

The facts and laws of life : being an introductory lecture delivered at the opening of the Medical School of the Westminster Hospital, on October 3rd, 1859 / by J. Russell Reynolds.

Contributors

Reynolds, John Russell, 1828-1896.
Royal College of Surgeons of England

Publication/Creation

London : John Churchill, 1859.

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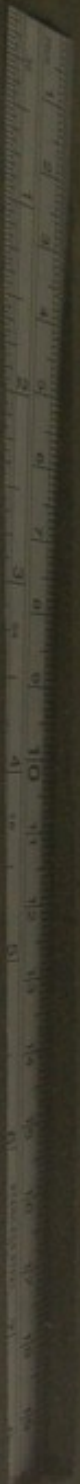
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FACTS AND LAWS

1874

In Introductory Part

DELIVERED AT THE OPENING OF THE

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THE WESTMINSTER

ON OCTOBER 1874

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J. RUSSELL REYNOLDS,

PROFESSOR OF ENGLISH LITERATURE, LONDON; MEMBER OF THE
LAW SOCIETY OF LONDON; AND
BY THE EDITOR, FOR THE STUDENT



LONDON:
JOHN CHURCHILL, NEW BURLINGTON
1874.

THE
FACTS AND LAWS OF LIFE;

BEING

An Introductory Lecture

DELIVERED AT THE OPENING OF THE MEDICAL SCHOOL

OF

THE WESTMINSTER HOSPITAL,

ON OCTOBER 3RD, 1859.

BY

J. RUSSELL REYNOLDS, M.D. LOND.,

FELLOW OF UNIVERSITY COLLEGE, LONDON; FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
ASSISTANT PHYSICIAN TO THE WESTMINSTER HOSPITAL; AND LATE ASSISTANT PHYSICIAN
TO THE HOSPITAL FOR SICK CHILDREN.



LONDON:

JOHN CHURCHILL, NEW BURLINGTON STREET.

1859.

THE LIFE OF SAMUEL JOHNSON

BY JAMES BOSWELL

WITH AN APPENDIX OF NOTES

BY THE EDITOR

LONDON :
S. GEORGEHAN, PRINTER, 6, BOUVERIE STREET,
FLEET STREET.



THE

FACTS AND LAWS OF LIFE.

GENTLEMEN,

WHEN William Tell had resolved to aim his arrow at the apple on young Tell's head, neither the malignant taunt of his oppressor, the timid entreaties of his friends, nor the innocent confidence of his boy, could deter him from his purpose, or diminish his chances of success. Gessler may smile grimly as young Walter takes his stand beneath the distant tree, still as a statue, but without one touch of fear—the crowd of friends may be breathless with horror at the thought of failure—but yet Tell lifts his “trusty yew,” and draws its well-tried string. But there is a lengthened pause; and, although the skill and daring of the man are “household words” among the young huntsmen of the Alps, Tell lets his cross-bow fall;—and why? Strong passion has dimmed his sight; he cannot see the mark at which he aims. No matter how vigorous may be his arm, nor how firm his resolve; no matter how skilled he may be in his art, how pure in his motives, how earnest in his effort; no matter how strong may be the confidence with which long years of success have inspired his soul; no matter how much may hang upon the issue of his attempt, he cannot, he knows that he cannot, succeed. He might display daring, energy, and skill, but yet he would miss the mark.

In the drama of “Wilhelm Tell” great historic events have been preserved, with such marvellous fidelity, beneath the poetry with which the genius of Schiller has adorned them.

that the strong limbs of the world's real history give all its form and movement to the poetic dress his art has so thrown around them as to hide only the ugly or unimportant, and reveal only the beautiful or the true. The same genius may be seen, perhaps less conspicuously, but not less really, in the minute incident, or "aside" allusion, I have quoted. In it we may so recognise the faithfulness with which the artist could observe and render Nature, as to see, that in her finer features there are signs of the oneness that gives authority to all her teaching, and renders her lessons applicable to all conditions and all times.

That which is true of the Alpine huntsman's cross-bow, is also true of every kind of endeavour that man may make. If he would be successful in his work, he must keep the object at which he is aiming, both well and constantly in sight. But it often happens that his sight is so dimmed that he cannot see his mark; and then, no matter from what source the dimness comes, should he persist in his effort, the results would be disastrous. The fault of sight is not to be conquered by energetic exertion; for, indeed, the very energy with which an effort may be made, is not unfrequently, the cause of failure.

Such fault is not peculiar to one profession; it is common to our race. Man, whatever his work may be, does often lose sight of his true and acknowledged aim. The admitted aim of the Counsel's presence at a trial is the just application of evidence and law to the particular case under consideration; but it has occurred, in practice, for the barrister to forget his mark, and his aim has sometimes appeared to be the establishing of what is false, and the perpetration of a wrong, the more keen because inflicted under the garb of justice. Political leaders, whose true aim is the welfare of their country, have been thought, sometimes, guilty of such dimness of sight that, to the ignorant lookers-on, their most energetic efforts appear directed rather to secure the welfare of their party. "Conservatism" is the avowed aim of some; yet so strong has endeavour been on its behalf, that one, at least, has exhibited the *reductio ad absurdum* of his principle, and has avowed his object to be the maintenance of that which is, no matter whether it be a state of stagnation or of progress. On the other hand, we have seen the Reformer so eager in his work, so "radical" in his resolution to turn all things upside down and inside out, that he has

brought again into being and pre-eminence the very abuses that his forefathers had renounced and removed.

If then, the barrister, in his most earnest pleading, may be so wide of the mark that he regards simply his client's welfare, or still worse, his own reputation for fine speaking; if the political leader may be so benighted as to think that the interests of his party are identical with those of the community; if the Conservative may do the Reformer's work, and the latter accomplish a retrogression in the affairs of State, we must not feel surprise if the medical student,—whose true aim is so to learn the facts and laws of life as to utilise his knowledge, in every way and to the highest degree, for his fellow-men,—we must not blame the student of medicine too severely, if, in his eagerness to attain this end, it should sometimes appear that he is but learning the names, and the most easily acquired means of so distinguishing the most ordinary diseases, as to pass an examination, and make use of his diploma for himself.

But, although things are not what they ought to be, neither are they what they seem; and these are but the extremes—the one the highest, and the other the lowest—between which the student of medicine practically takes his aim. It is scarcely possible that he should, perfectly and exclusively, realise either the one or the other. There is no man, no matter how lofty may be his aim, nor how earnest his endeavour, whose whole career is free from all taint of either selfishness, prejudice, or short-coming; neither is there, I trust, any student of medicine,—no matter how poor may be his conception of the work he has taken upon himself to do, nor how lazily he may be inclined to do as little as is possible to “pass” just safely, rather than to practise ably,—there is, I believe, no one, even thus unworthy of the rank he now holds,—who is not sometimes moved to sympathy with the sufferings of his fellow-men, sometimes eager to know more than mere “passwords” of the great mysteries of Nature by which he is surrounded, and into which he is urged to look; and sometimes desirous of hereafter throwing in his mite into the treasury of scientific knowledge, and lightening, by his aid, the heavy burden of humanity.

But, if the aim and work of the student may graduate between such extremes, and if in all individuals there is some battling of the higher with the lower tendency, our object should ever be so to cultivate the one and repress the other, that the student of medicine may become the true man of

science, of art, and charity ; and that he may become this, he must constantly keep his aim in sight ; it must be that which gives unity and form to all his actions, his purposes, and thoughts.

The huntsman's arrow is not, however, always on the wing ; nor is he always, with strained eye, keeping the mark in sight : there are moments when he burnishes the shaft, or mends the broken string ; times when he plays with his weapon or lays it aside in rest. And so with another life-work : it is not that, at every moment, the eye, and heart, and hand must be fixed on one end, and working in one groove. Such treadmill-like occupation might grind corn, and be more wholesome than utter idleness ; but the man would be thus using only a fraction of his energies, and would himself make no advance. It is not that the constancy of your purpose is to be the fetter to confine your limbs, nor the dead-weight to drag their movements down to a dull uniformity ; but it is to be the harmonising power—that which gives resultant direction to, and ensures progress in, the thousand-fold differently-pointing and acting forces of your being. There are, however, special occasions upon which a man's occupation may, with advantage, be the reconsideration of his "aim ;" the removal from it, and from himself, of obstructing and confusing elements ; and the gathering together of his powers for renewed and more successful exertion. No occasion presents greater claims to be thus employed by you than does the first day of a new period of your work, when you resume old studies and enter upon new—take stock of your intellectual property, and ascertain the balance of memory and forgetfulness—arrange your plans of work and of recreation—and start again forward in your life-career.

The aim of the student of medicine is, as I have already said, so to learn the facts and laws of life, in both health and disease, as to utilise his knowledge, in every way, and to the highest degree, for his fellow-men.

The *subject-matter* of your study, then, is LIFE.

There are many things and many principles which it is almost impossible satisfactorily to define ; but yet, upon these very subjects we know so much, that nothing is easier than to criticise and pull to pieces the attempts at definition made by others. I remember to have seen a number of gentlemen—barristers, physicians, clergymen, and others—formerly the pupils of a college in the metropolis,—who were

assembled to discuss the principle lately adopted by the University of London, of admitting candidates to the examination for degrees in Arts independently of their having attended any lectures at a college. These gentlemen, congregated for the very purpose of arguing in favour of a college education, were absolutely silent when asked by the distinguished historian of Greece to define what a college was! We may know very much without being able to define, for a true definition is much more than a mere means of recognition, with which it is not unfrequently confounded. We may recognise an individual by his walk, or by his hat; but neither a military gait nor a peculiar head-dress would be a definition of our friend. Again with man, he may be the only animal that cooks his food; but the definition of man that he is "a cooking animal" is eminently unsatisfactory. It is comparatively easy to discover means for distinguishing one object from some other, or from some other hundreds of objects; but a definition must be the statement of that which invariably distinguishes it from all others. In order truly and comprehensively to define, knowledge is required co-extensive with the facts, and accurately correspondent with them; and there is little—nay, there is nothing,—with regard to which our information is thus perfect; for, at the best, we know but in part, and see all things, "as in a glass, darkly," as unsolved problems for our study or our faith. This partial character of our knowledge is eminently true in regard of life. Much as we know about it, there is yet so much more that we do not know, so much that we feel not only may be, but is, and yet is behind some veil our sight cannot penetrate; near to us, and yet so placed that we cannot grasp it with our hand; so like ourselves in another that we feel that we are one, and yet so far separated by the dense wall that comes between soul and soul that we know each is individual and alone; so much that points to some principle where consciousness and experience may be one, and yet so much that rises up between us and that principle, that hitherto it has escaped our most earnest gaze:—there is so much that is mysterious in life, so much that is attractive in its mystery, that other sciences have been made but stepping-stones to a knowledge of this, the highest science; and yet, with all these aids, and with our two-fold method of arriving at its truths—viz, consciousness and observation—there are none which have so persistently and entirely eluded our grasp. Still the attempt is carried on,

and life is the subject-matter of your study; and your endeavour must be to know accurately that which can be known about it, and to know it all.

The view which we take of life will influence deeply the method of our study and our action. If definitions are defective, still they indicate tendencies, or directions, along which investigation has proceeded; and our adoption of one or the other will affect, if not determine, the direction of our own effort. It is not my purpose to examine definitions now; I will merely enumerate four classes of definition, for the purpose of showing that all they have yet accomplished is to give hints of the directions in which investigation should proceed. Whether we define life in some such abstract terms as the "tendency to individuation"—a definition which confessedly includes stocks and stones as well as trees and men;—or, in such chemico-mechanical phraseology, as "a double interior movement of composition and decomposition"—an expression which, if adopted, renders it difficult to see wherein life differs from a galvanic battery or a common fire;—whether we regard it as a "divine aura," and thus place it at once beyond the reach of all physical investigation; or as a particular expression of some general physical force, thus making it to agree, in essence, with heat, light, and electricity; whether we choose the one or the other of these phrases, by which it has been sought to define the nature of life, we shall fail in finding it to be a satisfactory definition, and we shall gain little real help from any one of them, unless we recognise that no one of them is in itself fully comprehensive; but, on the other hand, we shall lose much unless we see that there is in each some truth about life which it would not be well for us to pass by. Each expression I have quoted, although it points out some striking feature of life, yet leaves undefined that which it seeks or pretends to define; and we are left with these phrases, these hints of direction, reared as finger-posts, at long distance from each other, and each pointing from the light or twilight in which it stands to some spot in the darkness, at which their converging lines may meet. We may take our start from either of them, and advance freely to a certain distance, for the light is still around us, and our path beaten by the steps of those who have gone before; but soon the darkness comes, our path wanders and is lost, and we must retrace our steps, or stumble on into the still deeper night. Yet we know, we feel certain, that there is some point wherein all these lines must meet; we feel

confident that they do not pass onwards and onwards into the infinite, without relation to each other, without meaning, and without end; but that there is a central truth towards which they lead; and hidden though it has hitherto been, and still may be, from human eye, yet it is a reality which gives meaning to all that tends towards it, to all that lies around it and above; and that its discovery is the goal towards which all successful investigation of life must be directed.

Life, then, as the subject-matter of your study, embraces much more than it sometimes appears to do in your physiological hand-books: in it is wrapped up, besides bones, muscles, and intestines, the being and destiny of humanity. It is to be studied in the silent and solitary depths of your own consciousness, as well as in the lecture-theatre and dissecting-room:—you must see it in the minds and hearts of your patients, as well as in their limbs and viscera:—you have to deal not merely with that which may be analysed, experimented upon, cauterised, bandaged, or cut off, and cast away; you have to do not only with those pains which may rack the body or disturb the mind; you have for your study not only the material fabric, which is so mysterious in its facts and processes;—but you have also for your study its still more mysterious tenant; you have to do with that which can rise superior to all weakness, and can triumph over all pain; and which, in the very article of death, may utter the prophecy of a life,—as yet unseen, but still felt to be, and to be more real, more strong, than that which, though so real, is now just sinking into silence and decay,—a life, whose witness here, having just burned into your soul's deepest creed the facts that it is, and that it cannot die, is itself, in another moment, carried beyond your sight.

If, then, you would so learn of life as to alleviate its woes, you must not regard your patients as merely interesting clinical phenomena; you must not look on them as cleverly-acting physiological machines, upon which you may experiment for your own diversion; you must not imagine that “cases” are brought before you for the purpose of illustrating books, or of proving so-called statistical laws—that diseases are existing for the sake of teaching you the long names which men have given them, or for the sake of establishing this or the other pathological opinion; that limbs have been created and broken that you may feel the “crepitus” of fractured bones; or blighted, that the surgeon may display his skill in their amputation;—you must

take far other views than these, and see, in each sufferer who may come before you, that there is an individual history, as interesting, perhaps far more so than your own;—you must see that disease is something far more important, and far deeper than an aching head, a hurried breathing, or a fluttering pulse; that disease is something much more serious than the mere interference with the mechanism of physical life; that the measure of its evil is, not the increased rapidity of pulse, not the daily wasting of the body, nor its numerical frequency in the bills of mortality, but the degree to which it so tells upon the mind, heart, will, and power of man that it prevents him from doing that work in this world which it has been given him to do. Whatever pathological creed you may adopt as to the essence of disease, be assured that this is the true measure of its magnitude, the true standard of its evil. He, who after having toiled arduously and successfully for years, yet when having completed his threescore years and ten, amidst much weakness, distress, and pain, can still carry on the work that he was accomplishing, and, while on his death-bed direct others in their work, and aid them by dictating his own latest thoughts, is far less diseased, though his malady may invade whole organs, and may be of the most so-called “malignant” order,—yet for all the highest ends of life he is less diseased than is the wretched and useless hypochondriac, who, with strong limbs and mighty appetite, is, and has been for thirty or forty years, a mere drag upon society and friends, a torment to himself, a useless, actless, complaining cipher, always fearing the evil, which at last comes, it may be, by so-called accident, and then the most acute pathologist, with micrology and chemistry to help him, can find no trace of malady in any one of his long-maligned, but, even at the last, most creditable organs.

The mysterious material body which is your care, must be regarded as but a subservient part of a more mysterious whole; and you must never forget the higher elements in your eagerness to understand the lower.

While the subject-matter of your study is vast, complicated, and attractive, it is such that you cannot know it in its essence. Nevertheless, you may learn its *facts* and *laws*, for these come within the range of our powers. We have to learn about life just that which we have to learn about heat, light, electricity, or gravitation. The nature or being of any one of these we do not know; but, by reason of their less

degree of complication, we have become acquainted with a larger number of their facts and laws. The same kind, however, if not the same degree of knowledge, is possible in regard of life.

The word FACT is used in two senses. It is employed to designate an actual occurrence, a something done. Fact, in such sense is equivalent to that which is, or was. But it is used, as commonly, to denote a statement of what was, or is, according to the testimony of an observer. Fact, therefore, means correctly that which is; incorrectly, that which is said or believed to be. In the former sense, we speak of the "*facts of Nature*;" in the latter, of the "*facts of Science*." The process of respiration is at this moment going on in each of us; certain movements are effected in our bodies; certain changes, textural and chemical, are wrought in our tissues; the air of the room is affected in composition, temperature, and weight:—these are the facts, the actual occurrences, of respiration; they exist independently of all physiological treatises; they are unchanged by our having written anything about them, right or wrong; they are the subject-matter for investigation and thought. But the process of respiration is described in books, and has been described from the time of Hippocrates to our own; the muscles and nerves that effect the movements of the chest-walls have been enumerated; the precise changes in blood and air have been detailed, and that with extreme minuteness; theories have been introduced, and respiration has come to mean a certain more or less definite chemico-vital change; but, apart from theory, and apart from all secondary meanings of the word, we say of our physiological treatises that "the facts of respiration are to be found" in them.

Now, the moment that the word "fact" is applied to a description, or to any statement of what occurs, this supposition is made, that the individual who observed the occurrence was not only capable of observing correctly, and of detailing accurately, but moreover that he did so. In other words, that a correspondence existed between his mental conception and the reality; and further, that he has represented as truth that which did really exist as fact.

Without pretending to decide whether this correspondence ever has been, or ever can be, absolutely correct; without affirming that the facts of science must always be only approximative in the accuracy with which they describe the facts of nature, this, I think, may be stated, without fear of maligning either

our capacities or our scientific systems—viz., that, at present, the correspondence is by no means perfect; and that, therefore, the facts of science should be constantly submitted to re-examination, and to comparison with the facts of nature, that their true value may be assigned them.

In order to learn the facts of life, you have to observe them for yourself, and you have to become acquainted with those which others have described; and, that you may do this successfully, great caution and circumspection are required. "What!" you may ask, "am I not quite competent to take notice of any phenomenon, and just describe faithfully what I see? Surely, this is the simplest thing that can be required of me: common sense and honesty are the only faculties required for such a purpose!" True! common sense and honesty are faculties that you require; but how rarely can even these be found, and these alone! We bring to our observation not only our abilities but our weakness; not only the truths we have learned, but the errors we have received as truths; not only consummated information on some points, but very partial and imperfect information upon others; not only honest intentions, but preconceived opinions; not only an earnest wish to know the truth, but as earnest a wish that the truth should turn out to be something we have fancied it; not only a humble desire to learn what nature teaches, but a vain and very foolish desire to find our own pet theories, or the favored theories of others, confirmed by her great authority.

But further, for the observation of certain facts, a special kind of education, and much anterior knowledge, are required; and with this very education and its results there are attendant sources of fallacy. If the means to be employed in an investigation are imperfect, the result will share that imperfection. If the object you are inspecting is distorted by the glass you employ, so long as you are ignorant of the distorting power of your glass, your idea will be out of correspondence with the fact. If either chemistry or physics be defective, when you describe a vital function in terms of chemistry or physics your description will be, *pro tanto*, depreciated by that defect. You have to guard against all these errors; and simple, therefore, as it may at first sight appear to be, to observe a fact, let me assure you that there is no faculty in which the scientific man exhibits his right to that title more distinctly than in this very power of observation; and that there is no faculty, the

absence of which from many minds has brought more confusion and more error into our scientific annals.

The facts of nature are unchanged; and surely the mind of man was as able and as honest in the days of Aristotle as it is in our own; but many of the scientific facts of his time are not those of the nineteenth century;—nay, the scientific facts of to-day are not those of the past year. We have thrown aside as errors the statements which our fathers, or even we ourselves, had regarded but a few months ago as facts proved by the latest science.

Scientific facts are not, then, very easily observed; and why they are not you will see, if you think for a moment what a scientific fact really is. It is the description of a certain kind of phenomenon, or process, in terms of two or more other kinds. It is the division of a scientific word into its syllables or letters. For example, the scientific facts of life, *i.e.* of the kind called “vital,” are described in terms of other kinds, such as chemistry, mechanics, physics, chronology, and the like. The facts of the vital process termed respiration are thus resolved into certain chemical changes in the air and blood; certain mechanical arrangements of chest-walls, muscles, and nerves; particular relations in regard of time, of expiration and inspiration; certain changes in the colour of the blood; the temperature and hygrometric conditions of both the body and the medium in which it is placed. The “facts of respiration” undergo, therefore, in the attempt to state them, a process of reduction to their lowest terms; and these latter are not “vital” in their character, but physical, chemical, and mechanical. What is vital, is the link of connexion or association of these facts: *i.e.* not the letters themselves, but the words they spell.

One half of the facts of life cannot be submitted to this process of reduction; they can be stated in no simpler terms, and in no terms which are otherwise than figurative. You may compare one kind of sensation to another kind; you may qualify it by comparison with external conditions or processes; and thus you may speak of a “silvery tone,” or of a “tearing pain;”—but these qualifying terms are figurative, and the words tone, pain, taste, light, feeling, and odour defy all analysis, and are insusceptible of reduction. The same is true of all the processes of mind and heart: you cannot express these in chemical or mechanical phraseology; they must have a language of their own. It is not, however, with regard to these facts that I was speaking,

but of those which are to be witnessed in the material body, and which it is the effort of science to reduce.

The reduction is constantly advancing; but at the same time, the sciences of physics and chemistry progress, and any change in them necessitates some change in the statement of the facts of life. Until all the sciences are perfected, both in quality and quantity, there must be some want of correspondence between the facts of nature and those of every science; and in proportion to the advance of the simpler sciences, the more complex must undergo changes in the statement of their facts.

These are the necessary obstacles in the way of your appreciating facts; but there are some very unnecessary hindrances, which you may at once perceive and avoid, such as careless observation, and prejudiced reporting; and there are others, to escape from which will require all your care. The capacity of humanity for creating difficulties, and then blundering among them, seems almost infinite; see to it, therefore, that you do not take *fancies* for facts.

There have been, and still are, in science, mere fictions of the mind, having no counterpart in nature; perfectly gratuitous assumptions, or groundless assertions of things which the Magi of a past, or of the present generation, may have invented, in accordance with their preconceived notions of what nature ought to be and to do. We need not go back to past centuries for the discovery of such fictions; the "archeus" of Van Helmont was not less real than "the vital knot" of M. Flourens; and in our own day, and in our common conversation, there are terms used, and that very freely, of which it is by no means easy to show the counterparts in fact. I would not say that such words as "hysteria" and "rheumatism" have no meaning, for it is well known that there are certain definite conditions associated with those names; but let me ask whether the adjectives "rheumatic" and "hysterical" are not daily used without any approximation to a meaning, and without the shadow of belief that the aches or pains so denominated bear any relation to that which is denoted by the words rheumatism and hysteria respectively? Not content with the limits of pathology, as an arena for confusion, some men have gone, with such words as their passport, into the regions of religious feeling and social history; and the present so-called "revival" in Ireland has been deliberately denominated "hysterical," and that in scientific quarters! As well might "the builders' strike,"—because the

sweat of the labourer is stopped, and his temper somewhat soured by the process,—be termed “rheumatic!” These words are, nine times out of ten, but figures of speech; the clothing of ignorance or laziness in verbal finery or would-be scientific grandeur; and this even where the substantive use of the words is something more than a mere refuge for destitute diagnoses.

Do not mistake legitimate *hypotheses* for facts; but understand, and always bear in mind, that they are hypotheses, and as such they may be of great utility. The hypothesis is useful, inasmuch as it is often a hidden thread, binding together otherwise disjointed facts into provisional groups, so that the mutual relations of these facts may be studied, and also that the group as a whole may be compared with other groups. The hypothesis, moreover, suggests an explanation; or, at all events, the direction in which an explanation may be sought. It supplies temporarily some fact, some link in a chain of phenomena, or some relation between them, which is at present unobserved. But unless your hypothesis is of such nature that it is susceptible of future verification, or the reverse, by direct observation and experiment, its continued employment is illegitimate, and it is useless, and further, it is worse than useless when its nature (as an hypothesis) is forgotten, and it is taken for and employed as fact.

Many systems of “classification” which have been of great service, contain in them much that is purely hypothetical, and which eventually yields to an improved scheme of grouping. Thus, in the Linnæan vegetable system there are numerous guesses at truth, underlying very superficial phenomena, which latter were used as lines of classification; and in the more “natural systems” of De Candolle and Jussieu, there is still some hypothesis in the construction of every “alliance,” and indeed of every “order” and “genus.” The hypothesis is, that there exists between the individual species of a genus some nearer and deeper relation than any which is apparent in petal, leaf, or fruit; for in one species this character is absent, in a second that character is wanting, and no one contains all, and yet not more than all, the features proper to the group. Each species ranges itself around an imaginary centre—a typical, but non-existent combination of qualities—supposed to represent and witness to other characters than those which meet the eye; and the hypothesis is, that in the essence of each individual member of that genus, there is a greater likeness or oneness than there is between members of one genus and those of another. We know not what the essence is, but all our

attempts at classification, in so far as they are successful, and that because true to nature, are approximations towards its discovery, *i.e.*, towards a knowledge of the facts of its history

There is no difference of kind between the principles upon which we base our classification of those natural objects with regard to which systematic arrangement has arrived at its highest perfection—as, for example, in botany and chemistry—and those principles by which we classify other natural objects, in respect of which our information is far less perfect, as in physiology and pathology. Our classification of disease therefore contains much legitimate hypothesis. Of this let me give you an example. In the “Letters” of Morgagni, there are to be found cases—minutely and graphically described, in which we can now readily distinguish the features of a well-known disease. For many years such cases had been, and continued to be, observed; but it was the merit of the late Dr. Bright to form them into a group, and to suggest the link of connection between their diverse symptoms.

But if you ask, “What is ‘Bright’s Disease?’” I reply, that it is the expression of a hypothesis. Let me remind you that there may be three individuals suffering symptoms of this disease, and yet, at certain periods of their history no one shall present any symptom precisely identical with those of either of the others. In one there is anasarca; in another, hydrothorax, or ascites; in a third there is no dropsical effusion: in one there is albuminuria; in the others it is absent; in one the head is principally distressed, headache and blindness are present; in a second, the chest, there is dyspnoea and cough; in the third, the abdomen, there is vomiting and diarrhoea: in one, the kidney is enlarged; in another, it is atrophied; in a third, it is cystiform. There is little in either their general appearance, their age, the onset of their malady, its subsequent history, or in their mode of death, in which either two of these three cases resemble each other; and yet each may be an unquestioned example of “Bright’s Disease.” What, then, is “Bright’s Disease?” Every feature it presents in one case is absent in another; you cannot define it by this, or the other symptom; you cannot limit it to any one condition of the kidney. No; the name expresses a hypothesis—viz, that there is something common to all these cases; that there is between them a closer and deeper affinity than that of their merely

presenting in common—should they do so—albuminuria, anasarca, or the like; that in their essence—*i. e.*, in the essential character of the departure of each from healthy vital action—there is a similarity or oneness which we cannot yet define; may, perhaps, never accurately and comprehensively describe, but which, nevertheless, is; only, like life itself, it will not be compressed into our formulæ, nor expressed in our words. The various cases range themselves around some non-existent case, the centre and type, from which all exhibit more or less marked divergence. That which constitutes the centre was supposed to be a particular condition of the kidney: the hypothesis was that therein was the fundamental fact, associating the various forms of Bright's Disease. Prolonged investigation, however, appears to show that this idea is incorrect. But, in whatever direction future research may prove the true essence of Bright's Disease to exist—whether it be found in some hitherto undiscovered condition of the kidney, in the blood, in the nervous system, or in that which is denominated “nutrition”—the construction of a group of cases, by means of this hypothetical consideration, has been of the very greatest utility.

Hypotheses of the kind I have just sought to explain underlie every attempt at scientific classification, for there is no perfectly “natural system” save that which pertains in nature itself—*viz.*, the division into species. All grouping beyond this is artificial, and but an approximation towards the truth: each grade is a step upwards towards some generalisation, or some law of life; but there are no steps, any more than there are “leaps,” in nature itself: the slope, in reality, is a continuous incline; the steps are but aids, artificial lines and halting-places, which we have cut out to assist us in our progress.

In one department of your study—*viz.*, that of “Medical Jurisprudence,” you will have to recognise the existence of artificial lines, even more arbitrary than those which have been introduced into scientific classification. As students of nature with a “scientific” purpose, you fail to find points through which lines of perfectly true demarcation can be drawn, and you begin to believe that such lines do not, and cannot, truthfully exist. But, for “social” and “legal” purposes, such means of distinction must be employed; and, if natural lines cannot be found, artificial ones must be created. Scientifically considered, a man may be “insane,” or “guilty” of this or that special crime; but, legally re-

garded, because he is on one or the other side of a line, which it has been convenient to draw, and which is, or was, well drawn at some period of our history, he is to be treated socially as "sane," or "innocent" of the alleged transgression. You must distinguish, therefore, between legal tests and scientific hypotheses; although the former may be based upon the latter.

But the legitimate use of hypothesis must not be confounded with its illegitimate abuse. Care is required in the formation of this implement for study,—care that it is not contradicted by facts, and that it is of such nature as to be susceptible of verification; for without such caution the hypothesis is a hindrance rather than an aid. The words "pre-tubercular stage of phthisis" may not only have some meaning, but may express a chronological fact, as well as, upon certain premises, a logical necessity; but the existence of such a stage as a clinical fact is yet unproven; and the introduction of such phrase into symptomatology is, I think, precipitate and undesirable—not because it is a hypothesis, but because its verification is, from the very nature of the supposition, impossible. Again: the words "suppressed gout" may, in years that are past, have had relatively some more definite meaning than they can have now, inasmuch as our forefathers did not know what they meant by the very gout that was suppressed; but in the present day we have heard, and may still hear, trains of symptoms that have lasted for a lifetime set down most ruthlessly, and without the shadow of evidence, to this mysterious thing—"suppressed gout!" Do I mean to say that gout cannot be suppressed? By no means; such assertion would be as absurd as to say that there are no "mute, inglorious Miltons" in our country churchyards. The one statement would be unwarranted by history, and in the teeth of all the poetry of agricultural life; the other would be unwarranted by pathology, and in direct opposition to the authority of most venerable practitioners. But what I do assert is this, that any one who uses such term should be liable to some pains or penalties if he does so as a guess; that he should be compelled at once to verify his hypothesis, or to devour his own words; and that if, in these days of pathological chemistry, such verification is impossible, the term should be cast away from our nosology as an illegitimate hypothesis.

Modern pathology presents a profusion of these illegitimate hypotheses, and they are obstacles in the way of its advance. Sometimes they are created for the purpose of

concealing ignorance, and sometimes for the purpose of securing fictitious and temporary fame. Showy as they are unsubstantial, they often appear fashioned as the so-called "balloons" of the "circus" may be, to be held up for the purpose of destruction; glittering, gilt-edged baubles, through which critics, horsed on their editorial "we," may leap unhurt, to the admiration and astonishment of those who know not which to admire the more, the flimsy speculation, or the equestrian's agility in its demolition; but which, to all who are earnest in the search for truth, and who see that it is not to be found by an everlasting iteration of this circle of creation and destruction, is a lamentable waste of time, energy, and skill, and a still more grievous fallacy, because often mistaken for real progress.

Again, mere matters of *opinion* are not to be confounded with scientific facts. Such confusion often occurs from either carelessness or ignorance. The individual committing such mistake does not substitute a fiction of his own imagination, a deliberate creation of his own fancy, for a fact; neither does he produce anything which is worthy of the name of hypothesis. His guess is neither ingenious nor philosophic; it may be right, or it may be wrong; but if either, it is so by chance, for it is a hastily or ignorantly formed opinion passed off for fact.

It has been said that "one fact well observed is worth a cartload of opinions;" but opinions, whether single or in cartloads, are of some value, and that in proportion to the information and ability of those who frame and utter them. The opinion of an individual, either absolutely ignorant of auscultation, or totally deaf of both ears, would be of but little value in most cases of heart-disease; but minor degrees of these incapacities appear at times to confer upon the dicta of some people an extraordinary amount of importance.

But, whether particular opinions are of great or of little moment, it is of the utmost consequence that they should be distinctly separated from scientific facts. For example, it is the opinion in some quarters that an intimate connection subsists between disease of the supra-renal capsules and bronzing of the skin; it is the opinion in other quarters, that the relation is an accidental one. The facts are, that the two elements are often associated, often not; and it has yet to be shown that when they co-exist there is not some other element essential to their relation. It is the opinion of some that bronzing of the skin and emaciation of the body

depend upon disintegration of certain nervous ganglia in the neighbourhood of the supra-renal capsules, and that it is only when disease of the latter extends to these nervous elements that the cutaneous and nutritive effects are observed; and hence, that the supra-renal capsules have nothing to do with either the chromatogenous function of the skin or the nutrition of the body. These are opinions, and while the unquestioned facts are still *sub judice* in regard of their explanation, what is to be avoided is the expression and use of these opinions as facts.

It is because this kind of distinction has not been maintained that so much evil has arisen in many of those judicial investigations, where not only medical facts but scientific opinions form part of the evidence. Whether the case to be investigated be one of suspected lunacy or poisoning, we almost invariably have the spectacle of scientific witnesses called up in violent hostility to each other; and the report of this warfare is followed by an outcry from the public and the press, that, as the doctors disagree so widely their evidence, is of little value. This, gentlemen, is an opinion; it is not the fact; but there are some grounds for its existence in the public mind. A jury has to form its conclusion from two classes of scientific evidence, viz., facts and opinions; it has to hear a description of what actually occurred—of what are the symptoms, for example, of natural disease, and of what are the symptoms of poisoning. In order to decide upon such evidence, the jury is supposed to be educated up to a sufficient scientific eminence to form a rather difficult diagnosis, and to settle a question with regard to which the most careful and the best-informed of our profession might feel doubtful! But the evidence does not stop at this point; scientific witnesses are asked their opinions upon, or interpretations of, the facts they have stated. These opinions are given; and generally between those of the witnesses on different sides, and sometimes between those upon the same side, there is as great a divergence as is possible within the bounds of common sense; nay, sometimes even these limits are overleaped! The difficulty of the juryman's task is now increased tenfold: before, he had to judge of scientific facts, now he has to judge of scientific men; he has to weigh in the balances, not only their statements, but their opinions—not only their veracity, but their ability; and he has to form his own conclusion,—and one which must be at variance with a large amount of scientific evidence and opinion from one side or the other—by a judgment amongst scientific men, by the

differences in their mode of stating facts, and by a discrimination among the facts based upon the scientific credibility of the men.

Now, I readily believe that some plain-thinking, common-sensed artisan is quite competent to perform the task of at once recognising that some opinions given in evidence have no value whatever; that the man who has framed them has done so in carelessness or ignorance, or both: and that they are self-contradictory, or at variance with facts which he himself admits. On the other hand, the high value of some opinions may be immediately perceived and correctly estimated. But, when neither of these extremes is present, or when they are so combined or opposed as to neutralise each other, the position of the juryman is one of intense difficulty and complication. This it is by the very nature of the case; but its difficulty is increased to a most unnecessary degree by a want of distinct separation between the two kinds of scientific evidence, viz., the facts and opinions. This distinction is frequently neglected in all parts of the trial; scientific witnesses, counsel on both sides, and judge himself are alike guilty.

To exclude either element of evidence is, I think, impossible; to banish the facts would be to deprive the jury of all standard for the valuation of opinion; to exclude the opinions would be to take away all hints towards an interpretation of the facts; while, on the other hand, to allow both elements of evidence, is to give opportunity for a curious and somewhat unsatisfactory mental process, viz., the balance which an "inexpert" juryman has to strike between his own scientific opinion and that of the highest scientific authority in the country; and it furnishes, moreover, the opportunity for almost endless blundering between these two things, which are essentially distinct, viz., facts and opinions.

Again, do not treat and use as facts mere *half-facts*, or other fractional parts of them. Many statements may be true, but imperfect; and they become not only useless, but injurious, when their relation to the whole truth is disregarded.

There are two different ways in which you may know but half the facts of a question; you may be acquainted with the evidence on one side, and be entirely ignorant of that upon the other, or you may know only half of the evidence on both sides. He who, as a matter of habit, knows only the one side of a question, must have his mind diseased or crippled by prejudice; and if he act upon such information, his action will be that of the bigot. On the other hand, he who

habitually rests satisfied with half knowledge, on both, or all sides of a question, must, to begin with, care little for the point at issue; and if he have any interest therein, it is of some secondary or trifling moment.

If the medical student rests contented with the teaching of one book, or of one school, and cares not to know the views contained in or entertained by another, he exhibits a prejudice which may seriously injure him in after life; but, if he is contented with acquiring only such a smattering of information on all sides as to have no opinion of his own, and no valuable knowledge on any one disputed question, it will very probably be found that he cares little for truth for its own sake; and further, that his scraps of information bear a striking relation to the pet views of reputedly "crusty examiners," and that his magnanimous aim in their collection is, to "get through the Hall."

Avoiding the sources of fallacy which have been enumerated, keeping steadily in mind the broad distinction between facts and fictions or fancies—those scientific "delusions" which demonstrate the scientific insanity of a man;—further, maintaining hypothesis in its proper place, and perceiving the difference between that which is legitimate and that which is not; distinguishing between opinions and facts, and between parts of the truth and the whole, you may learn much of the facts of life; and having learned these well, you advance by their aid, as by the alphabet of a new language, to the study of VITAL LAWS.

The term "*law*" is one with which we are very familiar, but its applications are most various. It has been used to denote those ten great utterances of man's moral and social responsibility, which have come down to us, with sublime mystery and authority, from a far distant antiquity; and the same word '*law*' has dignified the last percentage announced by the Statistical Society. Those bare generalisations of geometrical facts, revealed by the motion of the planets about the sun, and of the satellites around their primaries, have been termed, from the period of their institution to our own day, "Kepler's laws;" while, on the other hand, the proscriptions and restrictions of the last act of Parliament form the latest addition to the "laws of our Country." The general statement of a progression in the order of development, from the general to the special, forms one of the "embryologic laws of Von Bär." The "positive philosopher" states, that the three stages through which scientific study passes are

“laws of the progress of humanity;” his critic may state that they are, or are not “laws of the human mind.” And again, the conditions upon which individuals are admitted into this excellent Institution, are termed the “Laws of the Westminster Hospital.”

Disregarding mere differences of detail in the objects, to the phenomena or relations of which the word may be applied, it is very commonly said that there is one great distinction to be observed between the several uses of the term which I have just enumerated, and that by means of this distinction we may form two categories of laws. In the one, it is said, is prominently conveyed the idea of enactment in accordance with the will of an individual or institution, plus a coercive power employed by that will, in order to enforce obedience or to inflict pains and penalties upon its transgressor. In such general idea, the Decalogue, Acts of Parliament, and the laws of this Hospital agree. In the other category there is no bringing forward of this idea; all that the law contains is, it is affirmed, a statement of the conditions under which certain phenomena occur. Apparently, there has been some endeavour to get rid of the idea of will or coercion from the statement of such laws; and in such negation are practically allied to one another, the laws of Kepler, those of the Statistical Society, of Von Bär, and Auguste Comte.

This distinction is not one in regard merely of the supposed origin of the laws referred to; the ideas of will and coercion are essential to the very conception of law in the one class, and not only inessential, but, in the judgment of many, absolutely foreign to the idea of law in the other class. This difference, however, is, in my belief, apparent, but not real; on the contrary, that which is common to all the uses of the word, and which justifies the employment of the term “law” to any of them, is, in my judgment, the presence of those very ideas which it seems now to be the wish of some to exclude. Whenever the word law is used, there is in it the suggestion or conception of that which is other than the phenomena, and greater than the mere fact of the order in which they occur. There is inherent in the idea of law the suggestion of a plan; and it is only to such generalisations of sequence as contain this suggestion that the word is correctly applied.

What, then, is the difference—for one plainly exists—between the two groups of laws that I have quoted? It is this:

that, in the one group there is merely a command,—by a visible or admitted lawgiver,—which may be disobeyed, the penalties resulting from transgression being the fulfilment of the law; in the other, there is no expressed command;—the lawgiver, though unseen, being necessarily assumed,—but there is no place for disobedience. To the one kind of law man's will may be opposed; he can obey, or he can resist: to the other kind the will of man may be opposed or not, but he has no power of resistance; obedience is a matter of choice in the one case—in the other, no choice is allowed. Thus, a man may violate every moral principle—he may break every social tie—he may transgress his country's laws, but he cannot escape from or resist the law of gravitation: he will sink in the water if he makes no effort to escape; he cannot resist the vital law of respiration; he must breathe air, or die. Moral and social enactments may be so inextricably interwoven with laws, of which they form but a part, that their violation involves, and that of necessity, ulterior evil; but physical laws cannot be violated; man cannot choose between obedience and penalty. The association of suffering with sin is, in my belief, as real as that between air-breathing and human life; but the relation, in the former case, is matter of inference from other data than mere experience; in the latter, it is matter of actual observation. If, then, not only the idea, but the fact of coercion, is more evident in the one group of laws than in the other, it is in that very group from which the modern philosopher would exclude it. So familiar has man become with the transgression of moral and social law—with the determination to run the risk of penalty rather than simply to obey—that, because he sees physical laws maintained inviolate, he loses sight of their common nature, begins to think of them differently, and tries to denote them by different words. And surely, if the difference that is supposed to exist does pertain between them, some difference of terminology is needed.

An ingenious and learned writer has proposed, in order to rid our minds of the “intrusive and delusive meanings” with which the word law is “clogged,” that it should be omitted altogether from our scientific glossary; and he substitutes in its place—though, it must be allowed, with some misgiving—the term “method,” or “path.” The so-called laws of nature are, in his improved phraseology, “the *paths* along which the activities of nature travel to results (phenomena.)”

But, let me ask, what is the meaning of a path? Surely there is, in the idea of a “*path*,” something besides, other

than, and anterior to, the "activities" which travel along that path! If it mean anything, it must mean a distinct and necessary line or direction, along which this travelling must be accomplished; a something, outside of which the "activities of nature" cannot "travel to results!" In such idea, that of coercion is as distinctly present as it is in the term law. The philosopher of to-day has taken the "strait-waist-coat" from off nature, but he has not set her free—he has placed her in a "padded room!" Surely, such treatment is not a true example of a system of "non-restraint!" The hunter, in his loose box, has more liberty than when tethered to his stall, but he is not free. Restraint is still present in the philosophy, the asylum, or the stables of the nineteenth century; although it may be in a more pleasant form, than in the words, the cords, or stalls of a bygone day.

It may be said that the supposition of will or coercion in the conception of law is an attempt to explain how the laws were framed, and whence they came, not what they are; and, that in making such supposition, we at once pass beyond the limits of scientific inquiry, and enter the domain of either theology or metaphysics. If an attempt to explain what is meant by, and included in, the terms vital function, secretion, respiration, and the like, is a departure from natural science, or from the science of physiology, and is an entrance into the region of etymology, chemistry, or mechanics, then the endeavour to say what is meant by the term "vital law," is a departure from the science of physiology; but it is so only in a similar manner, and to an equal degree. You cannot advance one step in the science of life unless you know the meaning of the terms you employ, *i. e.*, unless you are already acquainted, on the one hand, with so much of chemistry, physics, and syntax as to enable you to comprehend and refer to something more general than the vital functions you are studying, the elements and processes before you; neither can you advance towards the appreciation of a scientific law, unless, on the other hand, you have some notion of the meaning of that term, and unless your idea of law is of more general extent than that of the particular example you are studying.

We must, then, endeavour to know what we mean by "law;" and, if we would grasp that meaning, we must seek to discover it by other means than mere verbal translations of the term and its idea. If by "law," it is said, is intended a generalisation of the "conditions" under which certain

phenomena occur, let me ask what is meant by "conditions?" Do we, by such phraseology, get rid of the ideas of coercion or of will? By no means; these are still present, only under another name. The word implies something more than the facts and their relation—something greater than, because the source of, their order of occurrence. Mere sequence is expressed by the words "do" or "did;" law, by the terms "shall" or "must."

For these reasons, then, I would insist upon it that—no matter with what eagerness some may endeavour to find in natural law nothing but a generalisation of the conditions under which phenomena occur—there is invariably and inevitably some supposition besides and beyond the facts, which supposition does, in reality, give meaning to their words and thoughts. If there is no immediate recognition of God, there is some mystical conception of Nature, or some personification of Order; and to the will, or action of one or the other of these the law is referred. It is not that, by law, we have merely expressed what is, or the mode in which what is appears to us, but the method in which God, Nature, or Order operates. Remove, as completely as you can, all metaphysical entities from the idea of law, and there is yet underlying it such a supposition of order and uniformity, of independence and unchangingness, which are attributes of a something that directs, pervades, and embraces all, that the most so-called "positive philosopher," in his very endeavours to escape, only binds himself hand and foot more closely by the ideas of coercion and of will.

Inasmuch as in the possibility to appreciate facts there is the proof that a relation subsists between our minds and external nature, so in the capacity to advance to the idea of law there is witness to a still deeper harmony. "The laws of nature (as it has been well said) are at the same time laws of reason; . . . the geometry and mechanics which are practically applied in the works of nature, are precisely the same as those which reason perceives as necessary truth; so that in scientific observation we are really viewing the laws of our own reason operating around us in the objective world." But the laws of our own reason, and the laws of nature, in thus testifying to their common origin, bear witness to that which is greater than nature and higher than man; and whatever may be the application of the word, there is, I believe, always, as part of the idea of law, the conception of a source far higher than itself—the suggestion of a purpose

and a plan, of which the facts and laws are but the fragments of a revelation.

This is true of every form of law. Those ten great utterances of man's moral and social responsibility, by their nature-like simplicity, depth, extent, and universal application, proclaim their source to be that from which nature itself arose: those "great commandments," the conception of which, as kept inviolate, is that of a perfected humanity; those expressions of what man should be, so lofty, and so far above his actual life, and yet so consonant with all the ideas, so far as he can frame them, of what his life was meant to be, are such that he cannot regard them as laws of his own making, but as having their source in that which is far higher than himself, their origin in Him, who is not only the Creator of the material world around him, and of his own material body, but the Author of his intellectual power, and of that which is the highest element in his being, viz., his own moral nature. The laws of a Country or an Institution have authority and stability, because in conformity with responsibilities wider and laws profounder than those of the Country or the Institution from which they issue and to which they are applied. The laws of Nature,—whether seen in the tiny cell of some microscopic monad, in the mimic whirlpool that a rotifer may set up, in a drop of water, itself almost invisible to the naked eye; or seen in the perturbation of some planet's satellites, so distant from our world that thought is baffled with the attempt to imagine its extent, so vast that the mind trembles and sinks under the effort to conceive its grandeur,—wherever these laws are traced, there is, in them, the witness to that which is beneath, above, and around them all; witness to that which is still deeper than our most microscopic search, still vaster than our most extended gaze; to that which transcends all our knowledge, but which is yet the light of all our seeing, and the ground of all we know,—

"Whose dwelling is the light of setting suns,
And the round ocean, and the living air,
And the blue sky, and in the mind of man:
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things."

And, as we trace the harmony between our own thoughts and the facts of the objective world, we are moved, as the soul of Kepler was when he saw the planets obeying the

order which his reason had marked out for them, to exclaim, "O God, I think Thy thoughts after Thee!" In thus viewing law as the expression of the Divine thought, the mode in which God has been pleased to act, we arrive at its truest and deepest meaning, and find in it, not only the key to unlock nature's profoundest mysteries, but the key note to which our efforts must be attuned if we would understand her mighty harmony, and take our part therein.

In order to arrive at the discovery of law, there are certain fallacies to be avoided. Do not mistake for law mere sequence of events, although apparently invariable; do not confound therewith either accidental coincidence, mere speculation, or numerical hints of the direction in which law may lie.

There is no need that much more should be said on the confusion of mere *sequence* with law. Illustrations of a "*post hoc, ergo propter hoc*" mode of reasoning are too common to require further remark than that the real test of such fallacy is the discovery of a third element, previously unconsidered. Because when the sun arrives due south the chimes of a neighbouring tower perform a certain tune, and a large bell tolls twelve times, there is not to be inferred any necessary connection between that position of the sun and the particular tune that falls upon the ear. Certain clock-makers and bell-makers have come in between the sun and the sounds; and they could, if they chose, so arrange their apparatus that the particular sounds in question should occur at some other time, and that when the sun arrives due south the clock should strike one, or a quarter past. If, instead of coming to such unexpected grief, "Big Ben" and his satellites should have still kept true for centuries to come, until the well-known "traveller from New Zealand" commenced his sketch from a "broken arch of London Bridge," such long-trying and invariable association would not demonstrate the existence of a law to the effect that a certain position of the sun was necessarily associated with a certain chiming of those bells. Yet such laws as these, and many based upon evidence not one hundredth-part as good, are current in the science and pseudo-science of the day. We frequently leave out of the account our clock-makers and bell-makers, our men who wind up and regulate the works; and we fancy that the fore-established artifices, such as division into certain and particular hours, are parts of nature's plan. Absolutely invariable sequence is the strongest evidence you can obtain of the existence of some

law; but a mere expression of that sequence is not a statement of the law: nor is the latter statement a possibility, until all the elements of the sequence are understood.

The "traveller from New Zealand," if he came before his appointed time and took his stand within this hospital, might see one-half of the out-patients entering one room, and the other half another room; he might discover that the first group suffered from complaints of external organs, and that the second were the victims of internal disease; he might go further, and (waiving occasional mistakes or transgressions, and their penalties) might find that the individual by whom they were seen in one room was a surgeon, and in the other a physician;—he might generalise the conditions under which this sequence of phenomena occurred; but such generalisation would not be a "law." He might, from its regularity, infer the existence of a law; but if he did so, he would at once refer it to something other than the mere fact of the particular order of events I have described. That which he would infer to be the law, and that which is alone worthy of that name, is the expression of the mode in which this Institution has resolved to act.

Accidental coincidence, a fortiori, is not law, although sometimes it is more striking than invariable order. Moreover, it does not afford evidence that any law of the kind supposed is in existence. Yet the annals of science contain many illustrations of the one having been confounded with the other. Eclipses have coincided with abortions, comets with pestilences, and the changes of the moon with epileptic fits; but it has yet to be shown that the relation between them is deeper than that of mere coincidence.

Not detaining you with any endeavour to show that *speculation* is not law, I pass on to the other fallacy, viz., that of confounding *statistical results* therewith. The "numerical method" of estimating facts has been, and is, of great utility; it has pointed out the direction in which truth lies; but the statement of a percentage is not the utterance of a natural law. At the best, we know but fractions of the truth; the numerical method enables us to state what those fractions are: as a method of inquiry, it is invaluable; but, if its results are regarded as final, it is useless, or worse than useless.

If in one hundred cases of a certain disease, say "continued fever," there are sixty which present a particular form of eruption, twenty which do not, and twenty which

exhibit another, a statement of percentage to that effect may be valuable, proving either that the name was wrong, for it included too much, or that the eruptions alluded to were neither of them essential to the idea of fever. If, however, inquiry stops at the enumeration of these facts, it is of little service. If the statement of these facts, and the proportion in which they occur, is regarded as a law of "continued fever," and the conclusion is that the name is correctly applied and that the facts vary, then the numerical method is worse than useless; but if the mind advances, and eventually demonstrates by this method that there are essential differences between the cases referred to, then the method is of great utility, in eliminating error, and pointing out the direction in which an important truth previously lay concealed. But the truth, or the law, is not expressed by percentage. The two or three forms of fever are absolutely distinct; and the statistical statement was but the sign-post, showing whither the inquiry should be carried in order to prove their distinctness.

Again: the difference between a law of nature and a so-called statistical law is further seen in this, that the former is true at all magnitudes, times, and distances, whereas the latter is true only at such magnitude, time, or distance, as shall be sufficient to lose or hide the individual in the multitude. For example: the law of gravitation is true of two grains of sand, or of two planets in the solar system; the law of atomic proportion is such that the relative quantities of calcium, oxygen, and carbon are the same in the faintest line of a chalk drawing and in the mountain range; the process of assimilation is the same in the infusorial cell and in the brain of man; the seedling oak contains the same elements as the giant trees of the forest from which the acorn fell. But, try a so-called statistical law by such test, and it is at once proved unworthy of the name. If twenty thousand out-patients are relieved annually by this Hospital, and the number varies but little from year to year, it is not equal, but varies widely, from day to day. It is affected by the weather as much as by disease! The annual average mortality of a particular ward will not bear such division that it can be applied as a law to the individuals now lying therein. The law, so-called, that shows the chance of a railway accident to be an almost inappreciable fraction in the particular journey that you are about to take, affords little consolation to you if you are jammed up in a tunnel; nor will it—although you

ought to lose only a fraction of your finger-nail as the result of a collision—save you from losing your head, if, as unfortunately happens so often, the appropriate conditions are provided.

If the statement is—and it may be quite true of the multitude—that of ten thousand individuals, one hundred must suffer something, be it accident, disease, or death, neither this statement, nor the proportion, can be true of a less number than one hundred, for the same proportion, carried out, would with a less number affect only the fraction of an individual. If the statement is that of one hundred cases of a particular disease, such a symptom should be present in twenty-five, that law applied to four individuals is, that the symptom should occur in one; but, in a given individual, only a quarter of the symptom should occur. We say, in such instance, that the “chances” are three to one against its appearance; but, if the moment these statements have to be applied to the individual we have to change our phraseology, and speak of “*chance*,” what has become of our so-called law?

To illustrate this principle still further, let me employ some statistics furnished by the Royal Humane Society in the *Times* of September 5. From these it appears that during thirteen years 1,015,853 persons skated in the Regent's Park, and that during those thirteen years, 274 individuals met with accidents of different kinds: the general proportion, or numerical law, therefore, is, that 1 in 3,707 individuals should be victimised during this amusement. Now, this proportion is so near the truth that it agrees, almost precisely with that furnished by two periods, each of six years' experience, in the same locality. We divide the statistical law by about two, and find that of 498,283 skaters, 129 met with accident, the proportion being 1 in 3,862. Again: the numbers injured in periods of three years are very nearly identical, being 1 in 3,909, and 1 in 3,836; or, omitting the two last figures for the purpose of easier recollection, the proportions are—for thirteen years, 1 in 3,700; for six, 1 in 3,800: in the former three years, 1 in 3,900; in the latter, 1 in 3,800.

But, if we divide still further, the statistical result becomes variable, and the so-called law defunct; for in particular years—to say nothing of days—the proportions vary from 1 in 1,237 to 1 in 37,191. From this it is evident that a statistical result approximates the truth in proportion to the distance

to which it is carried from the particular fact with regard to which the statement is made. So long as the number of skaters ranges between tens of thousands and hundreds of thousands, the results are unequal, but when the numbers are between hundreds of thousands and millions, the results become nearly uniform. It is, then, interesting to observe, that although in consecutive years the proportions are so various as to range from 1 in 1,200 to 1 in 37,000, yet that in triennial periods these very inequalities are reduced to an inconsiderable amount. Hence, though the variations are great, these variations have limits. Herein is the treachery, and also the value, of statistics. It is not until the numbers accumulated are so large as to include all sources of variation that the result is true to nature, and therefore uniform: then it is so, but it loses its direct utility and applicability for the individual; and that which is a law for the multitude becomes, so far as its application is concerned, a *chance* for the unit or the hundred.

It seems that in periods of three years, and in about a quarter of a million skaters, every variety of folly, hardihood, and clumsiness on the part of the skaters; every variety of blunder, carelessness, and officiousness on the part of the icemen; and every treachery of ice, in its early brittleness and commencing thaw, must be included; the limits of variation are reached, and the results are equal:—1 in 3,751 is (not killed, but) visited with accident. But if, when this next winter comes, two of you start for the Regent's Park—not to any other park, for the proportions differ—persuaded that the chances are 3,751 to 1 that you will not go through; and if 3,749 individuals visit the same park, with the same persuasion, and one which is warranted by the facts, and applies equally to all, what becomes of the statistical law when one of you two receives a ducking? It amounts to this, that the chances were not equal for the two, but that it was from utter ignorance you thought they were: they differed as widely as they possibly could; and therefore, that the statistical statement is not worthy of the name of law. Further: if the statistical law could be accurately applied to the individual, so that his particular chances could be known beforehand, the practical utility of the law of probabilities would be annihilated. A moment's reflection upon the principle of life insurance will at once prove this. If, so far as human intelligence extends, it were not a mere chance that A and B, whose ages are the same, should have the

same expectancy of life ; but if, on the contrary, it could be known that A would live thirty years, and B would die in three, the former would not now insure his life, and the office would refuse the latter. It is because statistical results are true only of the multitude, and uniform only in regard of large numbers, that the individual can derive advantage from them. It is because the so-called law for the many becomes a chance for the unit, that the law of probabilities has a practical utility.

Perhaps the most unwarrantable conclusion which has been drawn from the employment of the statistical method is to the effect, that because events occur in such order that their numerical frequency may be calculated beforehand, therefore neither God nor man, neither Divine Providence nor human will, are operative in the world. Because there is a certain average number of suicides, for example, per annum, individual choice and general Providence have had nothing to do with the matter.

To arrive at such a principle as this, at the conclusion of a survey of the history of civilisation, would be, in my judgment, to conclude in opposition to both historical evidence and true reason ; but to start with such proposition, and to employ it as a method of investigation, is one of the most extreme examples with which I am acquainted of a "*petitio principii*."

Allow, for a moment, that the principle is correct—viz., that the existence of uniform averages would exclude the idea of will, either Divine or human—the past history of the world, and its present history, are such as to show that these averages have not always existed—do not now exist. The ordinary course of events has been suspended, or superseded, by the extraordinary or the supernatural, and the true basis of all nature has been revealed in such suspensions. But, further than to enter protest against such interpretation of history as this, is not my object now : it is to show that, even if the averages exist, they do not warrant a belief in the non-existence of will, either Divine or human. The proposition is this, that, because out of 10,000 individuals, say 100, in the course of twelve months, will do such a particular thing, therefore there was no will in the individuals who did that thing, or in those who did not. The argument in such proposition is erroneous ; it is a conclusion with regard to the individual, from observation on the mass or multitude ; and I have already shown that until the individual has been lost sight

of in the multitude—*i. e.*, until the accumulation is so great that it includes every possibility of action and every variety of condition, the statistical result is demonstrably untrue: the statistical law loses all force, and has to be termed a chance, when applied to the individual, *i. e.*, to the very thing or being supposed to exert the will.

Beyond the fact of almost universal human assent to its existence, I know of nothing which proves more cogently the “freedom” of human will than does the application of the numerical method to the results of human action. Such application shows the presence of disturbing causes, quite out of the range of explanation by the mere crossing or combination of natural laws. No matter how complicated is the object to be examined, so long as it is under the dominion of physical laws alone, the net result of its action is soon arrived at, and may be stated in comparatively low ranges of number; but, immediately that you have for examination that to which moral and social laws apply, you have to derive your results from tens and hundreds of thousands. Two healthy individuals of equal age, weight, and height, affect the physical atmosphere of this room in the same manner and to the same degree. Here you may soon calculate all the possibilities of variation, and state them in numerical terms; but between two individuals, side by side, how vast is the difference, when regarded in their capacity to affect the moral and social atmosphere! Alike in the laws they cannot transgress, the net result of their lives physically—so far, that is, as mere physical elements have been employed—is almost identical; but the difference between them is almost infinite when they are viewed in relation to the laws they can disobey. The fact that human actions, as studied in large multitudes, result in tolerably uniform averages, is evidence that man is under the dominion of some laws which cannot be broken. The fact that such large multitudes are required in order to furnish uniform results, is evidence that man has a disturbing power; that he is able to set himself in opposition to certain other laws, interwoven with these: choosing to disobey their expressed commands, and to fulfil the law, by suffering the penalty attached to disobedience.

The possibility of calculating the frequency of some human actions shows that the power and the variations of the human will are, in regard of action, limited, and that by physical conditions. Man cannot will himself out of life, for example: he must, in order to commit suicide, throw himself under the

dominion and operation of a physical law, which he cannot break, but which can destroy him : he must choose poison, or gunpowder, or drowning, or what not. Moreover, the implements from which he shall make his selection are not innumerable ; poisons and possibilities of destruction have their limits ; and thus the resulting actions of this hundred thousand individuals, and of that, may be nearly numerically identical in regard of suicide ; but the very largeness of these numbers is evidence of the presence of disturbing causes, which, in extent and variety of influence, will bear no comparison to any physical agencies.

It is by removing yourself to a great distance from the actual facts that the numerical statement of these facts exhibits uniformity. To the naked eye the moon's outline is an even curve—there are no inequalities, no changes in its form ; but lessen the distance, or enlarge your power of vision, and then mountain ranges, valleys, and extinct volcanoes, break the line. And so it is with man. Go far enough from the individual soul ; lose his personality in the thousand or ten thousand that surround him,—and the net result of this ten thousand, and of that, may be the same. But there are in him individual features—heights of aspiration, and depths of despair, angry passions, and Divine helps ;—and these, seen in the unit, but lost in the many, are the real moving forces, the determining causes of all his action.

In thus surveying the “aim” which, as students of the medical profession, is placed before you, I have shown that the “subject-matter” of your study, LIFE, is two-fold—mind and body ; material and immaterial ; temporary, tangible, and seen ; unseen, intangible, and eternal : and further, that the gulf between these two is such that no science has yet bridged it over, and no speculation, launched from either shore, has done other than find shipwreck in the abyss. Yet, that each is true, is near to us, and within us all ;—that our life-study will be but one-sided unless it embraces both, and imperfect unless it finds in each the hints and proofs that they come from the same source, obey the same laws, and work out but different parts of the same great purpose.

I have urged upon you, that although you know not, and may never know, the essence of life, yet that you may learn ‘FACTS’ about it ; that the object of your study, then, is truth, for the acquisition of which all your care and all your industry are required ; that you must arrive at truth by

avoiding the mistakes of confounding facts with either fancies, hypotheses, opinions, or half-truths; and that, by using these facts and this knowledge as your alphabet, you advance to the study of LAW; that in it you find the suggestion of something beyond the mere facts themselves—the conception and revelation of a higher power, and of a plan which gives harmony and meaning to the diverse phenomena you witness; and you trace a purpose which the processes of nature are gradually, but surely, developing. I have urged upon you the differences, to be constantly remembered, between law and generalisation of sequence or coincidence, and between natural law and numerical results of law.

Thus, your aim is to learn the truths or facts of a two-fold life, and to find in its deepest laws the revelation of that which is greater than itself. Life, life of two kinds. Truths about it, not untruths; and the reference of it all to a higher source.

For the reconsideration of your aim no time is more appropriate than the commencement of a new period of your work; but if you advance in this work—and in proportion to the rate of your progress—will it become every year more important that you should take this review. For at every step in our upward progress towards some height of science, the horizon widens, and with new wonders and new beauties there are new elements of confusion, and we may be baffled by the very largeness of our view. Pressing onward, we see that beyond some clear and hitherto limiting line there are depths into which our vision cannot penetrate, further than to see that they contain, in lavish profusion, wonders and beauties equal to those around us. The summit of yesterday's is but the starting-point of to-day's exertion; and as the circle enlarges, it is at its circumference that the increase lies. The rate of increase is accelerated, and the objects that surround us seem infinite and overwhelming, by their largeness, their number, and the marvellous intricacy of their combination. Life is too short to see them all. We must choose our path: we must leave much unseen, still more unthought of, and an infinitude unknown. For as we ascend still higher, we catch glimpses of the far-off sea—the infinite, unfathomable, Unknown—that mighty ocean of unknown truth that lies beyond, around, and beneath all our knowings, which confounds and wrecks every venturous barque that launches forth upon its mighty waves—that vast waste of water, sometimes dreary and bodeful as the grave, but

sometimes bright and beaming as the sky ; sometimes blazing with the sunlight, and again silent and sorrowful as the pale light of stars. It is only when we have attained, and can look out from some height of science, that we begin to see and know how vast is the unknown ; and how, compared with it, dwindles into nothingness the little that our powers have yet taken in. The mightiest of philosophers felt that he was but as a child gathering pebbles upon the shore of that boundless sea ! But we have to come down from these heights to every-day life and work : to know how to advance, and rejoice in the vision that each day's scientific progress yields ; but, at the same time, to find among the wide fields of scientific fact those principles which shall guide us in the prosecution of our real life-work—the alleviation of the sorrows and sufferings of humanity. These principles you must learn by means besides those of chemical experiment and dissection : you must learn them in the hearts and lives of your fellow-men. You must come to know the meaning of the infant's look—to understand the tone and teaching of its cry. You must appreciate the patience and long-suffering of woman, and the hardihood and rough exterior of man : you must look, and see beneath these, if you would measure the true degree of their affliction. You must learn to feel with and understand the feebleness of age, and gain all that is required for your ministration to its wants, from those hints that come to you through the failing powers and closing avenues of a soul that has for a long while battled with a world too rough. True sympathy will reveal much to you that science cannot see. Wherever there is life, there is your field of study—wherever there is suffering, there is your field of work ; and truly to relieve its burden your spirit must be that of Him, whose life was the perfect life—whose presence and word brought peace and health, and into whose work in this world it is our highest aim and highest dignity to enter.

But in such exercise—in loving your neighbour as yourself—you do but fulfil the duty incumbent on you as a man. As a medical practitioner, there is for you other work, and work which is peculiar to our profession. The medical practitioner has to educate—by converse, by life, and practice—those whose education is less specially scientific than his own. He is the exponent of the real method of arriving at scientific truth ; and it is his part to show that in action he can lose sight of minor differences in scientific creed, and can combine, with those who differ from him, to employ common

truths for the advantage of his fellow-men. The man of science is the apostle of the true spirit of inquiry—he is the humble investigator of nature's plan. Submitting himself, with confidence and entireness, to the truth as taught by nature, he is the abject slave of neither institution, party, clique, nor self: he utters his protest alike against servile dependence upon authority, and against the rabid independence and the folly which would rely entirely upon itself. He sees that, to ignore the teaching of the past, is to cut off from himself the rich entail of scientific treasure, and to impoverish the present—that to yield no honour to institutions is to oppose the common sense of humanity, and to do away with all standard in regard of truth; but he also sees that, to receive the teaching of the past, without question and without addition, is to introduce retrogression or stagnation into science, and to render the future even worse than the present day; and that, to despise individual exertion and conviction, is to rob institutions of that which supplies the conditions of their existence, and gives authority to their words. If there were nothing to which we could appeal, it would matter little which guide we might choose to follow; mere temperament would decide whether we should rest contented with the dogmata of the past, or should follow the speculations of the present; and in either case, our science would be but an empty dream—our action would be but a delusion and a sham—our profession a mere guild, maintaining itself upon the superstitious fears of those not quite so knowing as itself. But the Court of Appeal exists, and is ever open: nature is open before you, as it was before the fathers of our science; and to it, with as much confidence as they, you can apply for instruction. Common sense, educated by both the wisdom and the follies of the past, and common honesty, universally applied, will enable you to ask questions and receive their answer; but you need more than these—you need a simple, child-like trust, to free you from preconceived opinion on the one hand, and from self-confidence on the other, and to make you as open to learn as nature is to teach her lessons.

And finally, amidst the petty jealousies, the party bickerings, the presumptuous ignorances, the pharisaic prides, and mock humilities that do so fetter the limbs of men, and bind them up into such little bundles of humanity, that they can do nothing in this world but harm, unless they may do it precisely in the way their own fancy, their great grandfather's fancy, or their party's fancy dictates;—against all these little-

nesses, that make us almost ashamed of the race to which we belong—it is the part of the man of science to utter his strongest protest, the protest of example. To show that though he and his brother may chance to differ about the nature of ozone, they can yet clasp hands heartily and join in works of science and of charity. To show that his “aim” is such, that even if the method his brother adopts to “learn the facts and laws of life” does differ from his own, yet that he has so learned—from a higher source—the duties incumbent on him as “the true man of science, of art, and charity,” that he can join that brother in “utilising his knowledge in every way, and to the highest degree for his fellow men.”



