

ARTICLE V.

NATURE GUIDES BEST, WHEN GUIDED.

BY AMOS H. JOHNSON, M.D.,
OF SALEM.

READ AT THE ANNUAL MEETING, JUNE 13, 1883.*

MR. PRESIDENT AND FELLOWS
OF THE MASSACHUSETTS MEDICAL SOCIETY ;

A TRUTH so important as to prove like a diamond among other gems of wisdom, we should seek not only to cut into some sharply-defined form of utterance, but to set in such relations to other truth as will best exhibit its proportions.

Upon the seal of our Society we find, set like a brilliant of the first water, the motto "*Natura duce*," a motto so wisely obeyed, so judiciously illustrated, so eloquently taught by eminent men, not a few of whom have been members of this Society, that the truth it utters profoundly influences the modern study and treatment of disease. Its brevity sharpens the truth it commends. But it gains a peculiar pungency from the colossal assurance with which it thrusts aside all other

* At an Adjourned Meeting of the Mass. Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publications be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

guides in order to place itself foremost in our thoughts. In this conspicuous position it challenges critical examination of its right to sole and supreme authority. Therefore, since the part assigned to me to-day is to address you upon some theme of general interest, I have chosen to invite you to a brief study of the meaning and limitations of this motto.

We shall not be disappointed to find that it is one of those brilliant half-truths whose importance may lead us to overstate its value; or to find that its simplicity is more apparent than real; or to find that it is only partially applicable to our professional work; or to discover that its converse is as true; so that we may as wisely say "guide nature" as "let nature guide."

The attempt to condense into two words a cardinal principle of medical study and practice, has proved rarely felicitous. But, like all such epitomized teachings, it instructs us as much by its implications as by its direct exhortation. Our high esteem for its general fitness to our needs is not decreased by recognizing the fact that it suggests corrolated truths which, pressing hard upon its limits, are the better defined, defended, and practised.

After the progress of human learning had been long retarded by the adherence of scholars to speculative philosophy; when Bacon so urged the value of the inductive method that modern science, conceived in the time of Hippocrates, had its birth; no truth flashed out into clearer light than

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NATURE GUIDES BEST, WHEN GUIDED. 79

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this, that all positive advance in physical science must spring from the observation and proper interpretation of material evidences. This conviction then "burst as a new light in the heavens of human reason, to become like a guiding pillar of fire in that night of speculative mists." But those mists have been largely dispersed. The trend of modern inquiry follows almost instinctively and exclusively the inductive method. What was a startling exhortation may become unimpressive commonplace. New tendencies of thought change the relative importance of truth. Even the wisdom of our motto, now that it glides with the current of modern thought, less conspicuously reveals its force. The value of its exhortation sinks to the level of related truths which demand to be raised to equal prominence. A change in the surroundings, which at one time revealed in a dogma only apparent perfection, may shift the angle of their light so as to disclose deficiencies.

What is the intent of this excellent motto? It is put forth to check the imaginative and speculative study of the human system. It demands that the study of facts shall suggest and sustain our theories and methods of action. It reminds us that we cannot radically change the plan of the vital and chemical actions and reactions by which our bodies are maintained in health or are subjected to disease. It bids us first to observe the natural order, the mutual dependence, and the results of vital processes, and then to favor and expedite, rather than to interfere with, the se-

quence of operations by which disease runs its natural course toward recovery.

The superlative value of such teachings we all concede, without stopping to notice that they have one very conspicuous deficiency. An old receipt for cooking a hare began, "first catch him." The rule "*Natura duce*" is only productive when married to the rule, to guide nature. For nature only enlightens those who succeed in suitably conditioning her operations. She often leads as the escaping criminal leads the detective, or the fleeing savage his foe, when the moccasined foot selects the rocky ledge, or the bed of the running stream, or carries its owner backward over first impressions, until it can flee over a trackless path. Or, to use a milder figure,—nature is coy, and demands a cunning suitor. Won to disclose herself, anon she flees to concealment, whither she cannot be traced or from which only the most persistent and strategic lover can woo her.

When we study the history of the progress of learning two facts amaze us,—one, the failure of man through so many years to understand the phenomena of nature; the other, the patience and labor by which the secrets of nature were extorted from her. Up to the last half of the sixteenth century we have no evidence that men had learned more of electricity than that amber when rubbed possessed the property of attracting and repelling bodies, that the torpedo gave electric shocks, and that the human body sometimes emitted electric sparks. Since that time, the facts of

electricity and electro-magnetism have been obtained by the conception and construction of most ingenious apparatus, by thousands of successful and unsuccessful experiments, by keen mental analysis, by mathematical calculations, and wise theories. The rotation of a wire around the pole of a magnet, and of a magnet around a wire, was long a simple theory, until Faraday, by his great ingenuity, trapped nature into conditions where she could no longer refuse to indorse it as a fact. In 1824, on three occasions he made elaborate but unsuccessful attempts to produce a current in one wire by means of a current in another wire, or by a magnet; but it was not until seven years after, that he successfully led unwilling nature to reveal to him the fact of the induction of electric currents. Quite early in his career as an electrician, he conceived the use of polarized light to reveal the electric condition of transparent bodies. But not until twenty-three years after his first recorded trials do we find him, undeterred by failures repeated through many years, working with fresh, and at last successful ingenuity, to compel nature's assent to the truth of his conception that magnetic force and light have relations to each other. Who shall say which led in these discoveries,—Faraday, or nature? Nature repelled his advances. But, however baffled, his persistency wearied her to utter her secrets. We realize that even unsuccessful experiments were the voice of nature, saying, It is useless to seek in such directions. But this voice

is ambiguous, and as often seems to many to say, There is no such fact as you seek.

The telescope and the microscope are evidently the product of the contrivance of apparatus to determine the action of light in its passage through different media, and of the mathematical calculation of angles of refraction produced by lenses of different density and curvature, no less than they are the outcome of observed natural phenomena and laws. When with national pride we see Alvan Clark & Sons, of Cambridge, through weary months of labor, shaping with exquisite skill a telescopic object-glass of thirty-two inches aperture; or, in order to photograph the transit of Venus, preparing a plain mirror for a heliostat, which must be so undeviatingly exact, that, as Professor Newcomb tells us, if a straight edge laid upon the glass should be the $\frac{1}{100000}$ of an inch above it at the centre, the reflection would be useless; we realize that the mind of man leads nature to enter paths she would never voluntarily take, and there holds her, unwillingly subject to his familiar gaze and critical manipulations. The electrician detects her hidden movements with his galvanometer, weighs her with his electrometer. The astronomer outleaps the powers to which his own physical structure restricts him, wrests from nature her optical secrets, and, with instruments of precision, compels her to permit his eye to rove among the heavenly bodies. In like manner the student of histology, with the microscope, brushes away the veil behind which nature conceals some of her most attractive and important features.

It is common to speak of these results as the product of the applications of science by the art of man. But science is itself the product of the art of man. The unconscious forces of nature have not conspired during the last century to captivate the attention of men, or forced themselves into recognition, in order to pour into our minds the inspiring revelations with which modern science is radiant. Nature alone never led scientists to their present heights of learning. Man has won or driven nature to become her own interpreter. This has been accomplished, it is true, with more reliance than formerly upon the results of experiments and observation, but chiefly by reason of the mental activity, judgment and determination with which these results have been analyzed, and the fruits of such analysis have been made the basis of calculations, for the construction of channels through which the operations of nature must proceed, and so proceeding must reveal their method.

We have thus exhibited the fact that success in detecting, no less than in using, physical forces and their processes, demands a masterly adjustment of the conditions under which the methods of nature shall operate, no less than compliance with these methods, in order to more clearly present the same truth concerning the special department of nature in which we work; because in dealing with man we encounter all other forces combined with the distinctive characteristics of animal and mental life.

Whether we regard vital action as due to a distinct principle superadded to the properties of inorganic matter, or whether we think of it as simply another expression of chemical and physical forces, its manifestations offer special difficulties to physical analysis. Our complicated organizations present problems whose intricacy far exceeds that of any operations of inorganic nature. This intricacy is increased a thousand-fold when normal physiological action is thrown into a vast variety of those exceptional reactions and phases which we call disease. When, therefore, we assent to the soundness of the counsel in the words "*Natura duce*," we are reminded of the inconsequential remark of the notorious Duke of Newcastle, "Oh yes,—yes,—to be sure! Annapolis must be defended—troops must be sent to Annapolis.—Pray where is Annapolis?" To be sure we must follow the indications of nature, but what are they? They are like a system of guiding signals to those without the key. Through centuries these signals spelled before men the language of nature only to bewilder and oppress them. No wonder that, up to the time of Hippocrates, the history of medicine, so far as we know anything of it, was almost entirely a record of the power of priestcraft to exorcise by incantations, or to repel by amulets, the demons of disease. Yet the same nature that surrounds us, lay around and within them. They failed to understand her, partly because their minds were dominated by superstitious beliefs, but primarily because nature did not

plainly teach them how to interpret her. When at last men began to cease their futile efforts to propitiate imaginary spirits which moved the signals they saw, and set themselves to decipher nature's sign language, they perceived the nature of an appalling task, but accomplished little in its performance. For what the Rosetta Stone was to the language of ancient Syria, the teachings of Hippocrates and of Bacon were to the hieroglyphics of the human system. That stone secured only a fragmentary key, legible only to scholarly minds, and useful only to those who could use it with consummate patience and critical power. The resolve, to study the indications of nature, was not the same as their actual interpretation. The problem was not solved, but only the true direction of investigation indicated.

"Bacon, like Moses, led us forth at last;
 The barren wilderness he passed;
 Did on the very border stand
 Of the blest promised land,
 And from the mountain's top of his exalted wit
 Saw it himself, and showed us it.
 But life did never to one man allow
 Time to discover worlds and conquer too;
 Nor can so short a line sufficient be
 To fathom the vast depths of Nature's sea."

COWLEY, *Ode to the Royal Society.*

We want no better evidence of the vagueness of the signs by which nature leads us, than the errors into which the father of rational medicine fell, notwithstanding his unsurpassed powers of critical observation. Time would fail us, should we attempt to enumerate the masters in medical science, from the time of Hippocrates to the present, who, notwithstanding admirable mental gifts, have con-

tributed to medical records, together with a few additions to sound knowledge, a much larger number of blunders.

Notwithstanding the great advances made during the present century in the interpretation of vital and morbid phenomena, so much still remains unknown, that the known fails to prove an unequivocal guide. So much that is uncertain lies back of, between, and beyond the best determined facts, that their significance admits of a great variety of interpretation.

In a very thoughtful and instructive annual address, delivered in 1855 before this Society, by one of its former presidents, occurs the following statement: "The most important methods of cooperation are indicated by nature herself." This he illustrates by enumerating many facts, from which, for lack of space, we select but one class. "Vomiting," he tells us, "relieves a headache or surfeited stomach. It also attends the onset of some violent diseases, indicating nature's effort to repel them." From these facts he infers the value of a judicious use of emetics. This mode of relief, in common with others enumerated, he declares to be one "which nature so uniformly adopts and unequivocally points out." When the young practitioner attempts to act upon such suggestions of nature, he finds himself on treacherous ground, or, in other words, he finds that the indications of nature are very far from being unequivocal. The vomiting which springs from cerebral disease, from seasickness, from organic disease of the kidneys,

from phthisis, from diseases of the heart, from pleurisy, from uterine irritation, appears to indicate that nature is attempting to obtain relief by emesis. Shall we render assistance with emetics? If excessive emesis endanger the patient's life, the plain indications of nature invite us to address our remedies directly to the disturbed stomach. Yet the agitation of the stomach may be like a flag of distress from some point apparently near, but to which direct approach is either impossible or destructive. The vomiting of seasickness, quite contrary to indications, is often relieved by food and stimulants; that of phthisis by remedies to mitigate the cough; that of pleurisy and pericarditis by remedies selected with reference to the inflamed structures; that of Bright's disease by means which relieve congestion, œdema, and reflex irritability arising from the obstructed or contracted kidney.

There are many, not merely plain indications, but importunate cries of nature, which lure to death those who comply with them. The insatiable thirst which attends prolonged emesis or choleraic discharges, yielded to, perpetuates the disorder to its fatal issue. The hunger and returning vigor of the convalescent from typhoid fever prompt him to partake of solid food, to rise, to walk; he obeys nature, and in a few days dies from a perforated intestine. The relief which comes with the effusion of acute pleurisy, bids the patient to return to his usual exposures and labors; he goes, to come again, perchance a bonanza to an enthusiastic dis-

principle of paracentesis thoracis, equipped with his recently purchased aspirator, or possibly to the champion of permanent openings and antiseptic dressings for empyema; but personally a miserable ruminator, through a tedious experience, on the deceptiveness of nature. The adult sees the larger proportion of children pass unscathed through the ordeal of measles. He asks himself, "Shall not a man have more endurance than a child?" Confident in his acquired vigor, he treats the cough of measles according to its appearance, as an ordinary bronchial cold, and finds, too late to save his life, that "Things are not what they seem." A severe attack of scarlet fever, followed by a gradual recovery of strength, makes its plain demand for careful nursing. On the other hand, the trivial sickness, which sometimes attends the primary stages of the same disease, no less plainly guides to that small degree of care, out of which springs many a fatal case of scarlatinal nephritis. In Bright's disease, the excessive loss of albumen has been accepted by some as plainly indicating an albuminous diet to replace the portion lost. But when Pavy, by a similar direct interpretation of an unequivocal indication of nature, for a long time taught the use of a saccharine diet to make up for the large amount of sugar daily excreted in diabetes, he and his patients tasted "the sweets of adversity." The language of nature said most plainly that diabetes was a disease of the kidneys. But the physiological and chemical experiments, of Claude Bernard and others, showed it to be due to faulty assimilation, involving the glycogenic function of the liver.

The comparatively recent discovery of pathological conditions which give rise to symptoms so remote from their source that for centuries they received only fanciful interpretation, shows how ambiguously nature teaches.

It is less than forty years since the modern science of gynæcology gave us the right understanding both of the cause, and of the successful treatment, of a legion of symptoms due to uterine disturbances.

It is but fifty-six years since Richard Bright led the way to a true interpretation of renal diseases, and presented in harmonious grouping, as the related products of mutually dependent pathological changes, symptoms previously deemed indicative of special and distinct affections.

It is but a few decades since the structure and functions of the nervous system, the phenomena of automatic and reflex action, together with vasomotor disturbances, and the locality of pathological changes, were so discovered and announced as to give the key to manifold obscure disorders.

These advances have been made by determined efforts to *force* the secrets of nature. These efforts have included, not only the use of perfected microscopes, aided by all the refinements of physiological and microscopic chemistry, applied with consummate ingenuity to histology and pathology, but they have comprehended physiological experiments, which have fairly tortured nature to utter her secrets, and cross-examinations, by experiments, varied, repeated, and reiterated by a multitude of observers, in order to circumvent nature's evasive testimony.

With all desire to coöperate with nature, and notwithstanding the immense advance of modern times in knowledge of her methods, and in means wherewith to analyze her actions, we find many of the tracings contributed by nature to the chart of medical science vague, ambiguous or invisible.

After all the painstaking thermometrical study of disease, how diverse are well argued interpretations of the kind and degree of assistance for which an elevated bodily temperature calls.

Notwithstanding the too frequent repetition of the vivid clinical picture of phthisis, and the elaborate labors of the ablest investigators to detect its true causes and nature, the medical profession seem to await an Ariadne to lead them out of the labyrinth of conflicting observations into which they have pushed their way, and where at present, with microscopes pointed at some jerking bacilli, they are wondering if they behold the minotaurian monsters they seek to subdue.

The invaluable discoveries of Tyndall, of Pasteur, of Villemin, of Koch, and other equally eminent students of micro-organisms, have indicated to Lister and his school the need of a peculiarly antiseptic surgery. Yet how numerous are practitioners, equally able and desirous to obey the teachings of nature, who differently interpret these demands of nature, neglect the Listerian method, and rival his successes. The recent re-opening of the question of the treatment of eclampsia, with its revival of venesection, with its advocacy or condemnation of forcible delivery, with its en-

dorsement or rejection of the treatment by opiates, with its dispute of what have been generally considered well-established principles of action, seem, like a host of other similar examples, to give no little sarcasm to the teaching, "Treat your patients according to the indications of nature."

These discordant explanations and councils, which come from hundreds who aim to be careful observers and followers of nature, not only show how unreliable are nature's guiding signs, but they beget a wholesome scepticism concerning the possible attainment of knowledge sufficiently accurate to base upon it rigid rules of practice. If, to avoid perplexities arising from too ingenious efforts to explain and manipulate the processes of nature, one resolves to adopt a purely expectant treatment, he finds that a deferential following of nature is not so simple as it appears. It does not furnish the escape from responsibility which it promises. Our volitions must, to a large extent, determine our immediate surroundings. Variations in one's ordinary physical environment may involve the favorable or fatal action of forces as potent as any concocted by pharmacy. The more rigid one's determination to simply furnish nature the conditions under which she can the most successfully extricate herself from disease, the more imperative becomes the need of critical knowledge of all physical forces, and the manner and measure of their influence over the human body, of all physiological and pathological facts, and also of trained powers of perception, analysis and judgment,

exercised under a sense of personal obligation to control by our best judgment and activities *all* agencies which may affect vital processes.

This leads me to remark, that we gain a special warrant, for an active leadership of nature in disease, from the constitution of man. We deal not with nature merely, but with human nature. That is, with nature plus the supernatural. Or, in other words, with a physical nature united to a mind above or over it, which both directly and indirectly disturbs and controls its processes.

All thought involves molecular changes in the nervous centres. To the condition of the nervous centres the whole system is responsive, according to the law of coördinate action, whose enforcement the sympathetic system of nerves secures. Hence each thought has its physical influence for good or ill upon the remotest tissues of the body. This influence is in accord, not merely with the act and the amount of thinking, but with the complexion of one's thoughts. The physical depression produced by sorrow or melancholy, or worry or fear, and the bodily exhilaration which appears with joy, cheerfulness, faith and hope, are noticed by the most uncritical. Likewise familiar is the fact that various diseases are induced by a state of expectancy or imagination, such as the heart disease of medical students, the mental contagion of hysteria, and a host of imaginary diseases acquired by interpreting insignificant ailments in the demoniac glamour of quack advertisements. The wonderfully sensitive yet constant

participation of the vaso-motor system of nerves, in all cerebral conditions, reveals to us why prodigious bodily effects must sometimes result from apparently insignificant mental influences.

These facts teach us that the combination of forces with which the physician has to deal, contains an element not included in the studies of the natural scientist. A force, which, while a part of human nature, is itself over, not led by nature. A power which acts upon the body according to the caprice of the individual. A force which acts with vacillating sensitiveness to immediate surroundings, or moved by impulses from thoughts remote as the years of one's life, and deep as are one's stores of information and habits of meditation.

Since we find this supernatural element, with its secret workings, exerting its influence in disease, we have no choice but to guide a control which it already exercises. Or, in other words, since physiological and pathological processes are subject to the lead of the persons in whom they occur, and since this mental action may be secretly indulged with little wise regard to its physical effects, therefore the physician must take the guidance of nature from ignorant and unpracticed hands into his own.

The fancies and schemes of patients and their friends are always a feature of sickness. When the physician has merely to displace the false notions of his patient, his task is sufficiently difficult. But how common is it to have added to such mental

hindrances a most pestiferous onset of officious suggestions! They come like locusts for multitude from the four winds of heaven. By what spell they were ever evoked from human minds, by what assurance of infallibility they each claim sole title to credence, no mortal can tell, for their harmony is discord. Yet their presence is as unmistakable as that of a pursuing swarm of hornets; although sometimes, without the valiant trumpeting of this insect, they work like the thickly-sown larvæ of the moth, silently eating and weakening the robe of council with which the doctor seeks to protect his patient. Is one smitten with sickness, scarcely has an order of treatment been initiated, when questions and suggestions and prescriptions and directions and contradictions pour in from quarters near and remote. They may spring from the unwisely expressed sympathy of friends, and from their discordant faiths in special remedies, or men, or systems of medicine, or from the enthusiasm of some clerical or lay "amateur therapist." But practically, they offer so many different schemes for leading the sickness to a successful issue. Amid the clash of these designedly friendly efforts, who shall retain control of the conditions and forces by which the patient is to be relieved? The successful leadership of nature amid the criticisms with which the physician is sometimes beset often demands qualities of a high order.

Who of us failed to regard with keen sympathy those of president Garfield's medical advisers who had won the confidence of our profession? Their

every word and act under the censorship of a nation whose meed of blame or praise was sure to be awarded with vehemence proportioned to the exalted sympathy of the people; yet sure, also, to be awarded in accord with judgments based upon incomplete knowledge of conditions and reasons; or upon misrepresentations of enemies sustained by incompetent critics; or upon the misuse of the surmises of eminent medical practitioners, incautiously expressed during the president's life, or framed after the autopsy had solved the riddle of symptoms which previously no man could have surely interpreted. Our sympathy arose from the fact that such experiences, in kind, occur to every practitioner. They were seen to be simply more widely conspicuous because the magnifying lens of official position focused upon them a nation's regard. To meet such occasions requires clear judgment, kindly spirit, tact in dealing with friends or foes, ruled by a resolute purpose to control all means and influences available to restore the sufferer to health.

Furthermore, when we notice the agency of moral and social customs in the origin and spread of disease, we realize that the physician is called to a leadership of human nature, of the most extensive and decided character.

The spread of the contagion of scarlet fever, of measles, of small-pox, and venereal diseases, goes on, not solely nor chiefly through its physical properties, but by reason of moral conditions, such as the indifference with which their presence is re-

garded, the absence or irresoluteness of efforts to check their dissemination, the selfishness which sacrifices the public weal to individual comfort, or the obstinacy of ignorance which will heed no council. Under the law of heredity we see disease tending to self-limitation through the feeble life and early death of its inheritors, but in the same human nature we see the passions, the mental affinities and cravings, lead men to alliances which perpetuate the worst scourges of our race. To uncleanly habits we trace the conspicuous filth diseases; to the same source we trace the exciting cause, the intractable character, the wide diffusion, and fatal issue of a long list of other diseases. We find the germ of many ailments in social excesses. We also see the liberty of the press used, not only by its nobler representatives to supply our schools and households with pages made irresistibly attractive with their wealth of wholesome thought and artistic finish, but used also by certain "fellows of the baser sort," to make vice attractive, familiar, and fruitful in retributive suffering. We see, also, a large class of nervous disorders spring from overwork: overwork due to ambition to compete in professional or business life for the higher prizes of honor or money; or to the competition in manufacturing which lengthens the hours of labor beyond human endurance; or to the overdriving and overstraining of human energies to keep pace with the increasing speed and use of machinery, the rush of the locomotive, the spur of the telegraph, the incessant call of telephone,

through the perpetual day of the electric light, and too often through the three hundred and sixty-five days of the year, unbroken by the recreating calm and comforts and inspirations of the Christian Sabbath. Such facts not only illustrate the participation of a mental element in the production, the character, and the results of disease; but they suggest that the physician's duty is not limited to the control of the special cases of sickness he treats. A much broader field of labor, a much larger class of forces, awaits his efforts. I refer to all those measures by which a public sentiment favorable to the use of the best means for the prevention of disease is created and made operative.

The science of preventive medicine is of recent growth. But the knowledge it has already gathered brings with it a peculiar responsibility. As citizens we have duties whose character and sum is proportioned to our special knowledge. No man is fit to be a physician who is not a philanthropist in the best sense of the term. A true philanthropy will impel the physician to disseminate the facts affecting public hygiene. Under our form of government the enforcement of sanitary laws requires the consent of the governed. To gain this consent we must help the public to appreciate the increasing knowledge of sanitary rules. And if, in the execution of such benevolent intent, one should accept the invitation of some charitable society, or literary association, or educational institution, to instruct an audience in hygiene or expedients to meet the emergencies of sudden sick-

ness or accident, let the way be open for him to do so without encountering the suspicion that he seeks advertisement and notoriety for the pecuniary returns they bring. The disgust created by the abuse of the press and the platform by travelling charlatans should not be allowed to abolish their legitimate use. When each member of this Society proves faithful to his opportunities to influence the opinion of his fellow-citizens concerning perils to life and health, which can only be averted by state and civil laws, with judicious Boards to enforce them, we shall soon see the people eager to release our State Board of Health from the crippling bonds which political fears cast around it, eager to restore it to its former efficiency, as a help to our profession in imparting instruction, and in saving life, and ready to treat as sacrilege all future attempts to abridge its beneficent powers.

To proceed with the discussion of our theme, let us now notice that we should not allow the doctrine of our motto to obscure the truth, that we learn much more from the mental work already done, than from any direct personal inspection and manipulations of natural phenomena. We rightly think that personal observation and experiment furnish the very bone and muscle of useful medical knowledge. But they cannot form the whole body of a sound or practical medical education. In fact, one restricted to his own interpretations of the structure and functions of the human body, however versatile and faithfully used his intellect, would prove a misshapen manikin in medical learning,

when compared with another whose very moderate mental gifts had been reinforced and developed by a faithful use of medical records. To trust simply to the teaching of nature is to foster conceit in one's personal powers, and contentment with ignorance.

Some, after they have advanced a certain distance by the aid of books, seem to forget their indebtedness to such sources of learning. They are overcome by the extra impressiveness of facts with which they have been personally connected, or by the flattery of successes which appear to indorse their guesses, or by pecuniary gains which too soon satisfy one with the sufficiency and correctness of his professional acquirements. In the discussion of medical questions with such men, you find that they appeal to their experience for conclusive evidence upon all questions of diagnosis and practice. They appear quite intolerant of the notion that books can teach them more than their own observations of nature, although books contain the testimony of men whose acquirements, opportunities, and records of a hundred-fold more cases of a given disease than can come to the knowledge of the ordinary practitioner, entitle them to speak with authority.

The reasons given for the study of cases to the neglect of books are numerous, plausible, and familiar. They are somewhat of the following sort: it may be said that books make theorists rather than practitioners; that they often preoccupy the mind with notions which are an hindrance rather than an aid; that they are so numerous, so

filled with minute detail which has no direct practical importance; so made up of ill-digested compilation, backed up by feeble authority, mixed up with untested novelties and contradictory suggestions,—that life is too short, practical work too urgent, and prospect of solid instruction from books too small, to warrant wide searching among so-called “medical authorities.” To support such objections, one may tear from their connection and misapply these emphatic words of Sir John Forbes: “No systematic or theoretical classification of disease or therapeutic agents ever yet promulgated is true, or anything like the truth, and none can be adopted as a safe guide in practice.” But after we allow their greatest force to all conceivable objections of this class, it will appear that the very persons who utter these criticisms have gained their minute and correct knowledge of anatomy and physiology, and of the symptoms and treatment of disease, more from the writings of masters in medicine than from their own work. This indicates that if at the outset of a medical career it has proved possible to gain the elements of a sound medical education from medical treatises, it should prove far more profitable for the experienced practitioner to gain instruction from similar sources, since ability, wisely to compare the statements and reasonings of authors, is sure to increase with advance in knowledge. Moreover, all comparisons of the study of nature with the study of books to the disparagement of the latter, simply amounts to an enumeration of difficulties.

Trials are to be met in any department of learning. Nor do impediments to learning exist in books to so great a degree as in natural phenomena themselves. Allegiance to the guidings of nature cannot be maintained without loyalty also to faithful human records of nature. Nature and literature are not rival claimants to our service. We must not serve them with partisan spirit, nor bring them into antagonism. A large part of the usefulness of personal experiment is to qualify us to understand and pass judgment upon thousands of published researches, which bring revealing light to much in our experience that must otherwise forever remain obscure. We cannot but notice that the wisest and most instructive teachers in medicine, men who have discoursed most forcibly concerning our duty to observe and conform to nature's methods, have been indefatigable students of medical literature. Their wisdom is evidently the result of a life-long study of the methods in which reason has been applied to explain and treat disease. They have learned as much from the detection of errors as from the discovery of new truth,—errors which both they and their successors might have gone on repeating, had not their real character received copious illustration in medical records.

There are certain circumstances or conditions which do not reveal themselves to the direct observer of nature. Their presence will not even be suspected until they are suggested by the clashing of the published conclusions to which wide and careful investigations have led. Methods of treat-

ment shown by a careful analysis of cases to be almost uniformly successful in one epidemic of scarlet fever or diphtheria, prove of feeble efficacy in other localities, or in the same locality in another epidemic, although used by the very persons who thought they had demonstrated their value. These uncomfoting results convey the first hint that some conditions have been unregarded, and that our search for and weighing of evidence must take a wider range. Left to ourselves, we might spend a life time in searching among local causes for that which is independent of them, nor once have our attention called to the energy of those more universal, but imperfectly understood, causes of disease which exist in atmospheric conditions, or in the very laws of chemical and vital forces.

The fact that such suggestions do not reveal the precise source of a specific disease, or the full reason for its method of action, does not annul their value. For even when they fail to indicate with exactness the direction our explorations should take, they rid our minds of many false conceptions ; they awaken us out of contentment with inadequate explanations ; they give importunateness to our curiosity.

If it be true, then, that medical literature must furnish us by far the larger portion of our knowledge of facts relating to our own bodies in health and disease, that it treats these facts with explanations which have required centuries for their development, that no comprehensive view of nature can be obtained without its aid, that it points

out unproductive methods of study, into which we are sure, if unwarned, to fall, that it hints to us how and in what direction to most successfully push inquiry, that it unfolds the meaning of nature so as to make it more possible to conform to her efforts to maintain health; if this be true, then we may cry, **Wisely heed the records of human experience and reasoning, as urgently as we cry, Heed the teaching of nature.** Let us not concede to nature the power to convey the best knowledge of herself. For this work she lacks the means. They are the hardly won product of human reason applied to nature.

When we compare the writings of the most popular teachers of medical science, although we may select those who are among the wisest exponents of the law of conformity to nature, we find that nature receives a great variety of interpretation. What occurs to the best trained inquirers is sure to occur in much larger measure to ordinary practitioners. The sincerest attempts to understand, and to act according to nature's methods, are sure to exhibit more or less of not incongruity merely, but of mutual contradiction. Practically we are guided not so much by the actual meaning of observed conditions, as by our conceptions of them. When we consider the innumerable elements of which our bodies are composed, the intricate coördination of bodily functions, together with the vagueness of the signs which reveal their action, we realize the infinite number of combinations into which they may be thrown. If we re-

flect then upon the varying degrees of incompleteness, disorder, and maladjustment which characterize much of our general knowledge of nature, we shall be impressed with the fact that the physician has no task which should take precedence of his need to bring his conceptions of nature into the highest attainable accord with her actual conditions. To do this more is required than to store the memory with ascertained facts. The natural relations of facts must be sought. They must be mentally set in their proper connections, or, when these cannot be determined, they should not be fancifully linked together, but allowed by standing in isolation to provoke curiosity. This is not the work of nature, but of that which is placed over nature, the *super* natural, the human mind and reason. For although natural phenomena have their place in a definite sequence or order of actions, this sequence is often unknown or exceedingly obscure. Whether the indications of nature shall actually instruct and guide one depends upon the condition and habits of the mind which perceives them. We group facts received, according to knowledge already acquired. We value, sort them, and find them suggestive, largely in proportion to our possession of associated truths, but still more largely in conformity with preconceived notions and critical or careless methods of thought. The exhibition of a fact or the statement of a principle in the presence of many different witnesses may awaken in their minds as many different suggestions. Thoughts thus excited may

pursue a course, tangential to the truth announced, or revolve around it in the narrow circle of ideas which at the time rule the mind, instead of following it through the course prescribed by its correlation with other verities. A familiar illustration of this truth comes to us when even some of the more common physiological facts or phases of disease or methods of treatment are brought before any large body of physicians for discussion. Then appear more or less wide differences of conceptions, inferences, and conclusions. These often reveal more concerning their originators than concerning the mooted subject. We may quite plainly trace the source of incongruous ideas to different classes of minds. Such observations teach us that the leadings of nature have no higher value than a man's mental characteristics allow them. They do not irresistibly draw one to right reasoning and action. They do not necessarily assume in any given mind their own natural order. What guiding light they offer may suffer so much of refraction and polarization from the mental media through which it passes, that its rays, if not extinguished, cannot be traced to their source. It is wise to insist that he is not fit to be a physician who is not a careful observer of nature. But it is as necessary to insist that observation is not interpretation. To see is not to learn. The revealing power of facts lies not in themselves but in the mind which perceives and uses them. Nature can only lead the mind which is equipped to trace and follow her.

So it happens that all disease has, beside its actual form and history, other ideal forms which may differ widely from the reality. Could we collect the mental pictures of disease of the earlier centuries of medicine, and, giving them visible form, place them beside the conceptions of succeeding generations, their resemblances and relative fidelity to nature might be likened to the incongruous pictures to be found in art museums, where Indian, Egyptian, Chinese, Japanese, and ancient and modern drawings, hanging together, mutually question each other's correctness. If we select for comparison only those notions of disease and its treatment which are common in our own day, we shall find, even among interpretations defended by professed students of nature, conspicuous disagreement. This proves true not only when such recondite matters as the essential nature of disease germs or molecular action in pathological processes is discussed, but in the interpretation of common cases in everyday practice. Accordingly the practitioner finds that in a given case of sickness he has several forms of disease presented for treatment. First, he has that which nature herself presents in the patient and his surroundings. Second, he has a variety of representations of the nature and proper treatment of the malady gained from books. Third, he has the conception of the disorder indorsed by the minds of the leading physicians of his day, which should be a digest of the teachings of the best authorities with some modern light thrown in. Fourth, he has the popular conviction concerning

the source and character of the ailment, which is very far from proving invariably wrong. And fifth, if he wisely steady himself against vacillation, and reason his way through conflicting suggestions, he forms his own conception, which should be the resultant of all the testimonies enumerated, plus that of his own thought and observation. It is this ideal form which each skilled physician treats. This furnishes his working plan. He gains only its faintest outlines from the bodily conditions he witnesses. Yet it is not the product of the imagination. It is constructed from a more or less extensive familiarity with authorities and out of one's experiences, with trained powers of analysis and judgment. Whether this ideal shall prove a caricature, or be a true and perfect reproduction of nature, will depend not so much upon nature's teaching as upon the contents and action of the mind which receives it.

The symptoms of disease are suggestions rather than revelations. Their meaning appears according to the number and illuminating power of the lights of knowledge already in the mind. The novice gains little or no help from the most instructive microscopical preparations. The microscopist reads from them the secrets of histology and pathology; for every microscope requires two reflectors, one below the objective and the other above the eye-piece, to illumine what is transmitted to the eye with numberless rays of antecedent knowledge. The ordinary traveller on the railroad gains a more or less fleeting pleasure from the

scenery. The artist by his side detects combinations which furnish long-sought features to give completeness to many nascent conceptions, and sometimes even permanently build themselves in as the choicest elements of his style. The geologist, on the same car, receives what enters through the eyes of his fellow-travellers into darkened chambers of their minds, into scenes of tropic vegetation, or of fluvial action, or of glacial movements, or of volcanic disturbances; so that his enthusiasm may lead him, as it did Sir Charles Lyell, to ride for miles with his head thrust out of the car window, to glean from the sections of the hills hieroglyphics, which filled out for him already partially learned paragraphs in the records of nature.

So the forms of disease we treat are an hundred-fold more numerous than those in the most prolix nosology. The visible phases of disease are but its outer garb, often its disguises. Each physician conceives of such forms beneath the ample robe of symptoms as the extent or narrowness, the accuracy or incorrectness, the wise or fallacious use of his learning, may picture in his mind. If content with superficial learning, he may always mistake a few external signs for the real malady. If somewhat better informed, he will recognize the general or local character of an affection, and the portion of the body most affected. If still better instructed, he may determine the central source of the symptoms, and classify the organs which are secondarily and sympathetically affected, and separate sequelæ

and complications. With still wider knowledge, he will have before his mind the microscopical anatomy of each organ, the portions which the disorder chiefly elects to disturb, and the natural sequence of troubles to which these disturbances give rise. Into the delineation of his picture of the disorder will enter not only an accurate knowledge of anatomy, physiology, histology, pathology, and chemistry, but the thousand and one helps which come from all departments of natural science, and from broad culture in history, philosophy, and the arts. The broader the resources of the mind, the more wisely can it apply any special knowledge relating to human beings.

The differences between our conceptions of disease are not likely to prove those of degree merely, that is, of completeness or incompleteness, but in kind, that is, between true and false; since the ideas gained from a partial acquaintance with conditions may be quite the reverse of those conveyed by an entire and exhaustive knowledge. The sum total of ascertained facts may lead to correct diagnosis and treatment, when a large per cent. of the same facts, although indications of nature, would lead only to error. We may compare the manner of nature's leadings to the process of chromo-lithography. The visible features of an illness stamp the first impression, which gives little suggestion of the figure and coloring which is to follow. Systematic questioning to elicit the condition of the nervous, respiratory, digestive, circulatory, secretory, and other organs and functions, strikes in additional

lines and shadings. Methodical physical exploration, with mechanical and chemical aids, impresses new colors, which tone and reinforce those already produced. The process of diagnosis by exclusion, by its pressure, causes the entire disappearance of many tints, and so blends and contrasts the remainder, as to reveal still more the proportions and complexion. But the figure is not complete. It goes on to receive imprints from one's more or less exact knowledge of the natural sciences, from one's knowledge of mental influences, of social customs, of whatever products of human thought and deeds he has studied, since they all reveal somewhat of the physical powers, habits, conditions, and tendencies of human beings. And above the value of the number of special impressions from special blocks of learning, which are needed to perfect the conception, is the skill which so delineates and applies them, that colors and shadings fall with un-deviating exactness upon the spots to which they belong.

There is no power to guide us to the right understanding and treatment of disease, like that which takes the raw material of natural phenomena, and with the fingers of the intellect interweaves them with sound philosophy and learning into accurate fac-similes of nature.

This truth carries us on to affirm that the time has come when the cries "*Natura duce*," and "Search out the secrets of nature," should at least share their prominence with the exhortation—**Master the revelations of nature.**

More than thirty years ago, the revered author of "Expositions of Rational Medicine," in an address on "Medical Education," wrote as follows: "In modern times, the constituent branches of medical science are so expanded that they are not acquired by any physician in a life-time, and still less by a student during his pupilage." Since then, the name of toilers in the different departments of medicine is Multitude. They have wrought with trained and critical observation, with the light of the past to guide them, and with determination to push investigation to its final limits. They have penetrated to conditions of vital processes where material forms subdivide into atomic minuteness. Their importunate searchings for the secrets of nature have been richly productive. Each from his own department has contributed either new facts which shed direct light upon the processes we seek to manipulate, or more rational interpretation of old facts, or the negative results of wisely conducted experiments, which erect so many light-houses and buoys to mark out the right channel of investigation. The fruits of such studies appear each year in modest yet invaluable contributions to numerous foreign and home journals, and, after due allowance for errors and fallacies, a wealth of knowledge thus scattered in fugitive form, like the snow, has silently accumulated in quantity sufficient, if rightly distributed, to smother beneath its pure surface of truth a huge body of errors. But as the falling snow strikes the running stream and vanishes, or alights upon the

ocean the live-long winter without leaving a trace, or by the winds is swept from the highway, or piled upon it in obstructing masses, so the beneficent influence of innumerable contributions to medical science is lost upon unappreciative minds, or whirled away by the pressure of daily practice, or heaped in appalling bulk before the studious practitioner, who must open and grade and make for himself a highway by means of, upon, and through them. The sum of these additions to our knowledge of nature in modern times has assumed an overwhelming magnitude. It involves such intricacy, such fineness, such extensiveness of details, as to warrant the lamentation, not that so little is known of nature's methods, but that we gather, comprehend, analyze, and utilize so little of the knowledge already communicated.

The leadings of nature may demand so much of mental vigor in the search for the minutest ultimate elements, as to preclude a comprehensive and practical knowledge of general principles. In this way the acquisition of fresh facts at times threatens to perpetuate, as well as to remove, error. Nature then leads with irresistible traction. She may run away with a votary, or captivate him with the attraction of a special class of truths, or surfeit his mind with exceptional items, or swallow up his enthusiasm in a flood of miscellaneous facts, or even crowd him into imbecile skepticism by the contradictions and paradoxes of unsystematized teachings, until he is prepared to use these words of Milton:—

“That not to know at large of things remote
From use, obscure and subtle, but to know
That which before us lies in daily life
Is the prime wisdom: what is more is fume,
Or emptiness, or fond impertinence,
And renders us, in things that most concern,
Unpracticed, unprepared, and still to seek.”

PARADISE LOST, Book VIII.

The student finds willing and competent guides to the remotest limits of medical science. They take him over fields of research and discovery so vast, that as one's mental endurance and time are waning, he finds himself simply laboring upon some rapidly expanding boundary of knowledge, and so carried more remotely from departments of study which are no less legitimately related to the pivotal facts of medical science, but which lie in the opposite direction.

Since the supply of recorded medical knowledge already exceeds the strongest mental power of digestion, he, who labors chiefly to add to this supply, may tickle the palate of some epicure in medical lore, or perchance add a relish, or stimulant, or corrective to increase the popularity or nutrient properties of verities already furnished, and occasionally gain a flattering distinction for original work. However legitimate such work for the purely scientific man, the practitioner labors more wisely, who seeks to ascertain the form, the proper order, the proportions, the compatibilities, the relative value, and the timely applicability of the facts already known. This broader use of facts maintains mental health, mental hunger, and power to assimilate what is needed to correct impressions,

to justly balance judgment, and to provide a larger variety of expedients for the relief of sickness than any strictly original investigations could compass.

The immensity of the body of facts, by which nature now offers to lead us, often proves discouraging. It inclines one to seek the pith of all preceding wisdom in some recently announced and easily comprehended novelty. But an oft-repeated lesson of experience teaches, that we are not to expect that the discovery of any one or more secrets of nature will furnish some easy and sure way of detecting the true nature and treatment of disease. The voluminous results of the laboratory work of physiologists, the weekly published observations of skilled practitioners, give no hint of a discoverable panacea. They only reveal with growing impressiveness the increasing number of elements and conditions whose complex reactions produce the harmony and the discords of nature, but whose recognition and tabulation add just so much to the student's work to ascertain their relations and to use their light.

This work is to be done by diligent comparison and classification and generalization. If we had this work to begin we might find the present amount of revelations of nature as blinding as the noonday sun to the owl. Even with the powers of a Cuvier, or a Humboldt, or a Goethe, or a Darwin, we might as well seek to measure the ocean with a pint graduate, as to gain an exhaustive knowledge of all the facts on which medical prac-

tice is based. But this ocean, filled by the rills and rivers of knowledge which flow from every centre of learning, we can explore with the aid of general principles already framed and indorsed by the concurring experience of former generations. These principles furnish, as it were, vessels into which we gather material to strengthen, enlarge, and sometimes to reconstruct them, and by their aid we discover new means of exploration.

I should be recreant, indeed, to my sense of justice, if I did not here make mention of that indispensable guide through the sea of medical periodical literature, the "*Index Medicus*." May it receive from members of this Society, according to its needs, if not according to its invaluable worth, support sufficient to save its brilliant light from extinction.

A popular humorist has said, that "all we need, to possess the finest navy in the world, is ships, for we have plenty of water." So with less sarcastic intent we may say, that all we need to have the best possible knowledge of nature is brain-work, for there is plenty of knowledge.

It is no time for us to cry most urgently that nature would lead us with fresh revelations. Our minds, already over-taxed by the number, the wide distribution, and recondite relations of ascertained facts, are more likely to be distracted than enlightened by their increase. Overweighted powers weaken, stagger, and go astray. I urge the statement that we need more than any fresh contributions to the details of nature's workings, a proper mastery and use of the items of knowledge which

await our acquaintance and our judgment. Why grasp after fresh keys wherewith to unlock the mysteries of life and death, without faithfully and vigorously using those already in our hands?

The line of thought we have thus far followed, but upon which the waning hour will soon command us to halt, brings to view a fundamental principle which contests with our motto its claim to supreme importance. It is a principle which lies at the foundation of success in any one of the learned professions: namely, the rule to specially train the mental powers for their special work. Masterly discipline of the thoughts kindles reason into a guiding light of no less importance than that from the simple indications of nature. The reason which seeks first clear conceptions of material facts, and then so combines them that their logical reactions produce mental heat and light, quickening us to further investigation, this is our chief guide, the guide of all other guides, the employer, the director, the judge of guiding nature.

Medical practice consists in the adaptation of a knowledge of several sciences to prevent and alleviate disease. The effectiveness of such adaptation is dependent upon and subject to all the variations of individual judgment. To secure a measure of exactness and agreement in practice which will make the real scientific basis of our work more apparent, we must labor to train our minds to systematic, severely thorough, and scientific methods, and cautious judgments. The rational basis of honorable modern medical practice

is too often needlessly exposed to public suspicion. We meet a much larger conflict of opinion than the state of medical learning, or the intrinsic obscurity of medical questions, justifies. How often does a chilling mist of mortification cool our just pride in the actual advances in medical knowledge, when we read what is simply professional testimony, under the title "expert testimony," although it may reveal to every studious physician lamentably slipshod analysis of half-acquired facts, and random opinions unsustained by any logical use of the evidence in the case, or by any personal experience, or by any known scientific demonstration.

The physician's study and discipline of himself is one of the most important parts of scientific medicine. We are told that "Goethe looked upon his own personality, and its relation to outward things, as so necessary an ingredient in his scientific labors that he would not separate these learned investigations from his every-day existence. Hence the stress which he laid upon his personal condition when pursuing his scientific studies." The application of the rule, to allow nature to do her best work in the healing of disease, must extend to the physician's observance of the laws of nature in himself. Of what use is the microscope if the lens be clouded with dust? Of what use the pharmacopœia if the labels are gone? Of what use the knife when its edge is consumed with rust? In like manner, of what value is the physician whose mental optics, and powers, and knowledge,

and acumen are blurred and blunted and unavailable by reason of negligent preservation and preparation for their work? No less indispensable than a knowledge of anatomy, physiology, pathology, materia medica, and all related sciences, is the work of measurement of one's mental tendencies, detection of one's mental deficiencies, strengthening of one's mental weaknesses, and adaptation of one's mental processes to the end to which our lives are to be devoted; a work to be indefatigably pursued in order to make one a worthy disciple of rational medicine. That we do not overstate its importance appears from these words of Dr. Jacob Bigelow, contained in an address on "Medical Education": "The subjects," he says, "most important to be well taught in medical schools are the elementary principles which constitute the frame-work of medical sciences, *and the mode of thought and inquiry which leads to just reasoning upon them.*"

Confirmatory of the same suggestion are the words of Sir J. Forbes, which appear as the twentieth specification of things most important for medical men to think and act upon. "Lastly and above all," he writes, "to bring up the medical mind to the standard necessary for studying, comprehending, appreciating, and exercising the most complex and difficult of the arts, that are based upon a scientific foundation,—the art of practical medicine. And this can only be done by elevating the preliminary and fundamental education of the medical practitioner."

We have to congratulate one another that among the founders of this Society, were those whose wise counsels gave rise to early efforts to provide thorough medical instruction. The apparent disorder of first efforts, when the constituents of every department of medicine were turned into the mental stomach of the student in the same year, has, like a first confused gathering of foundation stones, disappeared in the construction of the systematic curriculum of the Harvard Medical School; a curriculum of which the architectural symmetry and fitness of the new building is not too strongly typical. Yet the convictions of the wisest of our profession, which are so clearly expressed in this costly provision for higher medical education, need re-enforcement from the words, and practice, and personal influence of every member of this Society.

Public opinion concerning the requirements of a well equipped medical practitioner still needs to be carried forward. There should not be simply here and there a few among the liberally educated who realize that prolonged study and severity of analytical reasoning are required for sound medical, no less than for sound judicial, opinions. With the increasing popular knowledge of some of the sciences on which modern medical practice is based, we may hope that for one to rush into practice with no more training than that afforded by a common school, and the briefest possible attendance on medical lectures, may seem to the public preposterous, and prove unprofitable. We believe that

the time is not far distant when the present exemplary thoroughness of a Harvard medical education, which now seems like the light of an Argand burner compared with the farthing candle of its beginnings, shall pale its brilliancy before the electric light of its future influence, when it shall re-enforce the example of the Johns Hopkins University in Baltimore by opening a medical course of at least four years only to those who have had a special preliminary training of three years.

When that time comes, nay, before then, we may hope that there will be found, among other new provisions, a chair from which shall be taught, separately from strictly clinical instruction, the rules and methods by which investigations shall be made, evidences collated, and courses of reasoning pursued in order to avoid judgments on insufficient evidence, and false opinions from misuse of evidence. Such a course of lectures, with copious illustrations of clearly defined principles, would send the beginner to his work zealous to observe the lines of scientific progress, and guarded against many deviations which misapply efforts, and beget misleading habits of thought.

Farther pursuance and wider application of our discussion I hasten to leave with you. If any of the utterances of the past hour have seemed oracular in form or tone, they have been prompted by no oracular spirit. They have been made with no hope to fix with invariable exactness the lines of truth. They will accomplish that for which I

have intended them, if they shall in some measure quicken desire and endeavor to be thorough in professional study and work. One who is unable to offer a novel contribution to science, may hope by re-phrasing old truth to give it fresh influence. I have sought simply to rustle the leaves of the tree of knowledge already in your minds, so as to quicken their call for nourishment. The thought that I had suggested disloyalty to the truth of our motto would bring with it a sense of sacrilege. For I have hoped to increase rather than to tarnish its lustre, by blending with its light the rays of a truth which gives inspiration as well as illumination. With the oppressive fact of our subjection to the laws of matter, let us couple the fact that nature's dominion is a *limited* monarchy. This gives us buoyancy in our work. This reminds us of our imperishable natures, under whose dictation the material universe is made to contribute to human exaltation. This truth we detect in the survival of the work, and the spirit, of many members of this Society, who, though now mingled with the dust, still, through us, maintain over nature the dominion of their thoughts. While, therefore, we keep the words of our motto upon our seal, as a reminder of a historic epoch, as well as the announcement of a vital principle, let us mentally tone their exclusive form, so that to us they shall always read,—

Ratione et natura ducibus.