force by contact with organised matter and by the modifying influence of vital conditions. But we must bear in mind that the source of power in the clock is uniform, whilst in the case of the body it depends upon the ever-varying external conditions in which the latter may be placed. To pursue our analogy. Power in sufficient amount is the first condition of life. The second condition is that it should be supplied with sufficient regularity, not at one time very much, and at another time very

little, but within certain limits of uniformity which must never be exceeded. The third condition is that it should be so distributed that each part of the mechanism should receive its own proper proportion, and that no part should receive an excessive amount, to its own injury by excess, and to the injury of other parts by deprivation of a sufficient supply. Now, in the case of the clock, if the weight be too small, it will not go for want of power; if the machinery be defective, the power may be inequably distributed; or if it be set crooked, the pendulum loses its regular beat, and the result is that the clock becomes practically useless.

We see then that by regarding the physical frame as a piece of mechanism, we get out of the regions of metaphysics, and into the domain of science; and we find medicine based upon the very same laws as chemistry, electricity, magnetism, and heat—nay, more, we may regard medicine as the climax of physical science, the noblest of all the natural sciences, because it cannot be thoroughly understood without more or less knowledge of all the others. Simple, indeed, and grand (in their simplicity) are its leading doctrines; but although every one can grasp the ideas of power, quantity, time, and proportion, the practical application of the theory of vital force requires no small amount of intelligence, and no ordinary diligence in observation. It is very true that disease depends primarily upon some irregularity of the nervous force, either as regards its rate of evolution, proper distribution, or periodic movements, and that this idea may be grasped by the meanest capacity; but how complex are the ideas which it is most intimately connected with! viz., the correlation of the physical and vital forces, the rythmical succession of vital changes, the electrical attraction and repulsion produced in the

nervous system by medicinal or poisonous substances, by alterations of temperature, and by mental emotions. A therapeutic law is no doubt a lever of enormous power in dealing with disease, but skill is necessary to apply it; or mischief and not benefit to the patient will be the inevitable result. When, however, we find men dealing with the human body as a disjointed conglomeration of organs, it cannot be deemed superfluous to point out that all diseased action (as well as all healthy action) is accomplished and takes place by and through nervous agency, and therefore that every remedy not simply mechanical must have an influence more or less direct upon the nervous system. We may classify remedial agencies under four heads—the *physio-dynamic*, or strictly natural agencies, as heat and electricity; the *mechanical*, as surgery, dentistry, and obstetrics; the *toxico-dynamic*, or purely medicinal; and the *hygienic*, as diet, motion, rest, clothing, &c. A true system of medicine should include every known remedy, and should embrace general laws for the guidance of the practitioner. There is no good reason why medicine should not be founded on fixed laws as well as the other sciences; nor does any educated person require to be told that there can never be any real opposition between any ascertained fact and a well-grounded theory. If those gentlemen who object to theory in medicine are prepared to give up theories in chemistry, mechanics, optics, and hydrostatics, it may be worth while arguing with them; but otherwise we shall be compelled to conclude that they are determined to do their utmost to prevent medicine from ever becoming a science, their real anxiety being lest what they have been in the habit of representing as facts should turn out to have been the most groundless of theories.

When I say that in order to cure disease—properly so-called—I must increase or diminish the rate of evolution of vital force—I must restore its proportionate distribution—or I must regulate functional periodicity in one or more parts of the mechanism of the body—I certainly do commit myself to a theory, but I also enunciate a fact; a fact, moreover, which includes within itself an infinite variety of minor facts. *That only is a disease which is accompanied by the perversion of some natural process, or by the increase, diminution, or alteration of some natural secretion.* I may not be able to explain the nature of life, but it is a great advantage to me not to be led astray by the notion that it is a force which requires no renewal from without. It is by the faculty of generalization that the human intelligence is chiefly distinguished from that of the brutes. Let us, then, not despise it in the noblest of sciences. Let us use every agency in nature whenever we find it to be beneficial; but let us make a wise choice of the remedies at our disposal, and show our skill rather in the selection of a few which we can rely upon, than in a fruitless multiplication of specifics whose properties do not materially differ from one another; or by a mere system of treating symptoms irrespective of the internal conditions of which they are only the index and the sign.

What men have hitherto looked for as a law of healing is something which would apply to every symptom a corresponding remedy; and I fully admit that a theory would be ‘nonsense’ which made any such attempt; for I have seen many diseases prove *fatal* just because the patient had been ‘cured’ (!) of his most prominent symptoms, only to be replaced by others of a still *worse* description. There is just as certainly a scientific basis for medicine as there is

a law of gravitation in natural science ; but we do not sneer at the latter because it does not teach us how to build a bridge ; and we ought to recognise the advantage of the former if it teaches us not to lower unnecessarily the vital powers of our patients ; to give up our false doctrine concerning specifics ; and our equally destructive fallacies about courses of tonics for chronic disease ; and the extracting of nervous force out of substances which are utterly incapable of assimilation.

APPENDIX II.

NEUROTHERAPEIA ; OR, SUGGESTIONS TOWARDS THE FORMATION OF A NEW SYSTEM OF MEDICINE.*

(Reprinted from the 'Medical Mirror,' August, 1867.)

THE great discoveries which have recently been made in some branches of knowledge directly bearing upon medicine, warrant us in believing that the time has come for larger and more accurate generalizations than any which have hitherto been accepted by the medical profession.

It is also reasonable to hope that the cultivators of this noble vocation may be henceforward found exhibiting a unity in diversity, whilst individually labouring in its varied departments.

As a first step towards the promotion of such unity, the following propositions are suggested, under the title of first principles of '*NEUROTHERAPEIA*,' a therapeutic system based upon the operations of the nervous or vital force within the living body.

* Derivation :—*νεῦρον*, a nerve, and *θεραπεῖα*, a fostering, nurture, or care.

Fundamental Propositions.

1. The nervous system is the chief agent, both in the production and cure of all diseases (parasitical affections only excepted*).

2. Both health and disease are threefold in their essential characteristics; and consequently, every form of morbid action is referable to one single type.

3. The primary essentials of healthy life are 'sufficiency of working power,' 'regularity in the rate of its evolution,' and 'proportionate distribution of the same to the various organs of the body.'

4. Disease consists in any aberration from this condition of the vital force, either in respect of quantity, proportion, or time; giving rise to 'diminished vitality,' 'disturbed nervous equilibrium,' and 'functional irregularity.'

5. This threefold type is constant; as departure from the healthy standard in one respect necessarily leads to the threefold irregularity in question.

6. The influence of the body on the mind is great, but that of the mind on the body is even greater; and a recognition of this truth is essential, both in the prevention and treatment of every form of disease.

7. The enormous value of hygiene should be more fully insisted upon than has hitherto been usual in the practice of the medical profession.

8. Constant and unnecessary interference with nature is adverse to recovery, and cannot be too much deprecated, as tending to defraud the patient, and degrade the physician.

9. No class of remedies should be set aside as worthless for which there is the testimony of educated and intelligent observers; but each practitioner should be left free to use whatever means he may judge most likely to be effectual.

* Note K, p. 83.

10. Whilst the utmost liberality is conceded in the choice of remedies, no one should be considered free to act contrary to reason—to use any kind of imposture—or to employ any treatment of a permanently debilitating character.

11. The chief efforts of the physician should be, in every case, directed to—

- ‘Increase general vitality,’
- ‘Restore nervous equilibrium,’ and
- ‘Regulate periodic action.’

12. The employment of thermal agents should be more encouraged, as having a greater influence in controlling disease and raising general vitality, than has hitherto been believed, notwithstanding the cures daily effected by their use, and the physiological reasons which may be assigned for their efficiency*.

In conformity with these propositions, the following CLASSIFICATION OF REMEDIAL AGENCIES is suggested, viz.:—

1. MEDICINES of every kind, including unassimilable articles of diet.
2. HYGIENE.—Mental, atmospheric, dietetic, thermal, mechanic, actinic, and depurative.
3. ELECTRICITY.—Frictional, galvanic, magnetic, and vital.
4. GYMNASTICS, comprising kinesipathy, frictions, and special exercises.
5. HYDROPATHY, comprising all thermal processes by which the temperature of the body or any part thereof is altered artificially.
6. SURGERY, comprising all manual operations and mechanical contrivances for the relief of morbid conditions, or for the assistance of nature during special circumstances requiring the intervention of art.

The employment of any or all of these remedial

* Note L, p. 83.

agencies in accordance with the principles previously enumerated, may fairly be said to constitute an *entirely new system of medicine*, which must stand or fall by its own merits, and which regards all therapeutic measures chiefly in their relation to the evolution and distribution of the vital force.

According to it, everything vital, or which acts upon living organisms, should be regarded principally in its dynamic aspect.

Thus, a system of therapeutics might be arranged in five grand divisions, comprising

1. Toxicodynamics.*
2. Hygeiodynamics.
3. Thermo-dynamics.
4. Electro-dynamics.
5. Mechanico-dynamics.

Of these, the first division comprehends medicines, stimulants, narcotics, &c.; the second, all hygienic agencies; the third, all baths and hydropathic processes; the fourth, galvanism and allied remedies; the fifth, surgery, dentistry, midwifery, gymnastics, and all mechanical contrivances.

In conclusion, it follows from what has been laid down, that if there be any such thing as a universal law of healing, it must be founded upon the threefold character of abnormal vital alterations, and not upon the idea of counteracting symptoms as they arise; for this would imply the absurdity that nature is *always* in the wrong*.

Sydenham has indeed left behind him three great physicians, 'Air, Water, and Exercise;' and the enlightened practitioner will always be proud that he is intimately acquainted with them†. Moreover, in whatever part of the world you place him, or whatever remedial agents you give him to work with, he will always keep in view these three indications;

* Note M, p. 84.

† Note N, p. 84.

and have them as it were, written in letters of gold, and engraven upon the palms of his hands :—

1. 'Endeavour to raise vitality' to
2. 'Restore nervous equilibrium,' and to
3. 'Maintain functional regularity.'

APPENDIX III.

NEUROTHERAPEIA :

ON 'VITAL RESISTANCE,' 'NERVOUS EQUILIBRIUM,' AND 'VITAL CONTINUITY.'

(From the 'Medical Mirror' for October, 1867.)

As health has three principal aspects in which it may be viewed ; so every living organism, in its relation to morbid agents, is endowed with two remarkable properties, whereby its life is preserved amidst all the varying influences by which it is surrounded. These two properties are respectively named 'Vital Resistance,' and 'Vital or Rhythmical Continuity ;' and by their mutual antagonism tend towards the maintenance of that healthy condition of the system which has been denominated 'Nervous Equilibrium'—a term by which we understand that the nervous currents are properly distributed in proportionate quantities to the various parts of the body, and that the said currents run in proper directions, according to the necessities of the organs. 'Vital Resistance' is likewise properly called *reaction*, as it is essentially the rebound of nature against all agents by which the present condition of the living system would otherwise be altered in any respect, either for better or worse*.

This it is which forms so useful a safeguard against

* Note O, p. 85.

the effects of variations of temperature, diet, sleep, &c., by preventing any permanent change from being suddenly effected in vital conditions. It is easy to see, that without a knowledge of this principle, not one single step can be taken in rational therapeutics. But the antagonism by which sudden alterations are met is only one element in the maintenance of nervous equilibrium. There is also a principle of conservatism in the body, whose tendency is to continue in operation any action once commenced, just as a series of advancing waves tends to overcome, by a repetition of vibrations, any obstacle which does not rest upon a sufficiently solid foundation.

These rhythmical vibrations may be good or evil in their ultimate effects; and we thus find that disease has its conservatism as well as health; and that the rhythm of its irregularity is oftentimes as perfect as the 'healthful music' of the strong man's pulse. To use a political simile, the rightful government has been temporarily deposed, and the nervous system is just as tenacious in adhering to bad habits once acquired, as a country is unwilling to give up a government to which it has been long accustomed, however much it may have resented its establishment in the first instance.

Again, in the human body, as in many a political community, there is often quiet from exhaustion, or degenerated sensibility; as when that state has been produced which is called a *tolerance of the remedy*. There has been vital resistance; but that resistance has been in vain. Any drug, therefore, which is swallowed under such circumstances will fail to produce its accustomed effect—a fact which clearly shows that the living body acts upon the dead drug, and not *vice versâ*, as commonly supposed. How otherwise can we account for the fact, that of two grains of opium, equally genuine, one may, under certain

circumstances, produce narcotism, the other stimulation; that stimulants may become sedatives, tonics laxatives, and so on to the end of the *materia medica*? Is it not evident that when powerful effects follow the taking of a small quantity of drug, *the greater portion (almost the entire) of the force operating in the production of such effects is at the expense of the living body*, and especially of the nervous system?

May it not be that what we call nervous centres are reservoirs of force, which may be called upon in any sudden emergency, to give up some of their store? and may it not also be that a reversal of the direction of the nervous currents may be instantaneously effected by an impression on the nervous centres?

When such reversal has once been effected, the body is (so to speak) negatively electrified; and this state will be maintained by the principle of continuity, until vital resistance is again roused to throw it off, either by accident, or by the systematic efforts of medical science.

In the condition known as chronic disease, we see either a series of reactions against a real *materies morbi*, or continuous vibrations against a cause which was formerly operative, but which has long ceased to have a real and tangible existence. A familiar instance of the principle in question is the sensation as of sand in the eye, after the offending particle has been removed; as is also the common feeling as of pain in the foot, felt by persons whose legs have been amputated.

It is by bearing these principles in mind, that such wonderful antiperiodic effects may be accomplished by the simple agencies of heat and cold; by whose means vital resistance can be aroused, morbid continuity broken through, and nervous equilibrium re-established.

APPENDIX IV.

THE SCIENCE OF MEDICINE.

(Revised and reprinted from the 'London Medical Review,'
March, 1863.)

IF 'the proper study of mankind is man,' then surely Medicine is entitled to be considered the first of sciences; but so modest are its professors, that we everywhere hear it styled 'an experimental art,' without any one entering the mildest of protests against the indignity.

If the discoveries of Newton have been followed by the most extraordinary progress in physical science, how much more may we not expect from that grand generalization of modern times, 'the correlation of the forces of nature!' This is a conception so sublime, that, compared with it, the whole Newtonian system shrinks into comparative insignificance; and it bears so directly and so powerfully on the entire range of science, that the finite nature of the human mind appears to be the only limit to the progress of our knowledge.

That great and good man, Count Rumford, about sixty years ago, demonstrated the doctrine that heat is a form of motion, and thereby laid the foundation of the subsequently-developed doctrine of the mutual convertibility of all the forces of nature; and in due time the doctrine of the 'conservation of energy' has been applied to medicine, and the principles of the art of healing may now be said to be within the domain of exact science.

We may not be able to define the word 'Life;' but we recognise in it not so much a source power as a dynamic condition. We no longer admit that force can be created out of nothing; an absurdity which

is implied whenever that indefinite somewhat 'the vital principle,' is confounded with or represented as the cause of the evolution of vital force. That the public have never imagined medicine to be a science is evident from the fact that almost every illiterate person is quite prepared to undertake the responsibility of prescribing for the most serious affections. No one thinks himself more of a carpenter because he possesses a box of tools; but how often do we meet with men who make the physician subordinate to the remedy, and think they know how to treat a disease because they have got hold of a prescription!

It is time to repudiate the idea that we are guided solely by experience; for that is a finger-post which points in every direction at the same time, and is hourly brought up in attestation of the most drivelling absurdities. But we claim for the science of medicine the same laws which regulate the scheme of universal nature; and declare that organization, and that alone, makes the distinction between vital and physical phenomena.

It is true that we cannot accurately measure the amount of force which is evolved within the body. We do not know, and we never can know, how much vital force is required for the functions of any internal organ; but this we do know, that for each a certain amount of nervous energy is required, or the machinery of the body must undergo temporary or permanent deterioration*.

We do not know exactly what is the nature of vital force; but we know how its amount may be increased, and we know the causes which *obstruct its evolution*.

We do not know, moreover, why every function

* Note P, p. 85.

of the body is intermittent, nor can we explain the remittency of morbid action; but we have many remedies which control the periodic changes of the body.

Formerly the language of the Colleges was in the prohibitive tone; as, 'Thou shalt not use bark or quinine;' 'Thou shalt not use vaccine lymph;' 'Thou shalt not use mercury,' &c. But now it is clearly perceived that it is only by the spread of sound principles that quackery can be put down, or rational practice encouraged.

Scientific medicine is catholic in theory, comprehensive in its list of remedies, and jealous of nothing but the liberty of its disciples*.

But, though the choice of remedies ought to rest with whoever has the responsibility of treating actual disease, sound principles are necessary to guide in their employment; and the following formula will be found practically useful.

There are only three ways of restoring health, and every successful remedy acts in one or all of these three ways; to wit—

1. By increasing the power of evolving vital force;
2. By promoting its equable distribution; and
3. By regulating functional periodicity.

The only reason which can be alleged against medicine having its axioms as well as other sciences is, that its fundamental ideas are of a very complicated character, and involve the abstruse conceptions of life and organization. This, however, only proves that the axioms of medicine cannot be self-evident. But, if they are capable of proof, it is unimportant whether they be self-evident or not. All that is wanted is that they should be true, comprehensive, and capable of practical application.

As a first effort towards the establishment of

* Note Q, p. 86.

fundamental principles, I would suggest a few postulates and axioms, viz. :—

First Postulate.

Let it be granted, that everything in nature is continuously acted on by one or more of the physical forces; and that all things are therefore either in a condition of static equilibrium, or in a state of change.

Second Postulate.

Let it be granted, that force and matter are alike indestructible, and that the vital force is correlated with the various physical forces.

Third Postulate.

Let it be granted, that vital phenomena are produced by the operation of physical agencies on organized bodies; and that vital force is vital, and produces vital phenomena, solely by reason of the peculiarity of the organization through which it is evolved*.

Axioms.

1. The blood is the life of the flesh†.
2. The presence of oxygen is the stimulus of the blood.
3. The assimilation of food is the first step towards the production of vital force.
4. Every process in the body (whether healthy or diseased) is liable to be controlled by nervous influence.
5. Medicines act upon the organs chiefly by means of the force which is evolved within the body.
6. The body is a chronometric machine, each part requiring a continuous supply of vital force.

* Note R, p. 86.

† Note S, p. 86.

7. Disease is a condition or phase of life in which there is either a deficiency of working power, a defect in its distribution, or a want of regularity in the rate of its evolution.

8. From which it follows, that it can only be removed (or rather altered) by increasing the regular evolution of vital force; by promoting its equable (or proportionate) distribution; and by regulating functional periodic changes.

9. Every agency in nature which is capable of altering the normal state of the body without injuring it, *may be used as a remedy.*

Finally.

Medicine is a science; but 'Art is tedious; the Occasion fleeting; Experience fallacious, and Judgment difficult*.'

APPENDIX V.

THE THREEFOLD NATURE OF LIFE.

(Read at the Victoria Institute, 3rd February, 1868.)

EVERY ONE is familiar with the experiment as performed with a prism, whereby a ray of white light may be divided into seven colours, three of which only are primary; as also with the different properties of the actinic, calorific, and luminous rays of ordinary sunlight†; but I had not heard or read anywhere the idea that health and disease were threefold in their nature until I published it myself in the *London Medical Review*, 1st September, 1862. Now I shall proceed to show that the normal or healthy condition of man's life, and that of all the higher classes of

* Hippocrates.

† Note T, p. 87.

animals, is characterised by three great principles, none of which can be interfered with without producing a corresponding alteration in the other two.

Analogy may help us perhaps to understand how this is. Let us compare the body to a machine in connection with the elementary ideas of Power, Time, and Quantity, and see what follows. I have elsewhere expressed the idea in the following terms, viz. : 'In a clock, a telegraph, a mill, or a steam-engine, the first thing requisite for its proper working is a *sufficiency of power*. But power alone is not enough ; if it be badly distributed the machinery will soon come to a stand-still. The second essential is, therefore, *proportionate distribution of power*. Thirdly, it is necessary that the power upon which the movements of a machine depend should be supplied *with regularity*, and not in sudden gushes followed by comparative inactivity.' Here then is the type of healthy life ; and it is evident that disease must consist in some alteration of its essential characteristics. Let us suppose, for instance, that working power is deficient in the human machine. This is equivalent to saying that vitality is lowered either through the operation of some depressing mental or physical influence, or the sudden abstraction of heat or electricity. Let us take a case in which the body has been cooled more rapidly than animal heat can be manufactured ; and what will be the result ? We know by experience that many and various effects may be thus produced, but in every case we notice, as the first consequence of such depression, an abnormal distribution of the vital power.

Who has not seen the simple exposure of the feet to cold or wet for a considerable length of time produce inflammation in different organs and in distant parts of the body ? The lining membrane of the nose or throat, the substance or investing mem-

brane of the lungs, or the sheath of part of the trifacial nerve is so often attacked with inflammation from causes of this nature that it is a matter of common observation. But what is the medium by which such rapid results are brought about? We find a sufficient explanation in the telegraphic system which the nerves supply; but without this it is evidently impossible to explain the actual phenomena. Observe the sequence in which they severally take place. First, lowered vitality; second, disturbance of nervous equilibrium (or proportionate distribution of vital power); and third, functional irregularity, as a consequence of the first two departures from the type of health. If, on the other hand, some regular function, such as sleep, is interfered with, we shall have as the direct result, lowered vitality and abnormal distribution of the nervous currents and blood: thus completing the threefold departure from the type of health. Or we may suppose a case in which nervous equilibrium is first disturbed, by bad news, contact with disagreeable people, or the injudicious use of stimulants or narcotics. Then follow bad digestion, nervous irritability, and other derangements of function, as the second element (or want of vital chronometry), leading in turn to the third phase of disease, or lowered vitality. Thus the circle is completed, and it is impossible to point to any case of disease in which these three elements are not abundantly manifest, when it has fairly laid hold of the constitution.

Disease, then, may be regarded in its negative aspect when compared with the type of health, or in its positive aspect when considered as an act of vital resistance against noxious agents or influences which unduly disturb the equilibrium of the nervous system. And life, whether healthy or diseased, is, as has been shown, plainly threefold in its nature.

It has three essential characteristics, and these three agree in one; for each implies the existence of the other two. Where there is nervous equilibrium there is sufficiency of working power and regularity of function; and where any of these three essentials is removed, there must finally be established in the body, the triple aberration from the healthy type which we denominate disease. It does not appear to be according to true science to regard life as an active principle, but rather as a condition. It is 'the dynamic condition of the organism in the balance of a threefold manifestation.' Illness is the aberration (in however slight a degree) from that triune type; and Disease, when confirmed, is the establishment in the body of an evil Trinity of disorder, consisting of lowered vitality, mal-distribution of power, and irregularity of function.

In opposition to the views here brought forward it may perhaps be urged that too great prominence is given to the nervous system; the very existence of disease being made to depend on the perversion, diminution, or exaggeration, so to speak, of some natural process, wrought by and through nervous agency, as, at all events, the principal channel of morbid phenomena. I fully accept this way of stating the case; and am prepared to prove, whenever called upon to do so, that, with the exception of parasitical affections, all known complaints have the character I have assigned to them: and even this exception is only made out of deference to established modes of speech and thought, rather than to strict inductive reasoning; for, both in medical works and popular language, we are accustomed to speak of the causes of disease as though they were themselves the morbid action to which they give rise.

Another and more serious objection is, that the view here advocated does not accord with the analogy

drawn from the known characteristics of vegetable life. And at first sight the discrepancy appears to be very considerable. However, on looking more closely at the question, it would seem that we are not called on to demonstrate the existence of a nervous system in vegetables; but simply to show that disease in them, as in animals, depends first on alterations of vital power previous to its local appearance, and that in the vegetable machine as well as in the animal, that power must be (in order to the maintenance of perfect health) *sufficient in amount, equable in distribution, and supplied with reasonable regularity to all its parts*. This, I think, is capable of demonstration: and first let us observe the periodic ascent of the sap; some plants being annual, some biennial, some triennial, and some perennial. The American aloe is said to flower but once in half a century; yet its chronometry is not less essential to its nature than that of the daisy, which opens or closes its petals according to the dawn or twilight.

Observe, too, that the health of a plant requires that the sap should be equably supplied to every part, as well as with regularity; and that, if it does not get sufficient heat from the sun's rays, propulsive power will be insufficient. How necessary, too, is the influence of light and air! Every gardener knows that he cannot have a large crop of gooseberries unless he prunes out the young shoots which crowd the centre of the shrubs, so that the actinic and calorific rays may equally penetrate to every part. He does not plant his strawberries in the shade, nor does he manure them highly; knowing that in these cases the vitality of the plant would be unduly directed to the leaves; but he places them in loamy soil, upon a sunny bank; and in due time finds that the vital force has been principally expended in fruit-bearing. He also knows how to produce an

improved quality of peaches by reducing the number of branches—a principle which is extensively applied in the vineyards of Northern Europe, where the vines are never allowed to exceed the size of a large raspberry bush; whilst his finest roses are from ugly grafts into the common hardy briar, and which are only allowed to expend their vital power in producing a dozen large flowers at the most.

When an injury is inflicted on a plant it cannot give any outward manifestation of sensibility, except in one or two instances to which I shall presently allude; but it nevertheless exhibits all the phenomena of vital resistance in the most unmistakable way. The ink with which this paper is written owes its existence to the gall-nuts formed by the oak, when the eggs of the gall-fly were deposited in the bark of its tender shoots; and the leaves of the currant and sycamore may be seen every year crumpled and puckered up, as if shrinking from the devastations of their numerous parasites. Various warty excrescences and irregular growths are common upon the elm and other trees, and furnish remarkable examples of mal-distribution of the vital power. It would be easy to multiply examples of action in the vegetable kingdom, which closely simulate the sensibility of animals, but a few out of many will suffice. The poet Moore in one of his beautiful melodies says,

‘The Sunflower turns to her god when he sets
The same look which she turned when he rose,’—

and every flower of the valley and every tree of the forest shows the most extraordinary impulse to turn towards the light. Other instances of the same tendency may be observed in the vine and the hop-plant, which project their tendrils when an object is sufficiently near to be grasped, but reserve their vital force for something else, if it be too far off.

But the most remarkable examples of all are furnished by the following account of experiments on plants with a current of electricity, as described in the *Intellectual Observer*, Sept. 21, 1867: 'We selected four plants (of the *mimosa sensitiva*) perfectly developed and so sensitive that the slightest contact, such as the friction of a fly's wing, caused their leaves to shut up and the petioles (leaf-stalks) to droop along their stems. Placing the pots containing these plants on an insulating stand, we attached to the two ends of these stems a small copper wire in order to pass through them the current from a single Bunsen's cell. After a few seconds, when the plants reopened their leaves and erected their petioles, we caused the current to traverse them; but the leaves did not fold up, the petioles did not fall, and the plants seemed insensible to the electric action. We then varied the experiment, and instead of employing the direct current of the battery we used an induced current obtained by the aid of a very small Ruhmkorff's coil. The results were then quite different; scarcely had the current commenced when the leaflets began to fold together, and the leaf-stalks drooped down along the stems. These movements were quickly propagated from one end to the other of the plants. According to this experiment plants are sensible to electric disturbances, and behave under such conditions like animals.

'We then wished to see whether the application of the electricity for a longer or shorter time would give rise to any special phenomena, and we exposed three of the plants to electric action for varying periods. The first plant received the current from the Ruhmkorff coil for five minutes, and was then left to itself. For more than a quarter of an hour it remained in a state of prostration, but gradually its leaflets reopened, the leaf-stems lifted themselves up, and in about

an hour it resumed its natural appearance, and seemed none the worse for the shocks which it had received. A second plant was similarly treated for ten minutes and then left alone. The state of prostration in this case lasted for an hour, and it was not till the expiration of that time that the leaflets began to open and the leaf-stalks to rise, and these movements seemed to be accomplished with greater difficulty than in the preceding case. The plant was evidently *fatigued*, and did not fully recover for two hours and a half. The third plant was electrified for twenty-five minutes and then left to itself. In this case we waited in vain for its restoration. The prolonged electric action had destroyed its irritability and even its life, for the next day we found it withered and blackened as if struck by lightning. The fourth plant was reserved for an experiment which proves that electric disturbance acts upon plants as it does upon animals. It is known that man and other animals exposed to the anæsthetic action of ether, become insensible to induction currents, even when strong. We desired to ascertain if it was the same with the sensitive plant. With this object in view we placed a plant under a bellglass with two openings through which two copper wires could convey the electric current to it. A few drops of ether were sprinkled in the glass, and in a short time the plant experienced the anæsthetic action of that substance, for when shaken it did not close its leaves or manifest any sensibility. In this state we passed the induction current through it, but it gave no sign of sensitiveness. The petioles remained straight, and the leaflets continued open.'

These experiments appear to prove that in plants, as in animals, the vital force is *indefinite in quantity, varying in amount with the conditions under which they are placed*; and we have seen that anything which

checks its evolution, alters its distribution, or deranges its chronicity, must (if carried beyond a reasonable extent) diminish the vitality of vegetable as well as animal organisms. It is true that in both plants and animals considerable alteration of function and normal condition may take place without amounting to disease; but, in either case, when a marked deficiency, mal-distribution or irregularity in the vital power can be recorded, we have a condition which will soon be followed by structural derangement.

It may be, and indeed is, true, that 'the life of the flesh is in the blood;' but it is also true that there is no animal without a nervous system, whether the same can be demonstrated or not; whilst, without a circulating one, there are myriads. In the animal, at all events, *it is the nervous system* which constitutes the *unity of the organism*, and which makes it literally true that, 'if one member suffer, every member suffers with it.' Paley is said to have learned anatomy in order to write his book on Natural Theology; but he only entered on the threshold of the subject; and there is yet room for many volumes on the wisdom and beneficence displayed in the constitution of the nervous system! The author believes that the foregoing view of the types of Life, both in its healthy and diseased condition, will be found to afford a reasonable explanation of a vast number of phenomena in which the speculations of science have hitherto been confessedly at fault; and that, ere long, it will be universally admitted that disease can only be removed by measures which increase vitality, restore nervous equilibrium, or regulate periodic action.

APPENDIX VI.

THE THREEFOLD NATURE OF HEALTH AND DISEASE; OR, FIRST LINES OF NEURODYNAMIC MEDICINE.

(March, 1866.)

‘It is in the nerves that the mobility of the organic forces, without motion of the ponderable masses, is most manifest: their operation is necessary for the functions of the body, since all parts of the system, through the medium of changes produced in the nerves, react on the brain and spinal marrow, and receive from these organs certain influences necessary for their peculiar actions.’ . . . ‘I am far from believing that the power of chemical action, which the glandular substance owes to its vital condition, has not as equally an important a share as the nervous influence in the process of secretion; but it is probable that the influence of the nerves is necessary for the support of this chemical action, which in each gland is different.’—MÜLLER’S *Physiology*, pp. 52 and 517.

THE usage of the same word to express different ideas is, according to Locke, a very fertile source of human error; and it is quite possible that one of the chief difficulties which attach to the study of Biology arises from this very source; for we find that the word ‘Life’ is popularly used to signify not only the act of living, but the capacity for or capability of living, so that, in order to be scientific and at the same time intelligible when dealing with this subject, it is necessary either to speak of two kinds of life, viz. active and passive, or to make the word ‘Life’ synonymous with vital activity, and to include under the general head of Vitality (or capability of being made alive) the inactive condition of seeds, eggs, frozen batrachia, and animals whose animation has been suspended.

That there is such a thing as vital force is generally admitted (though some have been sufficiently eccentric to deny even this), but there is the most widespread confusion of ideas made apparent when the question

is asked 'from whence does it come?' One answers 'from the vital principle!' Another, that 'it is electricity;' a third, that 'it is heat;' and a fourth, that 'it is chemical action.' All of these answers, however, are most unsatisfactory. On the first supposition, how are we to explain the phenomenon of suspended animation?

May it not be asked, in such a case, has the vital principle been first annihilated and then brought back again? And we observe, moreover, in some of the lower animals (as the hydra, the earth-worm, or any common winged insect) that life may continue for a long time after the body has been cut in two, or when decapitated. Nay, in either of the first cases we observe that two animals are the result of the division: but it would be absurd to speak of the vital principle as having been cut into two portions.

Various definitions of life have, from time to time, been proposed, but none hitherto accepted; doubtless because they all express either too much or too little. Some of them are absurdly long, and, without detailed explanation, absolutely unintelligible. Indeed, so utterly useless and pedantic are some of them, that it would not surprise me if one who had some conception of the nature of life before hearing them should regard the subject as absolutely incomprehensible after having heard them. It is not my intention to add to the number of those already in existence. It may be sufficient to observe that it must be difficult indeed to understand the nature of 'a thing' which turns out not to be 'a thing' at all! And this must be the case with respect to life, whether we regard it as a condition of the organism, or as a series of phenomena. There is perhaps quite as much difficulty in clearing our minds of false conceptions and preconceived notions respecting familiar occurrences

as there is in arriving at true scientific ideas concerning them.

To say (as has been maintained by a very eminent physician) that life is 'reproduction,' is to ignore its existence whenever it does not attain to that function. To say that it is 'renewal' is to ignore life in morbid conditions when no renewal takes place. Indeed, the talented gentleman who maintains this doctrine, calls his book 'The Renewal of Life.' Truly this is a more hopeless problem than that of seasoning salt which has lost its saltness; for, if renewal needs renewal, wherewith shall it be renewed? Neither is it correct to say that life is 'waste,' nor 'nutrition' (as has also been said), nor any one function alone, nor yet all the functions taken together; for this would be equivalent to saying that unless they all are simultaneously in action there is no life. Perhaps Mr. G. H. Lewes's short definition, 'The dynamical condition of the organism,' will answer practical purposes as well as those more highly elaborated ones which speak of 'composition and decomposition both general and continuous, &c.' The main point to be understood is, that when we speak of life we imply the existence of a special organism, in which there is generated and distributed a certain force to which physiologists have given the name of nervous or vital force, on account of the peculiar circumstances under which its manifestations take place.

It is surely a reasonable supposition that whenever action of any kind takes place it is effected by the expenditure of force or power of some kind or other; and that when we observe that a particular kind of force 'ebbs and flows,' as it were, in respect of quantity, the source from which it comes cannot be uniform, and must itself be susceptible of variations.

It may not be easy to establish the connection

between the affinities that bind together the elements of the food which nourishes our bodies and the forces by which we think, and feel, and move; but it is certain that such affinities represent real force rendered static by combination with matter, and that it must take some new form when the connection is dissolved. Observation proves that such connection is dissolved in the body; that matter sinks in the scale of organisation when any tissue is disintegrated, and that force is thus liberated and takes a new direction. Contrariwise, when flesh and blood are in process of formation, an extra quantum of force is required for combination with matter already organised, to raise it still higher in the scale of organisation, and thus store up in the body a reservoir, so to speak, of power in a condition of static equilibrium.

If this view be correct, a small amount of tissue, highly organised, really requires for its elaboration a large quantity of food, or less complex organic matter; and nervous tissue, in particular, cannot be formed without the previous disintegration of a very large quantity of ordinary aliment, and the rendering latent or static of a considerable amount of force previously uncombined.

How matter can be combined with force, or separated from it under nervous influence, we do not know, perhaps we never shall know; but it is not, after all, one whit more inexplicable than the laws of electrolysis or the combinations effected between certain gases under the influence of light, heat, or electricity.

If we take a general survey of the animal and vegetable kingdoms, we observe one grand distinction, which (whatever the apparent exceptions) may be considered as being universal—viz.: Every animal has one or more ganglia with nervous filaments

attached, or something which may be called a nervous system (though this cannot always be visibly demonstrated); whilst no vegetable has true sensation or voluntary motion. This is the first great truth in physiology; and the second, in the order of importance, is that it is by and through this nervous system that life exists as a presiding unity in any animal.

The blood has two great offices in the body. It is 'the life of the flesh,' or the pabulum from which the tissues are directly formed, and it is also, in a certain sense, the death of the flesh, the *cloaca maxima* into which the living tissues eject their effete particles before they can be taken up by those special emunctories whose function it is to thrust them out of the body. This is the reason why blood so rapidly putrefies, and why all wise legislators have endeavoured to discourage its use as human food, especially in time of pestilence.

The blood has a life peculiarly its own, and so has each organ of the body; and innumerable observations and experiments show us the life of the organs continuing after animal life, properly so called, is extinct. A human head separated from the body (as has, not long ago, been shown in the case of a French criminal) will contort its muscles, wink its eyes, and exhibit various emotions for one or two hours after life, as a unity, is extinct. The temperature will sometimes rise, and the hair and nails grow most perceptibly on human bodies for some time after death, whilst in some of the lower animals the heart will actually continue to beat for a considerable time after it has been removed from its anatomical relations.

All this, however, only proves that although there is sympathy and subordination of function throughout the nervous system, yet each organ may obtain a supply of vital force from the nervous tissue in its

own vicinity, and can thus act independently under peculiar circumstances. Besides this, there is the well-established fact that ordinary nerves are more than mere conductors, and can themselves generate or evolve nervous force so long as they continue to receive their own proper nourishment—*vide* G. H. Lewes's 'Physiology,' vol. ii. p. 17.

In the ganglionic or sympathetic system we see a unity of organic life independent of the power of volition or consciousness properly so called; yet supplying to each organ an amount of nerve-force varying with its necessities, and performing automatically the complicated problem of how to increase or diminish the generation of vital force as required, and how to give to every organ exactly what it requires at the time, without robbing the others of their usual and necessary supply. But not only is nervous force the great agent by means of which the functions of life are carried on, it is also the agent by which all morbid action goes on. If heat be abstracted from my body too rapidly, and in too great quantity, it will be sure to disturb the equilibrium of health in some way or other; but it will depend altogether on the way in which the nervous system reacts what disease will be produced. I may have, as a consequence, simple coryza, bronchitis, rheumatism, pneumonia, or even typhoid fever. But all these diseases are only manifestations of vital resistance against an abnormal abstraction of heat from the body faster than it could be generated. Some portion or portions of the body during that period must have received less than the amount of heat necessary for the due performance of their functions, and the fever set up by the nervous system is, at first, nothing more than an endeavour to counteract this deficiency. In like manner, all foreign bodies and medicinal substances produce cer-

tain reactions in the body, not so much by virtue of force which they bring into or communicate to it, as by giving a new direction to forces already existing in it, and which are lost or wasted in reacting against them.

That certain affinities may be brought into action by, or set free from chemical agents under the influence of nervous action, is true; but that medicines cannot act at all, except on living bodies, is also true; and moreover, the results which ensue on taking them into the stomach are evidently in many cases quite inexplicable on the hypothesis that all the force expended was contained in the comparatively small amount of drug actually employed. It is equally manifest that alcohol brings no force into the body which is sufficient to account for its effects; and it is well established that much of it leaves the body without having undergone any appreciable change in constitution. We must therefore suppose, that under the influence of vital stimuli, the nervous currents flow more rapidly, for a time at least, and are also liable to be altered in direction. An hypothesis which, if true, accounts for the fact that opposite effects are sometimes produced by the same drug when employed under apparently similar circumstances*.

* Physiologists seem to be divided in opinion as to whether the nervous centres exercise a controlling and restraining influence on the muscular system, or themselves generate and supply nervous force to the various tissues. Some facts and experiments seem to favour one view, and some another, while the truth probably lies between the extreme opinions. In either case the impression made by sedatives and stimuli is manifestly, in the first instance, on the nervous centres, and through their influence on the various organs and even the blood itself. In the words of Dr. Stevens—'The mind has an influence over the motion of the blood, and there are many reasons for believing that the nerves, like the electric fluid, can produce a sudden change in the quantity of the whole circulating current.'

This view of the case also accords with the well-known fact that any or all functions may be violently and continuously influenced by mental causes, or by the mechanical irritation of certain nerves, as may take place from fright, anger, or traumatic tetanus respectively. It is therefore much nearer to the truth to say that, when unassimilable substances are swallowed, the body expends a part of its force in acting upon them, than to say that they bring into it a modicum of force to assist in its operations.

Let us now see what analogy there is between the fundamental principles of physical science and the laws which govern the evolution and distribution of nervous energy in the human body.

We have already seen that life implies the existence, or rather the evolution, of a certain force in a continuous manner, yet is not itself that force whose existence it implies; it is rather that state or condition of the organism which is characterised by the operation of nervous force or energy, whatever be the function performed, and whether connected or unconnected with a state of consciousness or volition. Upon what then does healthy life depend, and what are its primary characteristics?

Let us take the three elementary ideas of power, time, and proportion, and apply them to the formation of an analogy.

The human body is a complex piece of mechanism—a microcosm of marvellous arrangements. Man may imitate some of the simpler contrivances which he finds in it, but in the more complex ones he can only clumsily imitate and follow slowly in the wake. ‘*Proximus sed longo intervallo!*’

There are in the human body hinges that oil themselves,—a steam-engine (or more accurately a caloric engine) that regulates its own evolution of power,

and supplies itself with fuel,—a laboratory where wonders are performed that the chemist cannot imitate, and a system of telegraphic communication which needs no superintendence, does not go out of order, and will in many instances continue working without intermission for threescore years, or even much longer, if not placed in conditions which are totally opposed to the principles of its construction.

These analogies have probably been thought of before, but it does seem strange that no one heretofore has suggested the essentials of almost all complicated machinery as finding their best exponent or illustration in the living body. In a clock, a telegraph, a mill, or a steam-engine, the first thing sought for and required is a sufficiency of working power. But power alone is not enough; if it be badly distributed the machinery will soon come to a stand-still. The second essential is, therefore, proportionate distribution of power. Thirdly, it is necessary that the power upon which the movements of a machine depend should be supplied with regularity, and not in sudden gushes, followed by comparative inactivity. This would be, at once to stop the work and to injure the machinery, if continued beyond a certain length of time. In the case of a living creature this regularity in the supply of force to each organ, and the consequent regularity of function which it produces, we shall call organic chronicity.

Here, therefore, we have in the primary essentials of machinery the ultimate characteristics of healthy life; and, in order to get a clear conception of the nature of disease, it is only necessary to suppose that one or more of them is absent: for, as darkness is best described as the absence of light, so disease is most philosophically regarded in its negative aspect. To put the idea into plain ordinary language, which

everybody can understand, disease is not itself something which has got into the body, and must be expelled from it, but rather a loss of balance in the nervous system, depending upon or accompanied by insufficiency in the amount of nervous force generated within a given time, and irregularity in its intervals of action and repose.

Although it is quite true that substances which cause disease often accumulate in the body, or are ingested from without; yet morbid action itself is generally either the effort of nature to expel noxious substances, or may be regarded as vital resistance against changes calculated to derange the organism; and, being unattended by the necessary conditions of renewal, must be directly productive of lowered vitality, and its natural consequences, irregularity of function, and loss of balance in the distribution of nervous energy.

Thus we arrive at one universal type of all disease, by whatever name it may be called, or how varied soever the symptoms by which it may be attended. The type of health is also threefold, as we have seen, having three manifestations perfectly distinct, yet really inseparable, so that each may be said to imply the existence of the other two. Thus, when there is nervous equilibrium, or proportionate distribution of nervous force, we may assume, *a priori*, that there is a sufficiency of vital power, and regularity in the periodic time of the functions; and, *mutatis mutandis*, when the organic chronicity is perfect we may be quite sure that sufficient vital force is evolved, and that every part of the body receives a due share of its influence.

In disease, on the other hand, we do observe local want of regularity before its effect upon the system at large has become perceptible, and in some cases we

can distinctly trace both functional irregularity and diminished working power to a faulty distribution of nervous energy, arising from excessive mental labour, or the influence of the various passions. But, when fully established, in every case of disease there are three primary conditions or essential characteristics, and these three are indissolubly and inseparably connected with each other!

It is the province of great truths to harmonize and to explain those minor ones with which they may be brought into contact, whilst false generalizations, on the contrary, are immediately detected by their incompatibility with numerous observed facts, or are soon exposed by their manifest inconsistency with the progress of knowledge. So many indeed have been the fine theories which have been confidently brought forward, and then abandoned for ever as altogether useless and untenable, that it has become the fashion to decry everything but observation; and the limited experience of individuals is actually represented as more trustworthy than the accumulated records of two thousand years.

Great, however, as are the advantages of experience, and valuable as is the registration of experiments, it is evident that without a foundation there can be no lasting superstructure, and that no use can be made of the most valuable treasures if buried under a weight of superincumbent rubbish, and thoroughly intermixed with useless lumber. We have already seen by referring to first principles, that the very highest condition of life, the most vigorous development of health, is that state in which the death of the particles of the body is most rapid and continuous; for the very force which we make use of in willing, reasoning, and perceiving, is primarily derived from the chemical union of the tissues with oxygen, which has been

compared by Baron Liebig to the falling weight by which the works of a clock are kept in motion.

We know indeed that chemical action is modified by nervous influence, and that vital force, heat, and electricity may be generated as a result of chemical action within the body; but we cannot tell the exact manner in which the vital force is produced. All we know is that the force which lifts high into the air the ponderous branches of a mighty oak was not contained in an acorn, and that, in like manner, the various forces which are generated within the bodies of animals previously existed in the form of chemical affinity between the elements of the food and drink made use of, and the gases ingested through the lungs and skin. So that we may consider it as certain that there is no internal source of power within any living organism, and that the vital force is correlated with (although quite distinct from) the other forces of nature. Those who wish to investigate more thoroughly this interesting subject, would do well to study what has been written upon it by Professors Carpenter, Draper, Le Conte, and other physiologists, whose researches have made it abundantly evident that the body derives its working power altogether from without, and that both bodily and mental processes are correlated with the natural agencies of light, heat, electricity, chemical affinity, mechanical force, and perhaps even gravitation. The works of Rumford, Grove, and Faraday have also done much to expand our ideas upon this subject. Upon the practical application of these truths not only volumes but libraries might be written; for none of the discoveries of Newton has so wide an application as the doctrine of 'The Conservation of Force,' nor has the mind of man ever conceived a grander idea in connection with external nature than this, that not only has no particle

of matter ever been destroyed, but no force has been lost since the creation of the world !

One practical consequence of the reception of the above truths must be the bestowal of greater attention upon physical agencies as modifiers of the functions of the human body in health and disease. The effects of temperature and friction, in connection with animal electricity, will be more studied and better appreciated ; and, above all, the nervous system will be recognised as the indispensable medium of vital action, whether normal or otherwise, of all pathological change, and of the operation of all remedies properly so called, whatever may be the tissue which has been altered, or whatever the nature of the remedy or the manner of its operation !

Finally, it may perhaps be of use to have a recognised formula which enables us to realize, under all its phases, the essential nature and unity of morbid action, with its diminution of aggregate power, its loss of nervous equilibrium, and its alteration of functional chronicity. Such knowledge, indeed, will not make a physician, but when it becomes general it must save many lives, by exposing the empiricism of all exhaustive or heroic medication, and by producing a greater respect for the operations of nature !

CONCLUSION.

THE reader who wishes to trace the course of subsequent opinion on the practical application of the doctrines advanced in the foregoing pages, is respectfully invited to compare them with the following, viz. :—

1. 'Two Essays towards a New Law of Healing.' *London Medical Review*, October and November, 1862.

2. 'Article on the Theory of Vitality.' *British and Foreign Medico-Chirurgical Review*, October, 1863. Pp. 400.

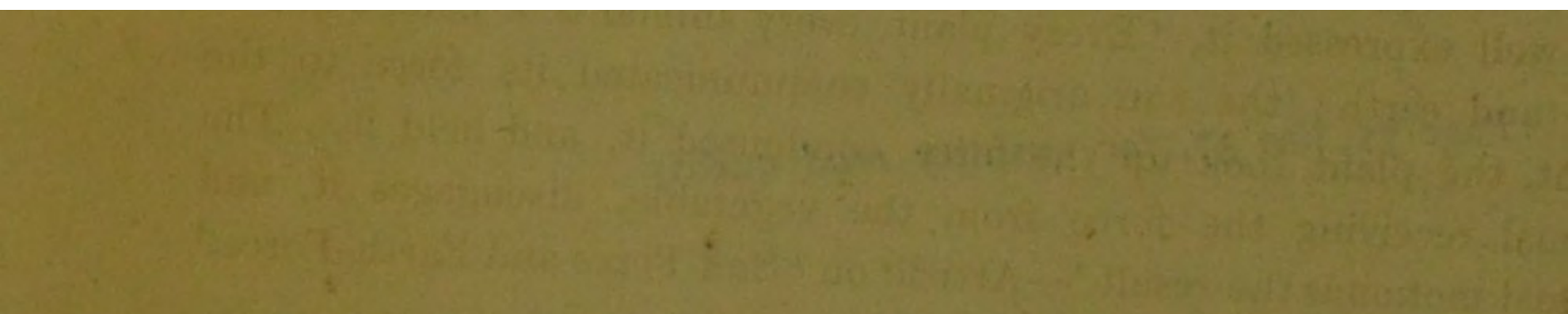
3. Dr. J. Chapman on the 'Treatment of Various Diseases, through the agency of the Nervous System.' 1863-6 and 1868.

4. Dr. Bence Jones on 'Force and Matter.' (Croonian Lectures.) May, 1868.

And,

5. 'Remarks on Malaria.' By Staff Assistant-Surgeon William Hensman. (Army Medical Department Blue Book.) December, 1868.

Page 71, line 37, *for* quantity *read* quality.



NOTES.

NOTE A, page 15.

Buffon went nearly as far when he said, 'All the powers of nature with which we are conversant are reducible to two,—that which causes heat, and that which causes weight;' or, as Dr. W. B. Richardson has well expressed it, 'Every plant, every animal is a compound of sun and earth: the sun originally communicated its force to the plant, the plant took up the force, condensed it, and held it. The animal receiving the force from the vegetable, disengages it, and animal motion is the result.'—Article on 'Sun-Force and Earth-Force.' *Popular Science Review*, vol. v. 1866.

NOTE B, page 15.

Dr. Bence Jones, in his lecture on 'Force and Matter,' published in the *British Medical Journal*, 16th May, 1868, declares (p. 472, second column) that 'The doctrine of the conservation of energy and the inseparability of matter and force will lead to *an entire change*, not only in physiology and pathology, but also *in that most practical part of medicine, therapeutics.*'

The reader is requested to compare the paragraph containing this statement with the following pages of 'The Laws of Vital Force,' viz. 15, 16, 21, 26, 28, 50, 51, 52, and 72. The Author, however, begs to say that the 'Theory of Vital Force' will not be affected by either the truth or falsehood of the doctrine of the 'inseparability of matter and force.'

NOTE C, page 31.

Professor Piorry, who has made use of douches for the cure of intermittent fever, and the subsequent enlargement of the spleen to which it gives rise, thus writes to Mons. Fleury :—

‘ 12 Février, 1854.

‘ MON CHER CONFRÈRE ET AMI,—Je n’ai d’autres faits relatifs à l’influence qu’exercent les douches froides sur le volume du foie et de la rate que ceux que vous connaissez et dont je vous ai parlé. Il s’agit de cinq ou six malades chez lesquels, pendant la dernière année de mon service à la Pitié et en été, j’ai eu recours à ce moyen, alors que la température de l’atmosphère le permettait. Ainsi que vous, j’ai vu, sous l’influence de cette médication, la rate diminuer très-promptement de volume, et cela tout aussitôt que la courant d’eau était porté sur cet organe. Quand cet effet était produit, la fièvre diminuait ou disparaissait. C’était presque comme si l’on eût donné du sel marin ou du sulfate de quinine, dont l’action n’est pas plus prompte, &c.

‘ (Signé) PIORRY.

‘ À Monsieur le Dr. FLEURY, Bellevue.’

NOTE D, page 32.

‘ Brugnatelli (1797) believed that the phosphorescence of the lam-pyridæ was due to a peculiar physiological act, by which these insects separated light from their food. In modern phraseology this opinion amounts to the hypothesis of organic assimilation, by which the nutritive act stores up certain elements of food capable of evolving with each metamorphic change, the original forces of light and heat by which they were produced. This philosopher certainly foreshadows the doctrine of half a century later, which we have formularized in the term “correlated force.” The remarkable analogy between this insect light and electric light has occurred to many naturalists. The anatomy of the electric organs in fishes corresponds in all essential points with that of the light-producing organs of insects. A congeries of cells containing semi-fluid albuminous matter, with an abundant distribution of nerves, and an appreciable metamorphosis of tissue, are characters common to both. In one organ the electric shock especially affects nerve and muscle of those who place themselves in contact with it. In the other, light is produced (which is not sensible heat). Both functions are periodical, correlative, and exhaustive.—Dr. H. Fripp ‘On the Light-Emitting Apparatus of the Glow-Worm.’ 1866. *Popular Science Review*, vol. v. p. 323.

NOTE E, p. 37.

The reader should study in connection with this aspect of the subject Professor Bain's lecture on the 'Correlation of Force in its bearing on Mind,' delivered in 1866 at the Royal Institution.

NOTE F, p. 37.

'An animal is an apparatus of combustion; possesses the faculty of locomotion; burns carbon, hydrogen, ammonium; exhales carbonic acid, water, oxide of ammonium, azote; consumes oxygen, neutral azotised matters, fatty matters, sugars, gums; produces heat, electricity; *restores its elements to the air or to the earth*; transforms organized matters into *mineral matters*.'—'Chemical and Physiological Balance of Organic Nature,' by Dumas and Boussingault.

NOTE G, p. 38.

An Appeal to Physiologists and the Press. By H. FREKE, A.B., M.D., T.C.D., &c. Dublin: Fannin & Co. 1862.

'We have not space for such a complete statement of Dr. Freke's views as we should have wished to lay before our readers, but we shall first give a passage from Mr. Darwin's "Origin of Species," which, according to the *Quarterly Review* (p. 226), contains "the theory which pervades the whole volume," and afterwards quote its pre-statement by Dr. Freke, viz., "Analogy would lead to the belief that all animals and plants have descended from some one prototype. . . . Therefore I should infer from analogy that probably all the organic beings which have ever lived upon this earth, have descended from some one primordial form into which life was first breathed by the Creator (p. 484). Mr. Darwin's work was published in 1860, whilst Dr. Freke's communication to the *Dublin Medical Press* is dated 1851, vol. 26, pp. 322 to 325, from which latter we select the following passage, which clearly contains the very same doctrine, on account of which Dr. Darwin has obtained so much praise from one party, and so much blame from the other, viz.—1. "A chain of microscopically minute organisms (or organising agents) gradually ascending in the scale of organisation, appears to me to have been

originally created. The entire of these organisms collectively (from the extreme minuteness of each granule, and from their number being probably limited)—the entire of these organisms, I say, collectively, might possibly, as I conceive, if united, have been comprised within the compass of a *granule of very inconsiderable dimensions*. 2. To this granule (or granules), being, as I conceive, the origin or source of the generation of all subsequent organisation, I would give the name *embryo of organic creation*; and the function of this embryo was, as it appears to me, to *organise* what hitherto had been unorganised matter—in a word, to generate an animate or organised world out of inanimate or unorganised creation.” The idea contained in this passage is repeated over and over again by Dr. Freke, so that it is quite inconceivable that either Mr. Darwin, or his followers who affirm that we are all descended from monkeys, can be unaware of the fact that his theory has been anticipated by a writer whose name they have most disingenuously suppressed. As for the worth of the views, that is quite another matter. We believe them to be as unsound philosophically as they are manifestly contrary to Holy Writ; notwithstanding Dr. Freke’s assurance in his preface to his work on the “Origin of Species,” that “nothing is advanced in this publication that is not perfectly in harmony with the Mosaic record of creation.” We might say more on this subject, but the whole tendency of the doctrine has been so ably set forth in a series of papers published in the “Transactions of the Victoria Institute” (9, Conduit Street, London), that we think Dr. Freke will be disposed, after their perusal, to disconnect his name from the doctrine which he has originated.’—*Hydropathic Record*.

NOTE H, p. 39.

According to Dr. Chapman, this proportionate distribution of power leads to a corresponding ‘balance or relative adjustment of two opposing forces,’ regulating the blood-supply of every portion of the body, and depending physiologically on nerve-currents from the cerebro-spinal and sympathetic systems respectively; the activity of the former increasing, and that of the latter diminishing the calibre of the arteries and their minute capillaries.

NOTE I, p. 39.

‘In the application of exact science to physiology, I look for the rise of that great and noble practice of medicine which, in a future age, will rival in precision the mechanical engineering of my times.’—Professor Draper, University of New York. 1858.

NOTE K, p. 46.

This proposition has been objected to by Dr. T. Inman, who says, ‘I do not see how we can divide an individual into parts, like school-boys are classed into forms, and say the success of the whole of the lot depends on the biggest boys learning their lessons well.’ Answer in *Medical Mirror*, 1st Feb. 1868, viz. :—

‘Here, I presume, the nervous system is the *biggest* boy, and I thank Dr. Inman for the admission. It has been well said by a distinguished professor, that “without a nervous system there is no animal—there can be none; without a circulating one there are myriads.” But he thinks I put this biggest boy in place of all the rest; and says that “the remaining eleven propositions will not be weakened by throwing No. 1 overboard.” Now I submit that proposition 1 only says that the nervous system *is the biggest boy*, which he himself admits. He further refers to the analogy of vegetables, which he remarks have no nervous system, and yet become diseased. He also adduces the case of parasitical affections, which I have specially excepted,’ &c.

Vide ‘The Threefold Nature of Life,’ p. 62; also Mons. Blondeau’s ‘Experiments on the Germination of Seeds,’ *Medical Mirror*, February, 1868.

NOTE L, p. 47.

‘A hot-air chamber, to accommodate several patients at the same time, would be particularly useful. * * *

‘Great stress has been laid by the medical committee on the necessity for its existence. We press upon the governors the absolute need of most if not all of these baths.

‘No hospital can be considered properly equipped without a set of baths, which are not nearly so frequently used in the treatment of disease as they should be.’—*Lancet*, 13th Feb., 1869.

NOTE M, p. 48.

The oft-times conservative influence of morbid action, and the true relation of pathological anatomy to medicine, are thus admirably stated by Dr. Vidart of Divonne :—

‘ En effet, tout en reconnaissant l’importance de l’anatomie pathologique comme étude comparative des organes dans l’état sain et dans l’état morbide, nous devons dire aussi qu’on a voulu, de nos jours, lui faire une si large part que, l’élevant à la hauteur d’une doctrine médicale, on a prétendu lui faire dire le dernier mot sur les causes de toutes les maladies. Cette prétention absolue, qui conduit directement au matérialisme le plus grossier, peut produire les plus graves erreurs et amener les conséquences les plus facheuses. Ne doit-on même pas rester stupéfait quand on voit le premier corps savant de notre temps consacrer une douzaine de séances à discuter l’existence d’une cellule particulière du cancer ? Les partisans enthousiastes de cette fausse théorie, malheureusement trop répandue aujourd’hui, méconnaissent sans doute les phénomènes vitaux et les lois primordiales qui les dirigent ; ils ignorent que la médecine la plus vraie, la plus sûre, repose sur ce principe qu’il y a au sein de tous les êtres organisés une force vive que les anime et qui est à la fois formatrice, conservatrice, et médicatrice. Cette force active c’est la nature, c’est la force vitale. Que toute maladie est le combat de la nature contre une cause morbifique, qu’elle est le résultat de deux actions distinctes, savoir, d’une action morbide et d’une action médicatrice, d’une *action* morbide produite par une cause morbifique et constituant une affection, d’une action médicatrice organisée par la force vitale médicatrice et formant une *reaction* ; qu’enfin dans ses efforts de conservation, la nature réagit par l’élimination contre les causes morbifiques.’ — *Etudes Pratiques sur l’Hydrothérapie*. Cherbuliez. Paris et Geneve, 1855.

NOTE N, p. 48.

‘ Plants and animals may be regarded as organized water * * * There is no life upon the globe without water. Many of the lower forms of animal and vegetable life consist mainly of water.’ — Edwin Lankester, F.R.S. *Popular Science Review*, vol. iv. 1865.

NOTE O, p. 49.

‘It seems probable, therefore, that the poison accumulates in the blood until a certain culminating point is arrived at, when the equilibrium of the nervous system is overthrown, and the poison exerts its depressing influence. After that depression is past, and tranquillity restored, a certain intermission occurs, and the poison does not again display its power until, by reproduction, the explosive point is again reached, and the equilibrium of the nervous system again overthrown. * * *

‘Generally speaking, however, the extreme degree of nervous depression is not reached, but the second or hot stage supervenes, and nervous depression is masked by vascular excitement, and provoked into excitement and activity by the irritation of the impure blood acting upon the vaso-motor nerves, and through them upon the nervous centres of circulation—an admirable instance of the conservancy of nature, by which the impurities are the means of exciting their own removal, and the purification of the blood is hastened and restored.’—‘Remarks on Malaria,’ by Staff Assistant-Surgeon William Hensman. *Army Medical Department Blue-Book*, 1868.

NOTE P, p. 53.

‘Liebig and his followers, misled by a preconception of the simplicity of nature, assigned to nitrogenous food the duty of providing the force necessary for the production of muscular work, by supplying the waste of muscular tissue; while they supposed the farinaceous and fatty foods to provide the amount of animal heat required by the body.

‘The opponents of Liebig have fallen into the opposite error, and deny that nitrogenous food contributes any portion of the force employed in muscular work. The truth, as is usual, lies between the two extreme hypotheses, and we are now compelled to admit that a given development of force, expressed in animal heat, muscular work, and mental exertion, may be the effect of several, perhaps many, supposable supplies of digested food, farinaceous, saccharine, fatty, and albuminous.’—Rev. S. Haughton, F.R.S., on ‘The Relation of Food to Work done in the Body.’ August, 1868.

NOTE Q, p. 54.

'The profession of medicine is certainly peculiar in the liberty it extends to all free-thinkers. No one can commit a heresy in medicine; no matter how his views may vary from the expressed ones of his leaders, he has only to support them with sound reasoning, careful judgment, and reliable experience, and they soon recommend themselves to countenance and adoption. Every medical man has a presumptive right to differ from another in opinion, and view any particular case in accordance with his own judgment.'—*New York Medical Record*.

NOTE R, p. 55.

The Author wishes here to convey the idea that organization is 'design' in actual manifestation; and that the constitution of nature is so ordered that it can produce its like or impress its type on surrounding materials, under certain fixed conditions. And he differs widely from the doctrine which has just been propounded by Professor Huxley (in his article 'On the Physical Basis of Life'), to wit, that 'all vital action may be said to be the result of the molecular forces of the protoplasm which displays it,' and that the thoughts to which he now gives utterance 'are the expression of molecular changes in that matter of life which is the source of our other vital phenomena.' It is to be feared that the philosophy which dispenses with the necessity for a God, and can see no design in the universal harmony of nature, is calculated to do irreparable injury to many minds, unless the difficulties which are continually raised are boldly grappled with, by those who are competent to do so, in the spirit of generous candour and truthful earnestness.

NOTE S, p. 55.

The celebrated John Hunter was a strenuous advocate of what is now called 'the Mosaic view' of this physiological question; and since his time (notwithstanding that it has been called in question) the doctrine still holds its ground that the blood is not only the materia out of which the tissues are formed, but is also 'the seat of almost all the chemical changes which develope force in the living body.'

NOTE T, p. 56.

‘Yea, the very breath of man’s life consisteth of a trinity of vapours,

And the noonday light is a compound,

The triune shadow of Jehovah.’—TUPPER.

Although the life of man does not consist of a ‘trinity of vapours,’ it is, like light, capable of affording an analogy which may be used to illustrate revealed truth. But all such illustrations are necessarily in the highest degree imperfect.

A Few Opinions of the Press on the First Edition.

‘The Theory of Vital Force,’ applied to the Practice of Medicine, and ‘The Threefold Nature of Health and Disease.’ JOHN CHURCHILL, New Burlington Street.*

‘Both of these valuable essays were written by E. Haughton, A.B., M.D., &c., the author of “Uses and Abuses of the Turkish Bath,” &c., the first-named being a reprint of a paper contributed by that gentleman to the *London Medical Review*. Mr. Haughton’s views are not those held by the faculty generally, but he reasons cogently, and only asks for a fair hearing while he openly expresses his honest convictions. None but the most bigoted will object to this, and these he need not fear.’—*Public Opinion*, 27th July, 1867.

‘Never has book received a more attentive perusal, never has graver consideration been given to a subject, than we have bestowed upon this little essay. The very style of its subject-matter, the ability with which it is written, the anxiety the author shows to throw light on a matter so intimately connected with the treatment of disease as is the vital force—its attractive name, “The True Basis of Medical Science”—all conspired to make us, if possible, additionally anxious to do justice to this treatise. * * *

* The latter is sold separately by Messrs. Churchill, and in Malvern, price 6d.

‘Those who have the gratification to read Dr. Haughton’s metaphysical little pamphlet (for its perusal is not by any means without pleasure), will be surprised at the strange mixture it contains. We have, however, no intention of following the accomplished writer (for accomplished in writing he is) through the fanciful and indeed contradictory propositions he puts forth, many of them altogether incompatible with the usual theories held even by hydropaths; the author, for instance, *appearing* to hold that the beneficial effects of baths do not arise from their action on the skin, but on the nervous system; and that all tonic medicines given to improve the appetite produce debility. * * *

‘Here follow twelve axioms (as Dr. Haughton calls them), which we have not room to quote, and some of which may possibly be taken for what they profess to be, by persons not habituated to metaphysical discussion; but, far from looking at them as representing “Eternal Truths,” *we* doubt they will stand a much shorter test, and *believe they are already in considerable jeopardy.*’—*Dublin Medical Press*, 26th November, 1862.

‘The author of this work will have rendered an essential service to medical science, and have conferred a great benefit on mankind generally, should the principles which he has so clearly enunciated be generally adopted by the medical profession.’—*Christian Herald*, 23d October, 1862.

‘This is a cleverly-written pamphlet from the pen of the accomplished author of the “Uses and Abuses of the Turkish Bath.”

‘It is written with a degree of clearness and candour much to be admired, and gives, as well as the above noticed, an immense amount of information in a very convenient compass. They are such books as Johnson so much admired—books that you might read comfortably at the fireside—to which we will add, books that might, without inconvenience, be carried in the pocket, and taken out whilst waiting for a train, or for the audience of a great man, or under any circumstances, or in any place where ten minutes, which would otherwise be inevitably lost, might be profitably spent.’—*Irish Times*, 21st August, 1863.