On the aims and philosophic method of pathological research : an inaugural address delivered at St. Thomas's Hospital, December 15th, 1847 / by John Simon.

ON THE

AIMS AND PHILOSOPHIC METHOD

OF

PATHOLOGICAL RESEARCH:

AN INAUGURAL ADDRESS

DELIVERED AT

ST. THOMAS'S HOSPITAL,

DECEMBER 15TH, 1847,

BY

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FORMERLY OF KING'S COLLEGE, LONDON.

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TO

RICHARD BAGGALLAY, ESQ.,

Treasurer of St. Thomas's Hospital,

ETC. ETC. ETC.

THE FOLLOWING ADDRESS,

PUBLISHED AT HIS DESIRE,

IS

BY HIS PERMISSION

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PREFACE.

THE following Address requires, perhaps, some few words of explanation.

The Governors of St. Thomas's Hospital having recently established in their School a Chair of Pathology in connexion with Surgical Practice; and the conjoint pathological and clinical duties of this office having been assigned to the Author; he was invited, on occasion of a large meeting of the friends of the school, to say something introductory to his teaching. The ensuing pages contain what he said, with slight correction, and with the insertion of one or two additional paragraphs.

No one can feel more entirely than the Author, that what is composed for oral delivery seldom bears printing,—seldom possesses that completeness and coherence of material, which the canons of criticism require in works written for leisurely perusal; and this, of course, least of all, where the occasion and circumstances of address happen, in many respects, to be of local interest only.

To this general rule, he is fully conscious that the present publication can prove no exception. But he has been induced to lay his Address before the Profession, by the hope that some of its material may operate usefully beyond the limits of his original Audience, and may awaken a wider interest in the aims and philosophic method of Pathology.

De rebus opinalibus, et simul inutilibus, non laboramus. At contra nobis constitutum est experiri, an reverâ potentiæ et amplitudinis humanæ firmiora fundamenta jacere, ac fines in latius proferre possimus.

NOV. ORG. I. 116.

INAUGURAL ADDRESS.

Mr. Treasurer and Gentlemen!

Delegated to represent my colleagues before this large and enlightened assembly, I am sensible of the embarrassments of my task no less than of the unmerited distinction it confers on me. But, standing here for the first time a lecturer of St. Thomas's Hospital, bounden (so far as my endeavours may succeed) to justify the favourable opinion of those who have honoured me with an important trust,—I am deeply conscious of other and weightier responsibilities than can belong to this one occasion.

To be commissioned to teach Pathology at St. Thomas's Hospital is indeed a great honour: first, on account of the subject-matter—the elucidation of those laws of life, on which, as an imperishable foundation, the whole superstructure of scientific medicine and surgery should be reared; next, on account of the traditional glories of this great school, peculiarly associated, as it has been, with the

development of English surgery in its present form. To one more conscious than I can be of powers proportionate to the vast career of utility here unfolded, such considerations might become a source of the utmost pride. For me, I may confess, they have operated differently. Fully apprehending the importance of the subject which I profess to teach, recognising in it at once the practical consummation of Physiology and the life and soul of Medicine, I have trembled lest I should fail before its large demands on the intellect, and should prove incompetent to develop the resources of so comprehensive a science. Nor less, in reflecting on the history of the school which was to be the scene of my labours, have I hesitated on my pretensions to teach in a theatre where the Clines and Cooper constructed their characteristic system of surgery; have hesitated, lest—unworthily stepping within that circle of fame which is the ancient heritage of the school, I might intercept, while striving to increase, the light which still floods to us from those elder times in the transmitted lessons of our greatest professional masters. If, in accepting office here, I have ventured to indulge the hope, that I may not discredit those to whose good opinion I owe my appointment, this has arisen in no undervaluing of the responsibility: it has arisen in my persuasion that earnest industry may compensate for many natural disqualifications; it has confirmed itself by the certainty I possess, of obtaining from the kindness of my colleagues all such advice, co-operation,

and aid, as their talents and longer experience will enable them abundantly to afford me.

Considering the circumstances under which I stand here, it appears to me that I shall best consult the wishes of my audience by speaking of the science which I profess. As, however, it would manifestly be unsuitable to this occasion, if I should seek to entertain you with a disquisition on any special topic of Pathology, I have thought I might more usefully occupy your attention with some remarks on the general philosophy and method of the science.

Firmly assured, as I am, that no real and effective progress can be made in any one science, otherwise than by a method and logic common to it with all others, I propose testing the present state of Pathology by the light of those principles of universal philosophy, which have guided the sister sciences of Nature to their earlier ripeness. If, almost within our own recollection, other branches of knowledge have ceased to be fantastic and superstitious; if chemistry possesses a numerical precision; if astronomy has attained a predictive certainty; if physical science has developed itself into unconceived applications; if vital dynamics are dawning for us; —surely these great results have been achieved by no casual, or abnormal and arbitrary process of the human intellect. For the pride and for the profit of mankind, Lord Bacon has lived; not vainly. Day by day, during the last two centuries, his mighty genius has been a living presence in men's minds;

standing vividly there, as in the clear horizon of daybreak; pointing from the un-illumined earth to the kindled sky; pointing from the chaos of undisciplined observation to the sublime possibilities of the inductive philosophy. In proportion as Science has conformed to the instructions of him, her chief legislator, so has her dominion been extended and established; in proportion as she has turned from the course of legitimate induction, obsequious to traditions, or enamoured of idols of the fancy, in such measure have the foundations of her empire been shaken; till at times, for our warning and our terror, she has seemed to recal that portent, that frightful emblem of fragility, which, with crown of gold and feet of clay, scared the Assyrian monarch from his sleep. In reference to our immediate subject, it would be an instructive process to travel over the whole history of pathological literature, and test its value at each successive epoch by the rules of strict induction. It will be sufficient for my purpose, however, in the light of those rules, to review the present condition of our science; to inquire and to illustrate how far, in the double right of observation and logical inference, it may claim to be accounted a branch of inductive philosophy.

It was Lord Bacon's peculiar merit, that while, in countless passages (and indeed in the whole spirit) of his writings, he referred men to observation and experiment as the real sources of increase for knowledge, he never ceased likewise to remind them that observation and experiment are but a process of

questioning Nature in respect of specific matters; that to suggest these questions is in fact half the business of philosophy *(prudens quæstio quasi dimidium scientiæ)*; and that to cultivate the faculty which imposes these tasks on the understanding, is the first discipline of the philosopher. To abstract, to generalise, to group; to compare the known and the unknown; to impute causes and conjecture effects;—these, Lord Bacon knew, are instincts and necessities of the intellect; actions, but for which the mere impressions on the senses could never rise to the lowest level of experience. But (he earnestly taught) it is the peculiar mark and test of the philosopher, that he raises these obscure processes of the intellect into distinct consciousness for himself as final purposes; that he subordinates his perceptive faculties to those constructive instincts of the reason. He taught that the mere habitual sight of objects is not observation; that a vague curiosity with respect to nature is not the material of philosophy. Such he compared to groping in the dark: *vaga experientia et se tantum sequens mera palpatio est, et homines potius stupefacit quam informat: at cum experientia certâ lege procedet, seriatim et continenter, de scientiis aliquid melius sperari potest.** Glance, Gentlemen, at the records of knowledge, and you will find that what he thus enunciates as philosophic truth, is abundantly illustrated by historical fact. While analysing compound phenomena; while eliminating what is casual, and cleaving to what is essen-

* Nov. Org. i. 100.

tial; while comparing the like, the unlike, and the opposite; while including the manifold under types for classification; while affirming the connexion of cause and effect; the augmenters of knowledge have toiled but to obtain definite answers to definite questions,—to questions that derive their whole import and cogency in the immutable laws of the human intellect.

Now—without carrying you through the arguments which have led me to this particular distribution of my subject, I may state, that I propose considering the condition of Pathology under the following heads: (1.) *Interpretation of Phenomena;* (2.) *Doctrine of Causes;* (3.) *Principles of Classification;* and I shall criticise the fruits of observation only in their *responsive* relation to questions that arise in those several topics. And first, it may be well to remark with respect to the subject-matter of the science, that, as Physiology treats of the phenomena of the living body in its ideal state of perfection, Pathology professes to treat of whatever manifestations are afforded under all possible declensions from that perfect standard. These manifestations of disease sometimes appear as mere changes in configuration and consistence:—sometimes they consist in certain material products which we investigate (whether in the dead or the living body) by aid of anatomy and chemistry; such are those of cancer, of diabetes, of cataract:—sometimes in certain abnormal movements; convulsions, delirium, vomiting:—sometimes

in certain changes of sensation or consciousness; pain, insensibility, loss of memory, and the like. All these (whether discovered during life, and entitled the symptoms of disease; or found after death, as morbid appearances and morbid products, to be investigated with the scalpel, the microscope, and the test-tube;) all these are the materials of the Pathologist; phenomena, which it is his aim to substantiate mentally in their several relations of significance, of unity, of causation.

I. The first act of the pathological observer is to interpret the facts of disease. His interpretation of these facts founds itself on the analogies of health: it is a process of ANALOGICAL INTERPRETATION. He has to render phenomena intelligible to himself by translating them into the language of physiology, and by expressing them in terms denoting their similitude or contrast to healthy processes.

The simplest illustration I can give of this, is in the common use of the words "hypertrophy" and "atrophy," expressing disease as mere *more* or *less* of the *natural process of growth.* Yet, even here, mark the use of the physiological formula;—when we speak of a big heart as hypertrophied in respect of its muscular substance, we are led directly to the cause: we know physiologically that a muscle grows in proportion to the stimulus of exercise; and in looking to the valves of the diseased heart, we find, in their defective condition, sufficient evidence that the heart must have done double work;—sufficient ex-

planation of its muscular hypertrophy. Similarly, when we speak of the characteristic flux of diabetes as an essentially normal secretion *plus* sugar and its consequences;—when we describe an encysted tumor of the scalp as accumulated sebaceous secretion;—when we say of an enlarged liver, that it is hypertrophied simply in respect of the fat of its endothelium;—when we speak of tetanus as a functional excitement of the spinal cord; we adopt the method and phrases of analogical interpretation. And in doing so, we express the several diseases in a form which, to the Physiologist, half intimates their origin, or at least suggests the direction in which their causes may be sought for.

There are other cases, where the physiological formula has been of less easy discovery, but, being found, is of more striking application. Look, for instance, at the so-called *congenital malformations*. We can now hardly conceive the superstitions that have been connected with these objects. Not only do we find Cicero enumerating them (*præter naturam hominum pecudumque portenta*) among the influences by which thoughtless men are frightened into serious reflections; not only do we find Martin Luther apprehending that a misbegotten calf might indicate the approaching millennium; but, even fifty years ago, the deformities in question, though no longer within the province of augury, still stood alone and unexplained; they were still *monsters*. And now, observe the process by which we have been led to the solution of the mystery, and to the compre-

hension of those uncouth shapes within the simplicity of intelligible laws. Tiedemann and Meckel first established in detail the great conception which had floated dimly before the mind of Wolff, and to which Hunter had given clear utterance; this, namely:—that the embryo of each higher animal, in the progressive phases of its development, passes rapidly through the forms of the animals inferior to it; or, in Hunter's own words, that "if we were to take a series of animals from the more imperfect to the perfect, we should find an imperfect animal corresponding with some stage of the most perfect." Thus at once was furnished a physiological standard for interpreting the apparent anomalies of birth;—a standard rapidly applied by the great philosophers who had established it. They saw and announced that, if the development of the embryo should be interrupted at some early stage of its regular evolution, any one of its transient shapes would be preserved as a specific permanent deformity. We owe it to the principle of analogical interpretation thus illustrated, that, at the present moment, all who are conversant with the normal development of the embryo are able to refer the origin of monstrous births to specific moments of intra-uterine life, and to the excess or deficiency of acts generically normal. It was with a clear prophecy of such fruit as this, that Lord Bacon urged his contemporaries to the observation of whatever in Nature might seem causeless and capricious:—*non ab inquisitione desistendum, donec ea quæ possunt*

*censeri pro miraculis naturæ, reducantur sub aliquâ formâ sive lege certâ.**

A second very important instance, which I may quote, is that afforded in the pathological application of the cell-theory. Ten years ago, structural anatomy had no existence: a few scattered and imperfect observations were alone extant, when suddenly in the year 1839, a new science seemed called into existence by the publication of Schwann's profoundly philosophical researches. Here, as in the former instance, Pathology rapidly adapted itself to the new knowledge; and, as Schwann had given us a morphology of health, so did Müller and Henle give us one of disease. Thanks to these three foremost physiologists, we may now use the common language of Anatomy in speaking of the several morbid products (pus, cancer, and the like); recognising in their formation the same morphetic laws as govern the development of healthy tissues.

The great importance of the intellectual process under our consideration, obliges me to refer to the possibility of its wrong employment; a possibility which I can easily illustrate in regard of the discoveries just quoted. The essence of those disco-

* Nov. Org. II. 28; where, further illustrating the aim of such research, he continues,—*ut irregularitas sive singularitas omnis reperiatur pendere ab aliquâ formâ communi; miraculum vero illud sit tandem solummodo in differentiis accuratis, et gradu, et concursu raro, et non in ipsâ specie: ubi nunc contemplationes hominum non procedant ultra, quam ut ponant hujusmodi res pro secretis et magnalibus naturæ, et tanquam incausabilibus, et pro exceptionibus regularum generalium.*

veries is this; that growth,—be it healthy or morbid; be it of gland, or nerve, or muscle; of pus, or cancer;—consists essentially in an act of cell-development; that a cell is the universal type under which the organising faculty shews itself. Now it has often happened to me, especially in respect of the morbid products, to hear cell-growth spoken of as if it belonged specifically and distinctively to the one particular product; as if it were the *differentia* of the product, instead of being its *genus*. But in point of fact, when we say that cancer consists of cells, we say no more than that it grows; and every one conversant with morbid anatomy is aware, that, very frequently indeed, the cells in question present no morphetic characters by which, even empirically, they could be distinguished as cancerous. To remain satisfied with *the mere cell* is as if the chemist were content to accept *crystals* as the ultimate facts of his science. Cell and crystal,—each in its domain is a generic method of manifestation: but, be it observed, each is generic only morphetically; generic, only in respect of those laws of material extension, which we are little justified in considering the most important in a scheme of dynamical physiology.* This appears to me so obvious, that I should hardly have thought it requisite to argue the point, were it not, that very recently I have seen a striking instance of what seems to me the error I would

* *In his diligens est adhibenda cautio, ne intellectus humanus postquam complures ex istis formis particularibus adinvenerit, in illis omnino acquiescat, atq. ad inventionem legitimam Formæ Magnæ se non accingat.*—Nov. Org. II. 26.

guard you against. In one of the most remarkable pathological works of the day, a work of extraordinary experience and merit, I read the suggestion of an affinity between the morbid actions of cancer and typhus, on the ground of an imputed similarity between their products. No doubt that, under the influence of typhus, the intestinal follicles become the seat of an augmented cell-growth; and that so do textures invaded by malignant disease; but to identify the two actions on that account merely, is as though one should identify the actions of brain and liver, by reason of the cell-growth which occurs in both organs; or, as though one should expect similar effects from arsenic and sulphur, because of their common crystallinity.*

One other caution that deserves to be borne in mind is this; that, before venturing to compare the phenomena of disease with those of health, as our standard of interpretation, we be certified of the accuracy of our standard; that we give credit to the pathological theory only in proportion as its physiological prototype is complete and trustworthy. Of the possible evils of the opposite system every day gives us examples. It may be sufficient if I quote one. Let me remind you that, of late years, repeated endeavours have been made to found a system of pathology on the morbid changes of the blood; that these systems have agreed in attaching funda-

* *In his omnino est adhibenda cautio gravis et severa; ut accipiantur pro instantiis conformibus et proportionatis illæ, quæ denotant similitudines reales et substantiales et immersas in naturâ; non fortuitas et ad speciem.*—Nov. Org. II. 27.

mental importance to the excess or deficiency of fibrin; and this, while no two of them can agree on the history of healthy blood, or decide whether or not fibrin be an excrementitious ingredient of it.

The instances I have cited may suffice to indicate the method of analogical interpretation, and perhaps for something more. They may have illustrated to you not only that, without a physiological foundation Pathology can have no existence or reality; but, likewise, that the enunciation of a physiological law, or of any great fact in structure or function, is a fructifying principle to the pathologist, suggesting to him new elucidations of disease, and the only rational criterion of treatment.

And while those persons, who reflect ever so little on the mental process under consideration, will readily perceive many directions in which it still has to be applied,—many directions in which the phenomena of disease still lie uninterpreted; I am anxious to impress on you that such defects chiefly depend on the incompleteness of our physiological knowledge. If we have hitherto no approach to a physiological expression for those autopathic cachexiæ in which gout, scrofula, and cancer respectively originate; let it be observed that our faculty of analogical interpretation remains inert, in respect of these and many other disorders, only for want of a correct and comprehensive hæmatology. *There*, I do not hesitate to affirm, is the most urgent and grievous deficiency in our present pathological materials. Indispensably for our further progress, we require

a history of the humoral metamorphoses of health; a history which, starting from the products of digestion, shall trace the successive steps whereby these become blood, and, having been blood, become excretion; in short, a developmental history of the blood progressive and regressive. For the consistency of Nature forbids me to doubt that, were such history afforded, it would include and render manifest the explanation of those cachexiæ I have cited as so obscure; would reveal them in their birth and filiation; would unfold their latent processes; and, not improbably, might enable us to deduce them from quantitative errors in functions hitherto imperfectly recognised.

II. NEXT in order to the process of determining the nature and signification of phenomena, is that of DISCOVERING THEIR CAUSES. This is the function of the philosopher, to which he himself attaches the highest importance; and it is that, too, by which the laity are most apt to measure him. For in all ages the observers* of the human mind have bewailed the ignorance of natural causes as the most fruitful source of disquietude, misery, and super-

* Most clearly of all, perhaps, the great Epicurean poet perceived the evil:

——— *formido mortaleis continet omneis*
Quod multa in terris fieri cæloq. tuentur,
Quorum operum causas nullâ ratione videre
Possunt, ac fieri divino numine rentur; (De Rer. Nat. I.)

and most eloquently, in numberless passages of his work, has he prescribed that sovereign cure which only Philosophy can supply.

stition; and it has ever been the imputed and envied prerogative of the philosopher, that his pursuits tend to emancipate him from the shadowy apprehensions of other men:—

Ille metus omnes et inexorabile fatum
Subjecit pedibus strepitumque Acherontis avari.

Eminently true is it of our profession, that the fears and solicitude, with which we approach the treatment of disease, are in exact proportion to our ignorance of its causes: as these escape us, we are bewildered and alarmed; as we detect them, we are re-assured and encouraged. Let us, then, proceed to examine how far we possess, in respect of disease, that privileged understanding of causes which alone can give tranquillity and confidence to our practice; let us examine the condition of our knowledge according to Lord Bacon's test,—*vere scire est per causas scire.*

It would be difficult in polite language to find phrases sufficiently strong for stigmatising according to its deserts the state of medical ætiology, as it existed some few years back. In the absence of exact physiology, how indeed could it exist, save as nurses' gossip, and sick men's fancies, and the crude compilations of a blundering empiricism? The great improvement which has commenced in this fundamental part of our science, and which is now in rapid progress, seems to me the natural, though tardy result of that experimental precision, which—with so many other obligations—we mainly owe to

the genius of John Hunter. We no longer accept those vague generalities of expression, by which it was the custom to refer a given complexus of symptoms, however manifold, to any one of a dozen morbid influences that might have happened remotely, perhaps harmlessly, to have preceded it. For our conviction of the efficiency of a supposed cause, we no longer rest satisfied with *post hoc, ergo propter hoc,* as our inductive formula; we require to know something of its *modus operandi;* we require a knowledge of the intermediate steps of change by which its operancy is prolonged into the development of those ultimate phenomena. Late years have enabled us in many cases to fulfil this requirement of reason; mainly by the establishment of two laws, which I proceed to illustrate.

First, we know that *causes choose their organs of manifestation,* with as decided, and sometimes as exclusive a preference, as governs the phenomena of inorganic chemical affinity. This we may make matter of experiment: if we introduce various noxious agents into the stream of circulating blood, all organs are equally exposed to their influence;—but how differently are they affected. Inject opium, and the brain suffers;—arsenic, and the stomach inflames;—strychnine, and the cord is acted on;—cantharides, and the kidneys are irritated: and all this so definitely, that the attraction evinced is equivalent to a chemical demonstration of the agent employed. When the gums swell with mercury, or (as Dr Burton has shewn us) become blackened by lead,

we have no more hesitation in naming the cause, than if we had the minerals precipitated in a test-tube. Equally precise is the elective affinity of morbid poisons, which indeed we recognise and distinguish only by their specific attractions. In the abdominal flooding of cholera, in the coughing and sneezing and sniveling of influenza, in the eruption of the exanthematous fevers, we see the human body yielding uniform local phenomena to the excitement of specific causes, with just as much constancy as is found in the reactions of brute matter; and the evidence, that various diseases have their specific ranges of affinity, is just as clear as that demonstration of a chemical attraction which we find in the precipitation of sulphate of baryta, or the combustion of phosphorus.

The second law to which I have referred is of no less importance. While we find an infinite variety in those influences from the outward world by which man is affected: while we find that the causes of disease are innumerable; (destructive violence, mechanical or chemical; atmospheric variations; irregular nourishment; the over-excitement or desuetude of organs; parasitic invasion; the infection of morbid poisons;) how remarkable a contrast do we see between this variety of causes and the simplicity of their organic effects! the singleness of life and living reaction opposed to the multiplicity of exterior contact! For, as excitability is the test and token of animal life, so is it by this function only that life becomes participant in the production of

disease; and, could its influence be subtracted, the only remaining maladies of the human body would be such as we might imitate with test-tubes and endosmometers, and the other implements of a chemical laboratory. And as excitation, more or less, is the only language in which life answers to the solicitations of the outward world; so we find in respect of morbid influences, that, whatever be the cause of disease, the affected organ has but a single method of suffering an effect: and its cognizance of injury can be manifested only by *quantitative changes* in its nutrition or its function,—only by more or less of those acts, through which it depends on the total system, or ministers to it. Let the sensitive part of the eye or ear be struck, or receive an electric shock, —it conveys to the centre only its own specific message of light or sound: let the brain be disturbed by over-work, or by alcohol, by fever or by mechanical injury,—its response is only in some distortion of thought or action: irritate a secreting organ—skin, liver, kidney, bowels,—by whatever means, by drug, by mechanism, by infection;—each, analogously to its fellow, answers only by an augmented effort of the cell-growth peculiar to itself. Under no quantitative variation of stimulus will the liver secrete urea, or the kidneys bile: any supply of nutrition to either organ, above its power of specific appropriation, either runs off unchanged (as in congestive albuminuria) or undergoes a peculiar development, identical for all organs, into the so-called products of inflammation. If to this law there are some apparent excep-

tions, I would observe that such exist only in respect of diseases we are ignorant of; and that, so far as we possess an accurate knowledge of the latent processes in disease, so far we find them subjected, uniformly and strikingly, to the control of the law stated.

The influence of these two laws in purifying our theories of causation has been immense; and, perhaps, I cannot better illustrate their use and application than by referring you to the improvement which late years have made in our knowledge, with respect to those mysterious connexions of disease called sympathies. Every one can remember when sympathies were spoken of as ultimate facts; when no one thought of explaining them. If it happened that any two organs had the habit of suffering conjointly, with some show of uniformity, they were said to *sympathise*. By degrees the word got to be applied to the most accidental concurrences of disease, till men forgot that, to speak of organs sympathising with each other was only to say, in Greek instead of in English, that they suffered conjointly; and the phrase was taken to be in itself an explanation, or to express a law of the animal economy, instead of suggesting a train of thoughtful inquiry. No bad instance of what Bacon terms the *idolon fori!* For—why should not an organ suffer singly? In hip-disease (for instance) why should there be any other pain than in the hip? or, if any other, why in the knee of the affected side rather than in the opposite one? or rather than in the elbow, or in the belly? The course of improvement

has been the following: First of all, there were set out of the list those cases where a disease propagates itself by mere continuity or contiguity of tissue; as when an ulcer deepens itself, or where erysipelas of the face turns the margin of the lips and threatens life by irritating the glottis, or where inflammation spreads from the urethra to the epididymis; these instances, if they are to be called sympathies at all, being sympathies by direct extension. And it then was seen, that, as distant parts of the body are knit into a single system by two media of connexion, namely, by the blood and by the nerves; so there are *humoral sympathies*, whereof the blood is the vehicle, and *nervous sympathies* which depend on nervous cords for their transmission, and nervous centres for their reflexion. With respect to the first class; when we see half a dozen joints and the pericardium simultaneously or alternately affected with acute rheumatism; when we see so many various organs suffer with constitutional syphilis, either at once or in order of their vascularity; when we see a thousand spots of skin and mucous membrane pustulated with the eruption of small-pox; we are forced to attribute the several lesions to one single influence, namely, to the prior contamination of the blood, which supplies all organs indifferently, and on which all have an identical dependence. Some admirable illustrations of humoral sympathy are afforded by its partial exercise, in cases where we can trace the material germs of disease—pus or cancer-cells for instance, entering the circulation at

a particular spot, becoming arrested at the next network of capillaries to which the blood may hurry them, and there leading to a secondary formation of abscess or of cancer: and the laws of this secondary propagation of disease are now so thoroughly known, that if, by way of experiment, you were to inject a little pus or cancerous secretion into a vein, you would be able to foretell the result just as certainly as if you transferred a handful of frog's spawn from one ditch to another.

With respect to nervous sympathies; since the well-known philosophical labours of Dr. Marshall Hall (second only to those of Bell in their practical importance, and in their effect in promoting a true physiology of innervation,)—since they have been before the world, with all their array of thoughtful experiment, and since Henle has contributed to science his admirable analysis of the subject, the triumphs of explanatory investigation have not been less. We now know that such sympathies depend on a diffusion of excitement, not by the nerve primarily affected, but by the centre on which its impressions impinge; that this diffusion operates by reason of the contiguity of centres, and in proportion to it; that in the spinal marrow it may operate predominantly in one direction or another; that sometimes the diffusion occurs chiefly in the transverse plane of the cord, and then, as it is propagated from behind forwards, or from side to side, we see manifested (in the one case) the so-called reflex movements, or (in the other case) a symme-

trical repetition of the original phenomena on the opposite side of the body; that sometimes the contagion of excitement spreads vertically in the cord, so as to increase the sphere of the original pain or original motion, or, by exciting the whole series of co-ordinate centres, to develop the symptoms of epilepsy or tetanus.

Among influences which modify the condition of the living body, and produce changes in its phenomena, we must count the causes not only of disease, but those likewise of recovery. As our indications for the treatment of any disease are evolved from its exact pathology, so all our means of fulfilling those indications can be derived only from an authentic and philosophical pharmacology,—from a knowledge of drugs in their powers and manners of operation. There is no point in which Pathology comes into nearer contact with Practice than here; none, where it may do more service in rendering Medicine rational and secure. Surely the *counter-agents* of disease, no less than its causes and *promovents*, belong to pathological study; surely the action of opium on the brain, or of turpentine on the blood, is as much a matter of investigation to the Pathologist as the nature of delirium tremens, or the causes of hæmatemesis; nor is the latter knowledge complete without the former. Independently, too, of other obvious reasons for connecting the two studies, it may be observed that the same medicines as cure one disease by their appropriate exhibition, produce another by their needless employment: they are causes

of disease to the healthy, in proportion as they are means of cure to the sick: they thus come directly, as on other grounds indirectly, within our ætiological province. And surely, if it be a fit problem for the Pathologist to determine, how arsenic produces gastritis or coma; it will be no inappropriate task for him to inquire, by what manner of working the same drug effects the cure of intermittent diseases, or suppresses the desquamation of lepra. I would venture especially to point to the action of so-called *specifics*, as a matter in respect of which Pathologists have been strangely indolent, but whence infinite instruction might be drawn, even as to the nature of diseases.* We have been content to accept the fact, that colchicum is a specific for gout—a disease, the essence of which has to do with the formation of lithic acid; without caring to know what influence the drug exerts over that formation; whether to increase or to diminish it; whether to promote the elimination of the acid, or merely to cover its hurtfulness. We have been content to talk of iodine as contra-scrofulous, of quinine as febrifuge, without knowing (almost without caring to know) what is that sphere of operation for the scrofulous

* Specifics, in respect of the diseases which they directly antagonise, represent the *instantiæ hostiles* of Lord Bacon; the power of the specific, and that of the disease, standing opposed to each other as tending to produce incompatible morbid actions. As to the great advantage of studying such instances, and as to the light which is given and mutually reflected between two actions that exclude each other,—I may refer to the remarks offered (in regard of classification) on the study of incompatible diseases. (*Infra*, p. 41.)

diathesis or the paludal poison, in which its antidote meets and conquers it. Suppose it admitted, *e. g.*, that scrofula consists in some such affection of the nascent blood, as may permit certain products of its faulty development passively to plug the organs of primary blood-making—the lymph-glands and lungs: then (it appears to me) the Pathologist should immediately inquire,—has iodine aught to do with that blood-making process? or does it, perhaps, only hasten the removal of those morbid infarctions? does it oppose the disease in its origin? or in the first generation of its effects? what is the precise and very act, in respect of which it is contra-scrofulous? Be assured, Gentlemen, that these questions arise in no vain refinement or subtilty. Every dose of medicine, ineffectively given, silently testifies to the insufficiency of our knowledge: we cannot with certainty predict the action of our drugs, because we are ignorant of the pathological conditions of their efficiency.*

The chief sources for still further improvement in our knowledge of the causes of disease will be found to lie in *experiment* and in *comparative pathology:* in experiment, as artificially filling up the intervals that separate morbid impressions from their remote consequences; or breaking a long chain of

* As a specimen of pharmacology conducted in the right spirit, I may cite the very interesting observation of Dr. Bence Jones on the influence of alcohol in retarding the oxidation of phosphorus in the brain; an observation which derives additional importance from Dr. Jones's correlative pathological discovery, that acute inflammation of the brain is attended by its increased oxidation.

causation into its component links, so as to enable us to verify step by step the accuracy of our conclusions, and the sufficiency of alleged causes for producing the results ascribed to them: in comparative pathology (where, in fact, we have experiments performed by Nature), as presenting to us the operation of causes less mixed than in the human subject, and as illustrating with singular force the influence of extreme differences of diet, habit, climate, and respiration, in determining the liability to particular cachectical states.

For an illustration of *comparative pathology:* suppose it were argued that gout must depend on animal diet, or on any habit peculiar to man;—and the disease were exhibited in its utmost severity in a graminivorous animal:* this one instance would, of course, totally destroy such a theory of its causation.

Or, for an illustration of *experiment:* the present theory of diabetes represents it as a specific form of indigestion, under the influence of which the conversion of farinaceous food is incompletely accomplished, so that this material does not advance be-

* The intensest gouty effusion that it has ever happened to me to witness, occurred in a common fowl. During the painting of a hen-house, the birds (previously in perfect health) had been transferred for a few days to a damp cellar; where presently some of them sickened and rapidly died. One of the bodies was sent me by a friend, on the chance of its being a pathological curiosity; and such certainly it proved to be. The pericardium and peritoneum were stuffed with a white deposit; similar material lay in all the larger joints; and masses of it had thoroughly broken up the structure of both kidneys. On chemical analysis, I found it to consist entirely of the lithates of soda and lime; the latter predominating.

yond the first stage of its transformation—that into sugar: and the theory argues, that the mere passage of this sugar into the blood is sufficient to cause the profuse diuresis, and other characteristic signs of the disease. Now, this portion of the theory is matter for experiment: by artificial injection of sugar into the veins we can effectually imitate the alleged course of Nature, and test the sufficiency of the above explanation. And we do actually find on experiment that the explanation is sufficient, and that the symptoms of the disease do admit of imitation in the manner stated. Or, suppose the doubt to be this: Does the cerebro-spinal system exert any influence over the nutrition of organs? The well-known fact would be adduced of the pneumonia which follows injury of the vagus nerve. The opponent of such an influence would argue, that the inflammation of the lung does not depend on injury of the vagus as such; but, perhaps, on the co-incident injury of the sympathetic, or on cutting off the peculiar influence (whatever it may be) exerted by the ganglion. Now here experiment steps in, settling the point at once and for ever; shewing that the same effects ensue* when the vagus is divided within the cranium, before the formation of its ganglion, or its union with the sympathetic.

I cannot altogether leave the subject of causation, without reminding the Student of Nature, that to

* I have had occasion to satisfy myself on this point (which is one of considerable interest in the physiology of nutritive innervation) by performing more than once the experiment referred to in the text.

his induction of causes there soon comes a limit. He soon arrives at that, which (in respect of Natural Science) may be considered supra-causal and absolute; namely, to that harmonious and constant operation of LAWS by which Life, as though with intelligent spontaneity and final purpose, fulfils its appointed scheme. Knowing that the essence of a cause is not in its mere precedence (*non præire modo, sed efficienter præire*), he sees that the outward *occasions* of disease acquire their *causal efficiency* only by becoming subject to the laws of the living organism, only by acting through them and with their direct potentiality. *Parendo vincunt.* Hence, amid all caprices of causation, the striking simplicity of result! We can conceive no material product of disease otherwise than in definite relations, abortive or excessive, to the predetermined types of normal construction: we can conceive no function of disease, otherwise than in relation to the ever-trembling balance of excitability and resistance: nor can we conceive any other sphere than this, within which the powers of outward Nature may co-operate with those of the living body, as efficient causes of disease. Infinitely, then, does it behove us to study these pure dynamics of Life; to toil in our task of interpretation, pondering reverently as we advance (for the ground on which we tread is scarce less than holy), and striving to raise ourselves—high above all that is accidental and deciduous, to an apprehension of the *essential*, the *typical*, the *regulative*;—to an apprehension of

LIFE, not only in the modes and measures of its working, but in respect of that, its unseen paradigm, which it ever strives to realise,—that idea, which is the final purpose of organisation,—that type of construction, which assigns the tendencies of health and betrays the declensions of disease.

While time obliges me to hasten from these reflections, amid which I would willingly linger, I rejoice in being able to refer you for their full development, to the published works* and oral teaching of one, the instructions of whose matured authority I could but faintly, though gratefully, rehearse. I refer you to one whom, in the councils of our profession and in the foremost van of European philosophy, you recognise conspicuous by wisdom, by virtue, by dignity, by eloquence; to one, whose almost universal acquirements forbid our art to claim more than a fragment of his wide reputation; but whose name is inseparably identified with the brightest associations of this place, and who, in the lessons of his vast professional experience and consummate judgment, still prolongs from year to year the echo of those proud recollections,—still permits us to boast for our chief strength that we retain, as Senior Surgeon of our Hospital, the nephew of Cline and the colleague of Cooper.

* It is particularly to Mr. Green's "*Vital Dynamics*" that I here refer; but my own deep obligations to his great intellect have arisen even more in the advantages I have enjoyed, of his friendship and familiar conversation.

III. As respects the CLASSIFICATION of facts (the next function of the philosophical observer), I have first to remark, that, though by no means the chief object of pathological study, it furnishes a very good measure of the success with which the other objects are pursued. Correct classification can proceed only from accurate knowledge; and it is in this sense, no doubt, that BACON prophesies,* "Whensoever man shall be able to call the creatures by their true names, he shall again command them, which he had in his first state of creation." In assigning this high importance to classification as a measure of knowledge, you will believe that I understand by it something more than a mere arrangement for convenience—a mere subdivided list of phenomena. There have been, alas! many men in our profession who have seemed to believe that all the mysteries of disease are solved, when we cite their titles in a dead language rather than our own; that Greek and Latin names have some specific pregnancy of their own; and that etymological harmonies are all that need be sought for in the ordination of disease. No!—the scientific classifier has to do with the deepest realities of nature;—

Ac non verba sequi fidibus modulanda Latinis,
Sed veræ numerosque modosque ediscere vitæ.

An arrangement can then only be dignified with the name of a *system*, when the principle on which it proceeds affirms, as a unity, the essence of the

* Interpretation of Nature.

subject to be classified. As the sole ground and pledge of that unity, which is the strongest need of the intellect and the prime condition of philosophy, a system pre-supposes an *idea*, which shall pervade all parts of the scientific construction, giving intelligibility to each element of it, and coherence to the whole. Failing the recognition of this great principle—failing the lode-star of an essential unity, no generalisation can profit for the purposes of system. Idols of the fancy, and mocking counterfeits, and trivial metaphors become substituted for the pure types of Nature,—for the *vera signacula Creatoris super creaturas.** Following those treacherous beacons, steering by a false compass beneath a heaven whose very light is darkness, and deluded by the genius he invokes to guide him, as by a lying prophet, the votary of science toils all in vain, "and finds no end, in wandering mazes lost": or else, in the mere absence of an unalising principle, distracted by inconsistencies and contradictions, still in a turmoil and chaos of facts† which lose their very reality when alienated from the law that interprets them, he comes at length by bitter experience to apprehend that deepest moral of philosophy, ἓν εἰ μὴ ἔστιν, οὐδὲν ἔστιν.‡ It would be quite impossible, in my judgment, to over-estimate the important bearing on our subject of these perhaps trite considerations; or to state too strongly the necessity, as it appears to

* Nov. Org. i. 124.

† *In particularium fluctibus;* Nov. Org. i. 124.

‡ Plato in *Parmenides.*

me, that those who aspire to scientific progress (in any large sense of the word) should contemplate and be conversant with a stricter logic than the popular one. For the rules, which I have just ventured to state, do not concern the philosophical observer merely in his act of classification, but likewise vitally affect him in the course of those generalising processes, which precede his interpretation of complex phenomena and his induction of causes.*

According to the principle I have stated as the test of true classification, I do not hesitate to affirm that, as yet, we possess no system of Pathology: nor —with the science in its infancy, would it be expedient to affect the possession of one. For, among the errors of philosophy Lord Bacon wisely enumerates "the over-early and peremptory reduction of knowledge" into systems: he reprobates as a "mere covering and palliating of ignorance, that men have used of a few observations on any subject to make a solemn and formal art, by filling it up with discourse and accommodating it with some circumstances and directions to practice;" and he further notes that "as young men when they knit and shape perfectly, do seldom grow to a further stature, so knowledge, while it is in aphorisms and in observations, it is in growth; but when it once is comprehended in exact methods, it may perchance be

* *Licet enim in Naturâ nihil vere existat præter corpora individua edentia actus puros individuos ex lege; in doctrinis tamen illa ipsa lex, ejusque inquisitio et inventio atque explicatio pro fundamento est tam ad sciendum quam ad operandum.*—Nov. Org. II. 2.

farther polished and illustrated and accommodated for use and practice; but it increaseth no more in bulk and substance."* Still, admitting that years must elapse before any system of Pathology can be enunciated, it may be well to observe the course in which our generalising faculties may most profitably be employed. Therefore let me illustrate, in respect of our subject, what I mean in speaking of an *essential unity* as the condition of philosophical generalisation; and perhaps I shall best illustrate the condition by means of its defect or non-fulfilment. Suppose then, *e. g.* it were proposed to classify diseases according to the colour displayed by the skin, under the several morbid influences. The advocate of the system would maintain it no doubt by plausible arguments: he would shew how natural his method, (for, are not all colours fixed by nature?) and how comprehensive (for, are not all our patients of some one tint or another?): and he would point triumphantly to his diagram tabulated with perfect neatness. There, in the white column would stand his diseases of exhaustion: jaundice and cyanosis would stand as types for the yellow and the blue diseases, respectively; scarlet-fever would marshal the exanthemata; the green-sickness would be a great fact; and finally, if our philosopher happened to be a friend of the slave-trade, he would no doubt take blackness as the symbol of congenital inferiority, and put negroes at the head of his last

* Advancement of Learning; 1.; and Interpretation of Nature, 18.

column. Now, in laughing at the manifest absurdity of such a proposition, what is the flaw—let us inquire, which so instantaneously strikes us? Nothing in the chromatic details; we leave the facts as he states them; inflammation *is* attended by redness, and bilious patients *are* yellow; but we attack the principle, and laugh at its self-evident insufficiency:—thus. It professes to answer the great requirement of the reason; it engages to embrace the manifold as one; it affirms an unity; but the unity which it enunciates is irrelevant to the subject, instead of being essential to it: for, what has colour to do with Life?

Now, to illustrate the principle affirmatively, I apprehend there can be no difference of opinion in this; that, with respect to classifying the acts and phenomena of the living body, whether in health or disease, the only true key lies in the thought of *life as a power;* and that a system of pathological classification will only then be perfect, when it shall admit of being verified and sanctioned *à priori* as a scheme of *dynamic possibilities* implied in the conception of Life, and evolvable from it by a connected process of thought, even as an organism from the germ which potentially includes it.

As in the problems of pathology there are always two elements, namely, (1) impressions from without as the causes of disease; and (2) the excitability of the subject, as the liability to disease; so the principle I have stated assigns to us a double rule of procedure; namely, First, morbid phenomena must

be generalised in the direction of the vital forces concerned in their production; Secondly, morbid influences or causes must be contemplated, not in the multiformity of the outward world whence they originate, but in their relation to the living agent, whose excitability is the condition of their causativeness,—the living agent whose powers and functions they excite or depress, or whose organic material they modify.

But further, it must be remembered that, for these purposes, it is requisite to go to the very root of the subject. Our heads of classification must be relative to those genetic laws,* which stamp on each disease *ab initio* its individual type and specific import. Accordingly, our suggestions for systematisation do not lie in the superficial signs and complications of disease, but in its primary form and first causes. Often it happens, that the symptoms under which our patient sinks, are but the tertiary or quaternary results of a remote and unrecognized malady. Often a number of morbid phenomena, presented to us in a single case, are not the joint and cöetaneous results of one primary cause, but may be traced as successive links in a chain of causation, by which we slowly ascend to the first processes of disease. Consider, for instance, the long series of causes we may have to contemplate, in order to determine the class and order of a case of dropsy, of pleurisy, of hemiplegia: the dropsy perhaps arising

* *Qui* FORMAS *novit, is Naturæ unitatem in materiis dissimillimis complectitur.*—Nov. Org. II. 3.

in valvular imperfection at the heart; the heart-disease in rheumatic fever; the rheumatic fever—in what? or the pleurisy perhaps dependent on the presence of urea in the blood; this dependent on disorganisation of the kidneys; the spoiling of the kidneys on their chronic inflammation; their chronic inflammation on gout; and the gout—on what? or the hemiplegia caused by a clot of blood on the brain; the blood extravasated by the rupture of an artery previously degenerated; and that fatty degeneration of the artery caused—by what?

Before leaving the subject of pathological classification, I may mention, as in some respects subordinate to it, one particular form of generalisation, which—though still in its infancy, promises to be of great service with respect to the discovery of causes, no less than for establishing the natural affinities and families of disease. I refer to generalisations conducted with regard to the concurrence and non-concurrence of particular morbid phenomena: so that we may arrive at a knowledge of what diseases necessarily accompany others, or alternate with them; what diseases are incompatible with each other, or mutually exclusive. In respect of such as occupy the latter category (that of incompatibility with each other) important distinctions may be drawn. First, there is Hunter's dogma,* "that no two actions can take place in the same constitution, or in the same part, at one and the same time"; and

* Works, II. 133.

this, so far as it is true (and it must be taken with great limitation) seems merely to imply a pre-occupation of the energies, or of the implements of life, by the disease which has first possession, or is of chief intensity; as we observe that pregnancy counteracts and suspends the signs of local irritation in phthisis. Next come cases, where the opposition asserted to exist between particular diseases is a local opposition only, explicable probably on local and anatomical grounds; such is that between pulmonary tubercle and pulmonary emphysema. But, thirdly come instances, which seem to indicate an absolute polar contrast and inverseness between particular manifestations of disease; instances which seem to suggest an opposition of two diseases, founded in the very act of life by which they are established. Such an incompatibility is asserted by Rokitansky to exist between cancer and tubercle. I need hardly dwell on the vast importance of such an opposition, if real, as tending to throw more light on the true nature of those obscure diseases than any observation with which I am acquainted; enabling us to consider each disease as representing towards the other, what perhaps I may venture to call the *negation of causativeness.**

* These generalisations of compatibility, incompatibility and the like, correspond to the *instantiæ comitatûs atq. hostiles* of the Novum Organon; *quæ exhibent aliquod corpus sive concretum tale, in quo natura inquisita perpetuo sequatur tanquam comes quidam individuus; aut contra, in quo natura inquisita perpetuo fugiat, atq. ex comitatu excludatur, ut hostis et inimicus.* Lord Bacon thoroughly appreciated their importance, arguing that

Here, however, of necessity I pause: conscious of an infinite subject, and feeling at every step, as its topics multiply around me, how inadequately I can convey to you my sense of their magnitude and unbounded interest. Suffice it, if I have illustrated, however feebly, that discipline of experience, that logical method of observation, in which the science of Pathology has its root, and by which alone it can claim kindred with the universal trunk of inductive philosophy.

And now, Mr. Treasurer, by your permission, addressing myself especially to those who will be my pupils and, I hope, my fellow-students in this field of investigation, I shall endeavour in few words to suggest the motives, which may fill them with zeal and impel them to industry.

First of all, Gentlemen, I would remind you that Pathology, on its own merits and independently of its application, is a subject of transcendent interest for the scientific inquirer. That the human mind, in proportion as it merits to be called human, can find no satisfaction or repose in any complexus of unexplained phenomena, all history bears witness. Amid even the most beautiful objects of sense, the human mind asserts its restless independence. In contemplating the sublimest of all natural specta-

knowledge of one term in such a relation must of necessity lead to a knowledge of the other; so that whoever can propound the subject of his investigation in these its natural concords and discords, *non longe abfuerit ab extrahendâ in lucem formâ naturæ inquisitæ*.—II. 33.

cles, the midnight sky "with moving fires adorned innumerable," who ever yet rested satisfied in the passive unspeculative perception of its vault, as "thick inlaid with patines of bright gold"? Since first Chaldean shepherds gazed and trembled at its shifting phases, how it has riveted men's minds, as a mystery, is attested in the very names of the planets, is chronicled in the successive epochs of fire-worship, divination, and astrology, and furnishes the explanation or excuse of a thousand genial superstitions. And now, when Kepler and Newton, with almost creative genius, have supplied the light for which centuries had yearned and thirsted; now when the harmony, which poet-philosophers dreamed of, has been realized to a degree which makes it almost a lesson of our childhood;—how infinitely deeper is our sense of the beauty, and how more reverential our gaze, knowing as we do that those infinite orbs fulfil their appointed courses *in unity of law, with mensurable precision of movement.*

And, if this be true with respect to objects full of natural beauty and loveliness,—how much more are all our moral interests enlisted, to explore the sources of that which is physically evil and repugnant; to explain the possibility and significance of things which are awful to us, while unexplained, as apparent interruptions and catastrophes in the uniform and beneficent system of the universe! And how great the relief and the satisfaction to find, that disease and degeneracy constitute no dark insoluble problem; to find that the laws of Life, in

their own grand simplicity, include and account for all that, to the casual observer, seems hostile and capricious; to find nothing really abnormal; nothing in part or member foreign to the conservative intention of the whole; every contingency of disease included within those conditions which permit the possibility of health.

But, Gentlemen, though I have given first mention to this great intellectual delight as a reward that belongs to the patient cultivator of Pathology, I am unwilling to rate it highest. *Ipsum posse et ipsum scire naturam humanam amplificant, non beant.** Happy are they, whose pursuits impose on them no painful choice between the aims of philosophic interest and those of social utility; happy they, whose industry may reap the double harvest of scientific truth and practical application. Before every other inducement to the study, I feel bound to give you this: Pathology is the scientific foundation of Medicine; *Your success in the practice of your profession,*—your success in prolonging human life and in lessening human anguish, *will (cæteris paribus) be exactly commensurate with your pathological acquirements.* I am not unaware that the ingenuity of indolence may find partial contradictions to this sanguine belief, and may point complacently, no less to the imperfections of our present knowledge, than to the occasional felicities of the merest empiricism; but such arguments are almost hourly losing their

* Nov. Org. II. 49.—*itaque decerpenda sunt ex universitate rerum ea quæ ad usus vitæ maxime faciunt.*

low and limited application; and, for the general accuracy of my statement, I appeal without hesitation to the many enlightened members of the Profession whom I have the honour to see here. I am sure that their daily experience amply corroborates my assertion, and justifies me in stating that your chief inducement to the study of Pathology is included in those motives which should impel you, with hopes of distinction and utility, to labour in your profession generally. These have been impressed on you on other occasions; and I may confess I should consider it a misapplication of our present time, to insist on motives so imperative and duties so obvious. No man, who is accessible to the ordinary arguments of morality, can need much external persuasion on such subjects. In deliberately pledging himself to a career of professional study, each of you must have contemplated the high possibility of the art; each must have known that in the practice of medicine, fitly and humanely discharged, it might be his to fill a loftier rank than any earthly potentate can bestow; to be the messenger of life and happiness to his fellow-creatures; to stand towards them, according to Cicero's exquisite comparison,* almost in the relation of a God. And, if such be the high scope and promise of medicine, surely no reasonable and moral person can doubt, that it has commensurate solemn

* *Nullâ re propius homines ad Deos accedunt quam salutem hominibus dando: nihil habet nec fortuna tua majus quam ut possis, nec natura tua melius quam ut velis—conservare quamplurimos.*—(Pro Ligario.)

responsibilities; that to tamper with its obligations voluntarily undertaken, or to neglect the means of fulfilling them, is, beyond palliation, a wickedness and a dishonour. Therefore am I quite satisfied to repeat, with no additional argument, that, since your success in medicine will (*cæteris paribus*) be in proportion to your pathological knowledge, so all motives to the acquirement of this knowledge are included in your general motives to become competent and successful practitioners; they share the same high sanction; they possess the same stringency.

But finally, Gentlemen, I cannot forget, nor can I refrain from reminding you, that the course which I invite you to run is in no beaten track of traditional knowledge. The science which we have jointly to study, is yet but in its first dawn and immaturity; and the terms of my commission here have imposed on me, as an especial duty, "to institute researches for the purpose of unveiling the latent processes by which disease is established, and the curative processes by which it is removed."* To co-operate with me in these researches, and to go far beyond me in achieving their great results, I earnestly invite and exhort you. I bid you enter on a field of science, where industry must have its reward in an unparalleled harvest of discovery: a field now first beginning to bear fruit, with promise of unmeasured fertility. If you have energies in you beyond the mere care for sustenance, how can you

* Mr. Green's Introductory Lecture, 1847.

better or more nobly bestow them, than in original investigations, which have Nature for their field, and the alleviation of human ill for their final purpose? It is in no transient access of enthusiasm, but in the deepest conviction of my judgment, that I affirm the supreme dignity of such pursuits; that I affirm them not only to be in themselves the loftiest occupation of the human mind, but to include the largest and most enduring rewards. To be the successful interpreter of Nature; to discover her hidden laws of operation; or by your personal exertions to augment the permanent resources and utilities of Medicine; this implies as its result, *to be remembered*, so long as Man and outward Nature coexist; *to be remembered, as the ornaments and benefactors of your species.* For when, for your instruction and encouragement, you would recount the names of those who are thus gratefully recorded; when, with the son of Sirach, you would "praise great men and your fathers that begat you;" when you would scan that great hierarchy of genius with which it is our glory to commune; whose are the memories that rise? Mark them, and analyse their achievements; mark them, while their spirits, like the angel-forms in the dream of the patriarch, seem to be passing to and fro betwixt earth and heaven, ever with new burthens of blessings for us. Like Jenner, to stay the pestilence; like Watt and Gutenberg, with the press and the steam-engine, to soften the barriers of time and space, and make human fellowship universal; like Dante, Æschylus,

and Shakspere, like Phidias and Raffaelle, to educate the affections, and purify the passions through the imagination; like Newton, Harvey, and Hunter, to be the crowned ministers and interpreters of Nature; like Plato and Bacon, to legislate by the reason eternally; thus do men achieve immortality. And if, in that bright cohort, there may seem some distinction and rivalry, between those (on the one hand) who by great and useful inventions have chiefly subserved the physical needs of man, and those (on the other hand) who have most ministered to the requirements of his intellect and his imagination; if some have seemed more identified with the weakness and mortality of their race, others rather with the power and the divinity;—again I say to you, rejoice, that in the career of original study to which I would impel you, no such distinction prevails, nor any such embarrassment of selection between conflicting aims of a noble ambition. Rejoice that, in the discoveries by which our Profession has to grow, scientific truth and practical utility are absolutely inseparable.

And, Gentlemen, for the sufficient and appropriate prize of such exertions—doubt it not for a moment! doubt not that those great men, whose names I cited, had their reward in the clear foreknowledge of our veneration and love. Doubt not that this has been their secret support in self-sacrifice and in anxious vigils: that this has given them their dignity, their constancy, their calmness. In the visions of their genius, as from some high

watch-tower, they have seen charted beneath them the continuity of human existence, like a mighty river speeding to its goal: — like it, silently and incessantly fed, as by an undistinguished dew rising from it in one hour, to relapse to it in the next: like it, ever and anon enriched more amply, as by tributary streams precipitous from above. Those streams which so swell the tide, which stamp it so far onward with their own individual character, with their mountain-freshness, with their swift determinate motion, and which impart fresh fertility to every bank that enchannels the growing torrent,— such have been the master-spirits of our race. In such guise they have read their destiny and their reward. They have foreseen themselves incorporated with honour into the perpetual organism of the human spirit,—a part of its life, a source of its development; they have known that their fame must have its pledge* in that deathless continuity of thought which makes the unity of ages; and, in their silent chambers, their hearts have kindled within them, prophesying that unborn generations would bless their name,—that they would be part of humanity for ever.

Thus—upon the heights of Nebo stood the Hebrew legislator. On his memory, peradventure, there thronged the importunate recollection of many years — years of burning sands and bitter waters; the recollection of ingratitude and of low

* Τὸ τῆς ἀρετῆς φέγγος λαμπαδευόμενον ἐπ' ἀλλήλοις διαδοχαῖς ἰσόχρονον γενήσεται κόσμῳ. (Philo.)

idolatrous apostasy; the recollection of a sordid race that he could never infect with his own high motives —never make humble beneath his guidance, even when he gave them "water from the flinty rock," or uplifted the healing symbol between their living and their dead. But, what to him *now* was any retrospect of sorrow, with the plains of Canaan spread beneath his gaze? And surely, as on that tall eminence he stood, looking forward,—surely not his outward eye alone reveled in the fertile landscape; nor did his heart dilate merely with the selfish triumph of an accomplished personal purpose. Not for him were the milk and honey of promise: not for him was it ordained ever to tread that desiderated verdure. *His* horizon circled beyond the world of sight; and a deeper intuition was his reward, as he shaped the distance prophetically. There, in clear vision before the great leader's mind, rose the whole futurity of his people —the futurity which he had wrought for them: full in his knowledge stood their achievements, their captivity, their mysterious fate: loud on his mental ear swelled their sublimer minstrelsy: far in his mind's perspective uprose their thronged metropolis, with hum of life and worship,

> The holy city lifting high her towers:—
> And higher yet the glorious temple reared
> Her pile, far off appearing like a mount
> Of alabaster topt with golden spires.

Unparalleled, heroic *Euthanasia!* with hope fulfilled; with idea realised; the light, which had led

him in the desert, now consuming the last clouds of mortality from around him,—now enfolding him for ever in its divine embrace,—now "making him like to the glorious saints, and leaving his memorial blessed."

THE END.

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