FRANCIS BACON

THE ADVANCEMENT OF LEARNING

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SIR FRANCIS BACON

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Preface

Lord Bacon can only be said to have carried the first three parts of his “Instauratio Magna” to any degree of perfection. Of these the “Sylva Sylvarum” is but a dry catalogue of natural phenomena, the collection of which, however necessary it might be, Bacon viewed as a sort of mechanical labor, and would never have stooped to the task, had not the field been abandoned by the generality of philosophers, as unworthy of them. The two other portions of the “Instauratio Magna,” which these volumes contain, unfold the design of his philosophy, and exhibit all the peculiarities of his extraordinary mind, enshrined in the finest passages of his writings.

Of the “De Augmentis,” though one of the greatest books of modern times, only three translations have appeared, and each of these strikingly imperfect. That of Wats, issued while Bacon was living, is singularly disfigured with solecisms, and called forth the just censures of Bacon and his friends. The version of Eustace Cary is no less unfortunate, owing to its poverty of diction, and antiquated phraseology. Under the public sense of these failures, another translation was produced about sixty years ago by Dr. Shaw, which might have merited approbation, had not the learned physician been impressed with the idea that he could improve Bacon by relieving his work of some of its choicest passages, and entirely altering the arrangement. In the present version, our task has been principally to rectify Shaw’s mistakes, by restoring the author’s own arrangement, and supplying the omitted portions. Such of Shaw’s notes as were deemed of value have been retained, and others added where the text seemed to require illustration. Due care also has been taken to point out the

sources whence Bacon drew his extraordinary stores of learning, by furnishing authorities for the quotations and allusions in the text, so that the reader may view at a glance the principal authors whom Bacon loved to consult, and whose agency contributed to the formation of his colossal powers.

The version of the “Novum Organum” contained in this set is that by Wood, which is the best extant. The present edition of this immortal work has been enriched with an ample commentary, in which the remarks of the two Playfairs, Sir John Herschel, and the German and French editors, have been diligently consulted, that nothing may be wanting to render it as perfect as possible.

J. D.

FRANCIS OF VERULAM'S GREAT INSTAURATION

ANNOUNCEMENT OF THE AUTHOR

Francis of verulam thought thus, and such is the method which he determined within himself, and which he thought it concerned the living and posterity to know

Being convinced, by a careful observation, that the human understanding perplexes itself, or makes not a sober and advantageous use of the real helps within its reach, whence manifold ignorance and inconveniences arise, he was determined to employ his utmost endeavors toward restoring or cultivating a just and legitimate familiarity between the mind and things.

But as the mind, hastily and without choice, imbibes and treasures up the first notices of things, from whence all the rest proceed, errors must forever prevail, and remain uncorrected, either by the natural powers of the understanding or the assistance of logic; for the original notions being vitiated, confused, and inconsiderately taken from things, and the secondary ones formed no less rashly, human knowledge itself, the thing employed in all our researches, is not well put together nor justly formed, but resembles a magnificent structure that has no foundation.

And while men agree to admire and magnify the false powers of the mind, and neglect or destroy those that might be rendered true, there is no other course left but with better assistance to begin the work anew, and raise or rebuild the sciences, arts, and all human knowledge from a firm and solid basis.

This may at first seem an infinite scheme, unequal to human abilities, yet it will be found more sound and

judicious than the course hitherto pursued, as tending to some issue; whereas all hitherto done with regard to the sciences is vertiginous, or in the way of perpetual rotation.

Nor is he ignorant that he stands alone in an experiment almost too bold and astonishing to obtain credit, yet he thought it not right to desert either the cause or himself, but to boldly enter on the way and explore the only path which is pervious to the human mind. For it is wiser to engage in an undertaking that admits of some termination, than to involve one’s self in perpetual exertion and anxiety about what is interminable. The ways of contemplation, indeed, nearly correspond to two roads in nature, one of which, steep and rugged at the commencement, terminates in a plain; the other, at first view smooth and easy, leads only to huge rocks and precipices. Uncertain, however, whether these reflections would occur to another, and observing that he had never met any person disposed to apply his mind to similar thoughts, he determined to publish whatsoever he found time to perfect. Nor is this the haste of ambition, but anxiety, that if he should die there might remain behind him some outline and determination of the matter his mind had embraced, as well as some mark of his sincere and earnest affection to promote the happiness of mankind.

AUTHOR’S PREFACE

Of the state of learning—That it is neither prosperous nor greatly advanced, and that a way must be opened to the human understanding entirely distinct from that known to our predecessors, and different aids procured, that the mind may exercise her power over the nature of things

It appears to me that men know neither their acquirements nor their powers, but fancy their possessions greater and their faculties less than they are; whence, either valuing the received arts above measure, they look out no further; or else despising themselves too much, they exercise their talents upon lighter matters, without attempting the capital things of all. And hence the sciences seem to have their Hercules’ Pillars, which bound the desires and hopes of mankind.

But as a false imagination of plenty is among the principal causes of want, and as too great a confidence in things present leads to a neglect of the future, it is necessary we should here admonish mankind that they do not too highly value or extol either the number or usefulness of the things hitherto discovered; for, by closely inspecting the multiplicity of books upon arts and sciences, we find them to contain numberless repetitions of the same things in point of invention, but differing indeed as to the manner of treatment; so that the real discoveries, though at the first view they may appear numerous, prove upon examination but few. And as to the point of usefulness, the philosophy we principally received from the Greeks must be acknowledged puerile, or rather talkative than generative—as being fruitful in controversies, but barren of effects.

The fable of Scylla seems a civil representation of the present condition of knowledge; for she exhibited the countenance and expression of a virgin, while barking monsters encircled her womb. Even thus the sciences have their specious and plausible generalities; but when we descend to particulars, which, like the organs of generation, should produce fruits and effects, then spring up loud altercations and controversies, which terminate in barren sterility. And had this not been a lifeless kind of philosophy, it were scarce possible it should have made so little progress in so many ages, insomuch, that not only positions now frequently remain positions still, but questions remain questions, rather riveted and cherished than determined by disputes; philosophy thus coming down to us in the persons of master and scholar, instead of inventor and improver. In the mechanic arts the case is otherwise—these commonly advancing toward perfection in a course of daily improvement, from a rough unpolished state, sometimes prejudicial to the first inventors, while philosophy and the intellectual sciences are, like statues, celebrated and adored, but never advanced; nay, they sometimes appear most perfect in the original author, and afterward degenerate. For since men have gone over in crowds to the opinion of their leader, like those silent senators of Rome, *Endnote 002* they add nothing to the extent of learning themselves, but perform the servile duty of waiting upon particular authors, and repeating their doctrines.

It is a fatal mistake to suppose that the sciences have gradually arrived at a state of perfection, and then been recorded by some one writer or other; and that as nothing better can afterward be invented, men need but cultivate and set off what is thus discovered and completed; whereas, in reality, this registering of the sciences proceeds only from the assurance of a few and the sloth

and ignorance of many. For after the sciences might thus perhaps in several parts be carefully cultivated; a man of an enterprising genius rising up, who, by the conciseness of his method, renders himself acceptable and famous, he in appearance erects an art, but in reality corrupts the labors of his predecessors. This, however, is usually well received by posterity, as readily gratifying their curiosity, and indulging their indolence. But he that rests upon established consent as the judgment approved by time, trusts to a very fallacious and weak foundation; for we have but an imperfect knowledge of the discoveries in arts and sciences, made public in different ages and countries, and still less of what has been done by particular persons, and transacted in private; so that neither the births nor miscarriages of time are to be found in our records.

Nor is consent, or the continuance thereof, a thing of any account, for however governments may vary, there is but one state of the sciences, and that will forever be democratical or popular. But the doctrines in greatest vogue among the people, are either the contentious and quarrelsome, or the showy and empty; that is, such as may either entrap the assent, or lull the mind to rest; whence, of course, the greatest geniuses in all ages have suffered violence; while out of regard to their own character they submitted to the judgment of the times, and the populace. And thus when any more sublime speculations happened to appear, they were commonly tossed and extinguished by the breath of popular opinion. Hence time, like a river, has brought down to us what is light and tumid, but sunk what was ponderous and solid. As to those who have set up for teachers of the sciences, when they drop their character, and at intervals speak their sentiments, they complain of the subtilty of nature, the concealment of truth, the obscurity of things, the entanglement of causes, and the imperfections of the human understanding; thus rather choosing to accuse the common state of men and things,

than make confession of themselves. It is also frequent with them to adjudge that impossible in an art, which they find that art does not affect; by which means they screen indolence and ignorance from the reproach they merit. The knowledge delivered down to us is barren in effects, fruitful in questions, slow and languid in improvement, exhibiting in its generalities the counterfeits of perfection, but meagre in its details, popular in its aim, but suspected by its very promoters, and therefore defended and propagated by artifice and chicanery. And even those who by experience propose to enlarge the bounds of the sciences, scarce ever entirely quit the received opinions, and go to the fountain-head, but think it enough to add somewhat of their own; as prudentially considering, that at the time they show their modesty in assenting, they may have a liberty of adding. But while this regard is shown to opinions and moral considerations, the sciences are greatly hurt by such a languid procedure; for it is scarce possible at once to admire and excel an author; as water rises no higher than the reservoir it falls from. Such men, therefore, though they improve some things, yet advance the sciences but little, or rather amend than enlarge them.

There have been also bolder spirits, and greater geniuses, who thought themselves at liberty to overturn and destroy the ancient doctrine, and make way for themselves and their opinions; but without any great advantage from the disturbance; as they did not effectively enlarge philosophy and arts by practical works, but only endeavored to substitute new dogmas, and to transfer the empire of opinion to themselves, with but small advantage; for opposite errors proceed mostly from common causes.

As for those who, neither wedded to their own nor others' opinions, but continuing friends to liberty, made use of assistance in their inquiries, the success they met with did not answer expectation, the attempt, though laudable, being but feeble; for pursuing only the probable reasons of

things, they were carried about in a circle of arguments, and taking a promiscuous liberty, preserved not the rigor of true inquirers; while none of them duly conversed with experience and things themselves. Others again, who commit themselves to mechanical experience, yet make their experiments at random, without any method of inquiry. And the greatest part of these have no considerable views, but esteem it a great matter if they can make a single discovery; which is both a trifling and unskilful procedure, as no one can justly or successfully discover the nature of any one thing in that thing itself, or without numerous experiments which lead to further inquiries. And we must not omit to observe that all the industry displayed in experiment has been directed by too indiscreet a zeal at some prejudged effect, seeking those which produced fruit rather than knowledge, in opposition to the Divine method, which on the first day created time alone, delaying its material creations until the sun had illumined space.

Lastly, those who recommend logic as the best and surest instrument for improving the sciences, very justly observe, that the understanding, left to itself, ought always to be suspected. But here the remedy is neither equal to the disease, nor approved; for though the logic in use may be properly applied in civil affairs, and the arts that are founded in discourse and opinion, yet it by no means reaches the subtilty of nature; and by catching at what it cannot hold, rather serves to establish errors and fix them deeper than open the way of truth. *Endnote 003*

Upon the whole, men do not hitherto appear to be happily inclined and fitted for the sciences, either by their own industry, or the authority of authors, especially as there is little dependence to be had upon the common demonstrations and experiments; while the structure of the universe renders it a labyrinth to the understanding; where the paths are not only everywhere doubtful, but the

appearances of things and their signs deceitful; and the wreaths and knots of nature intricately turned and twisted; *Endnote 004* through all which we are only to be conducted by the uncertain light of the senses that sometimes shines, and sometimes hides its head; and by collections of experiments and particular facts, in which no guides can be trusted, as wanting direction themselves, and adding to the errors of the rest. In this melancholy state of things, one might be apt to despair both of the understanding left to itself, and of all fortuitous helps; as of a state irremediable by the utmost efforts of the human genius, or the often-repeated chance of trial. The only clew and method is to begin all anew, and direct our steps in a certain order, from the very first perceptions of the senses. Yet I must not be understood to say that nothing has been done in former ages, for the ancients have shown themselves worthy of admiration in everything which concerned either wit or abstract reflection; but, as in former ages, when men at sea, directing their course solely by the observation of the stars, might coast along the shores of the continent, but could not trust themselves to the wide ocean, or discover new worlds, until the use of the compass was known; even so the present discoveries referring to matters immediately under the jurisdiction of the senses, are such as might easily result from experience and discussion; but before we can enter the remote and hidden parts of nature, it is requisite that a better and more perfect application of the human mind should be introduced. This, however, is not to be understood as if nothing had been effected by the immense labors of so many past ages; as the ancients have performed surprisingly in subjects that required abstract meditation, and force of genius. But as navigation was imperfect before the use of the compass, so will many secrets of nature and art remain undiscovered, without a

more perfect knowledge of the understanding, its uses, and ways of working.

For our own part, from an earnest desire of truth, we have committed ourselves to doubtful, difficult, and solitary ways; and, relying on the Divine assistance, have supported our minds against the vehemence of opinions, our own internal doubts and scruples, and the darkness and fantastic images of the mind; that at length we might make more sure and certain discoveries for the benefit of posterity. And if we shall have effected anything to the purpose, what led us to it was a true and genuine humiliation of mind. Those who before us applied themselves to the discovery of arts, having just glanced upon things, examples, and experiments; immediately, as if invention was but a kind of contemplation, raised up their own spirits to deliver oracles: whereas our method is continually to dwell among things soberly, without abstracting or setting the understanding further from them than makes their images meet; which leaves but little work for genius and mental abilities. And the same humility that we practice in learning, the same we also observe in teaching, without endeavoring to stamp a dignity on any of our inventions, by the triumphs of confutation, the citations of antiquity, the producing of authorities, or the mask of obscurity; as any one might do, who had rather give lustre to his own name, than light to the minds of others. We offer no violence, and spread no nets for the judgments of men, but lead them on to things themselves, and their relations; that they may view their own stores, what they have to reason about, and what they may add, or procure, for the common good. And if at any time ourselves have erred, mistook, or broke off too soon, yet as we only propose to exhibit things naked, and open, as they are, our errors may be the readier observed, and separated, before they considerably infect the mass of knowledge; and our labors be the more easily continued. And thus we hope to

establish forever a true and legitimate union between the experimental and rational faculty, whose fallen and inauspicious divorces and repudiations have disturbed everything in the family of mankind.

But as these great things are not at our disposal, we here, at the entrance of our work, with the utmost humility and fervency, put forth our prayers to God, that remembering the miseries of mankind, and the pilgrimage of this life, where we pass but few days and sorrowful, he would vouchsafe through our hands, and the hands of others, to whom he has given the like mind, to relieve the human race by a new act of his bounty. We likewise humbly beseech him that what is human may not clash with what is divine; and that when the ways of the senses are opened, and a greater natural light set up in the mind, nothing of incredulity and blindness toward divine mysteries may arise; but rather that the understanding, now cleared up, and purged of all vanity and superstition, may remain entirely subject to the divine oracles, and yield to faith, the things that are faith's: and lastly, that expelling the poisonous knowledge infused by the serpent, which puffs up and swells the human mind, we may neither be wise above measure, nor go beyond the bounds of sobriety, but pursue the truth in charity.

We now turn ourselves to men, with a few wholesome admonitions and just requests. And first, we admonish them to continue in a sense of their duty, as to divine matters; for the senses are like the sun, which displays the face of the earth, but shuts up that of the heavens: and again, that they run not into the contrary extreme, which they certainly will do, if they think an inquiry into nature any way forbid them by religion. It was not that pure and unspotted natural knowledge whereby Adam gave names to things, agreeable to their natures, which caused his fall; but an ambitious and authoritative desire of moral knowledge, to judge of good and evil, which makes men

revolt from God, and obey no laws but those of their own will. But for the sciences, which contemplate nature, the sacred philosopher declares, “It is the glory of God to conceal a thing, but the glory of a king to find it out.” *Endnote 005* As if the Divine Being thus indulgently condescended to exercise the human mind by philosophical inquiries.

In the next place, we advise all mankind to think of the true ends of knowledge, and that they endeavor not after it for curiosity, contention, or the sake of despising others, nor yet for profit, reputation, power, or any such inferior consideration, but solely for the occasions and uses of life; all along conducting and perfecting it in the spirit of benevolence. Our requests are—1. That men do not conceive we here deliver an opinion, but a work; and assure themselves we attempt not to found any sect or particular doctrine, but to fix an extensive basis for the service of human nature. 2. That, for their own sakes, they lay aside the zeal and prejudices of opinions, and endeavor the common good; and that being, by our assistance, freed and kept clear from the errors and hindrances of the way, they would themselves also take part of the task. 3. That they do not despair, as imagining our project for a grand restoration, or advancement of all kinds of knowledge, infinitely beyond the power of mortals to execute; while in reality, it is the genuine stop and prevention of infinite error. Indeed, as our state is mortal, and human, a full accomplishment cannot be expected in a single age, and must therefore be commended to posterity. Nor could we hope to succeed, if we arrogantly searched for the sciences in the narrow cells of the human understanding, and not submissively in the wider world. 4. In the last place, to prevent ill effects from contention, we desire mankind to consider how far they have a right to judge our performance, upon the foundations here laid down: for we

reject all that knowledge which is too hastily abstracted from things, as vague, disorderly, and ill-formed; and we cannot be expected to abide by a judgment which is itself called in question.

DISTRIBUTION OF THE WORK IN SIX PARTS

1. Survey and Extension of the Sciences; or, the Advancement of Learning.
2. Novum Organum; or, Precepts for the Interpretation of Nature.
3. Phenomena of the Universe; or, Natural and Experimental History, on which to found Philosophy.
4. Ladder of the Understanding.
5. Precursors, or Anticipators, of the Second Philosophy.
6. Second Philosophy; or, Active Science.

We divide the whole of the work into six parts: the first whereof gives the substance, or general description of the knowledge which mankind at present possess; choosing to dwell a little upon things already received, that we may the easier perfect the old, and lead on to new; being equally inclined to cultivate the discoveries of antiquity, as to strike out fresh paths of science. In classing the sciences, we comprehend not only the things already invented and known, but also those omitted and wanted; for the intellectual globe, as well as the terrestrial, has both its frosts and deserts. It is therefore no wonder if we sometimes depart from the common divisions. For an addition, while it alters the whole, must necessarily alter the parts and their sections; whereas the received divisions are only fitted to the received sum of the sciences, as it now stands. With regard to the things we shall note as defective; it will be our method to give more than the bare titles, or short heads of what we desire to have done; with particular care, where the dignity or difficulty of the subject requires it, either to lay down the rules for effecting the work, or make an attempt of our own, by way of

example, or pattern, of the whole. For it concerns our own character, no less than the advantage of others, to know that a mere capricious idea has not presented the subject to our mind, and that all we desire and aim at is a wish. For our designs are within the power of all to compass, and we ourselves have certain and evident demonstrations of their utility. We come not hither, as augurs, to measure out regions in our mind by divination, but like generals, to invade them for conquest. And this is the first part of the work.

When we have gone through the ancient arts, we shall prepare the human understanding for pressing on beyond them. The second object of the work embraces the doctrine of a more perfect use of reason, and the true helps of the intellectual faculties, so as to raise and enlarge the powers of the mind; and, as far as the condition of humanity allows, to fit it to conquer the difficulties and obscurities of nature. The thing we mean, is a kind of logic, by us called The Art of interpreting Nature; as differing widely from the common logic, which, however, pretends to assist and direct the understanding, and in that they agree: but the difference between them consists in three things, viz., the end, the order of demonstrating, and the grounds of inquiry.

The end of our new logic is to find, not arguments, but arts; not what agrees with principles, but principles themselves: not probable reasons, but plans and designs of works—a different intention producing a different effect. In one the adversary is conquered by dispute, and in the other nature by works. The nature and order of the demonstrations agree with this object. For in common logic, almost our whole labor is spent upon the syllogism. Logicians hitherto appear scarcely to have noticed induction, passing it over with some slight comment. But we reject the syllogistic method as being too confused, and allowing nature to escape out of our hands. For though

nobody can doubt that those things which agree with the middle term agree with each other, nevertheless, there is this source of error, that a syllogism consists of propositions, propositions of words, and words are but the tokens and signs of things. Now, if the first notions, which are, as it were, the soul of words, and the basis of every philosophical fabric, are hastily abstracted from things, and vague and not clearly defined and limited, the whole structure falls to the ground. We therefore reject the syllogism, and that not only as regards first principles, to which logicians do not apply them, but also with respect to intermediate propositions, which the syllogism contrives to manage in such a way as to render barren in effect, unfit for practice, and clearly unsuited to the active branch of the sciences. Nevertheless, we would leave to the syllogism, and such celebrated and applauded demonstrations, their jurisdiction over popular and speculative acts; while, in everything relating to the nature of things, we make use of induction for both our major and minor propositions; for we consider induction as that form of demonstration which closes in upon nature and presses on, and, as it were, mixes itself with action. Whence the common order of demonstrating is absolutely inverted; for instead of flying immediately from the senses, and particulars, to generals, as to certain fixed poles, about which disputes always turn, and deriving others from these by intermediates, in a short, indeed, but precipitate manner, fit for controversy, but unfit to close with nature; we continually raise up propositions by degrees, and in the last place, come to the most general axioms, which are not notional, but well defined, and what nature allows of, as entering into the very essence of things. *Endnote 006*

But the more difficult part of our task consists in the form of induction, and the judgment to be made by it; for that form of the logicians which proceeds by simple

enumeration, is a childish thing, concludes unsafely, lies open to contradictory instances, and regards only common matters, yet determines nothing: while the sciences require such a form of induction, as can separate, adjust, and verify experience, and come to a necessary determination by proper exclusions and rejections.

Nor is this all; for we likewise lay the foundations of the sciences stronger and closer, and begin our inquiries deeper than men have hitherto done, bringing those things to the test which the common logic has taken upon trust. The logicians borrow the principles of the sciences from the sciences themselves, venerate the first notions of the mind, and acquiesce in the immediate informations of the senses, when rightly disposed; but we judge, that a real logic should enter every province of the sciences with a greater authority than their own principles can give; and that such supposed principles should be examined, till they become absolutely clear and certain. As for first notions of the mind, we suspect all those that the understanding, left to itself, procures; nor ever allow them till approved and authorized by a second judgment. And with respect to the informations of the senses, we have many ways of examining them; for the senses are fallacious, though they discover their own errors; but these lie near, while the means of discovery are remote.

The senses are faulty in two respects, as they either fail or deceive us. For there are many things that escape the senses, though ever so rightly disposed; as by the subtilty of the whole body, or the minuteness of its parts; the distance of place; the slowness or velocity of motion; the commonness of the object, etc. Neither do the senses, when they lay hold of a thing, retain it strongly; for evidence, and the informations of sense, are in proportion to a man, and not in proportion to the universe. *Endnote 007*

And it is a grand error to assert that sense is the measure of things. *Endnote 008*

To remedy this, we have from all quarters brought together, and fitted helps for the senses; and that rather by experiments than by instruments; apt experiments being much more subtile than the senses themselves, though assisted with the most finished instruments. We, therefore, lay no great stress upon the immediate and natural perceptions of the senses, but desire the senses to judge only of experiments, and experiments to judge of things: on which foundation, we hope to be patrons of the senses, and interpreters of their oracles. And thus we mean to procure the things relating to the light of nature, and the setting it up in the mind; which might well suffice, if the mind were as white paper. But since the minds of men are so strangely disposed, as not to receive the true images of things, it is necessary also that a remedy be found for this evil.

The idols, or false notions, which possess the mind, are either acquired or innate. The acquired arise either from the opinions or sects of philosophers, or from preposterous laws of demonstration; but the innate cleave to the nature of the understanding, which is found much more prone to error than the senses. For however men may amuse themselves, and admire, or almost adore the mind, it is certain, that like an irregular glass, it alters the rays of things, by its figure and different intersections.

The two former kinds of idols may be extirpated, though with difficulty; but this third is insuperable. All that can be done, is to point them out, and mark, and convict that treacherous faculty of the mind; lest when the ancient errors are destroyed, new ones should sprout out from the rankness of the soil: and, on the other hand, to establish this forever, that the understanding can make no judgment but by induction, and the just form thereof. Whence the doctrine of purging the understanding requires three kinds

of confutations, to fit it for the investigation of truth, viz.; the confutation of philosophies, the confutation of demonstrations, and the confutation of the natural reason. But when these have been completed, and it has been clearly seen what results are to be expected from the nature of things, and the nature of the human mind, we shall have then furnished a nuptial couch for the mind and the universe, the divine goodness being our bridemaid. And let it be the prayer of our Epithalamium, that assistance to man may spring from this union, and a race of discoveries, which will contribute to his wants and vanquish his miseries. And this is the second part of the work.

But as we propose not only to pave and show the way, but also to tread in it ourselves, we shall next exhibit the phenomena of the universe; that is, such experience of all kinds, and such a natural history, as may afford a foundation to philosophy. For as no fine method of demonstration, or form of explaining nature, can preserve the mind from error, and support it from falling; so neither can it hence receive any matter of science. Those, therefore, who determine not to conjecture and guess, but to find out and know; not to invent fables and romances of worlds, but to look into, and dissect the nature of this real world, must consult only things themselves. Nor can any force of genius, thought, or argument, be substituted for this labor, search, and inspection; not even though all the wits of men were united: this, therefore, must either be had, or the business be deserted forever. But the conduct of mankind has hitherto been such, that it is no wonder nature has not opened herself to them. For the information of the senses is treacherous and deceitful; observation careless, irregular, and accidental; tradition idle, rumorous, and vain; practice narrow and servile; experience blind, stupid, vague, and broken; and natural history extremely light and empty: wretched materials for the understanding to fashion into philosophy and the sciences! Then comes in

a preposterous subtilty of augmentation and sifting, as a last remedy, that mends not the matter one jot, nor separates the errors. Whence there are absolutely no hopes of enlarging and promoting the sciences, without rebuilding them.

The first materials for this purpose must be taken from a new kind of natural history. The understanding must also have fit subjects to work upon, as well as real helps to work with. But our history, no less than our logic, differs from the common in many respects; particularly, 1. In its end or office; 2. Its collection; 3. Its subtilty; 4. Its choice; and 5. Its appointment for what is to follow.

Our natural history is not designed so much to please by its variety, or benefit by gainful experiments, as to afford light to the discovery of causes, and hold out the breasts to philosophy; for though we principally regard works, and the active parts of the sciences, yet we wait for the time of harvest, and would not reap the blade for the ear. We are well aware that axioms, rightly framed, will draw after them whole sheaves of works: but for that untimely and childish desire of seeing fruits of new works before the season, we absolutely condemn and reject it, as the golden apple that hinders the progress.

With regard to its collection; we propose to show nature not only in a free state, as in the history of meteors, minerals, plants, and animals; but more particularly as she is bound, and tortured, pressed, formed, and turned out of her course by art and human industry. Hence we would set down all opposite experiments of the mechanic and liberal arts, with many others not yet formed into arts; for the nature of things is better discovered by the torturings of art, than when they are left to themselves. Nor is it only a history of bodies that we would give; but also of their cardinal virtues, or fundamental qualities; as density, rarity, heat, cold, etc., which should be comprised in particular histories.

The kind of experiments to be procured for our history are much more subtile and simple than the common; abundance of them must be recovered from darkness, and are such as no one would have inquired after, that was not led by constant and certain tract to the discovery of causes; as being in themselves of no great use, and consequently not sought for their own sake, but with regard to works: like the letters of the alphabet with regard to discourse.

In the choice of our narratives and experiments we hope to have shown more care than the other writers of natural history; as receiving nothing but upon ocular demonstration, or the strictest scrutiny of examination; and not heightening what is delivered to increase its miraculousness, but thoroughly purging it of superstition and fable. Besides this, we reject, with a particular mark, all those boasted and received falsehoods, which by a strange neglect have prevailed for so many ages, that they may no longer molest the sciences. For as the idle tales of nurses do really corrupt the minds of children, we cannot too carefully guard the infancy of philosophy from all vanity and superstition. And when any new or more curious experiment is offered, though it may seem to us certain and well founded; yet we expressly add the manner wherein it was made; that, after it shall be understood how things appear to us, men may beware of any error adhering to them, and search after more infallible proofs. We, likewise, all along interpose our directions, scruples and cautions; and religiously guard against phantoms and illusions.

Lastly, having well observed how far experiments and history distract the mind; and how difficult it is, especially for tender or prejudiced persons, to converse with nature from the beginning, we shall continually subjoin our observations, as so many first glances of natural history at philosophy; and this to give mankind some earnest, that they shall not be kept perpetually floating upon the waves of history; and that when they come to the work of the

understanding, and the explanation of nature, they may find all things in greater readiness. This will conclude the third part.

After the understanding has been thus aided and fortified, we shall be prepared to enter upon philosophy itself. But in so difficult a task, there are certain things to be observed, as well for instruction as for present use. The first is to propose examples of inquiry and investigation, according to our own method, in certain subjects of the noblest kind, but greatly differing from each other, that a specimen may be had of every sort. By these examples we mean not illustrations of rules and precepts, but perfect models, which will exemplify the second part of this work, and represent, as it were, to the eye, the whole progress of the mind, and the continued structure and order of invention, in the most chosen subjects, after the same manner as globes and machines facilitate the more abstruse and subtile demonstrations in mathematics. We assign the fourth part of our work to these examples, which are nothing else than a particular application of the second part of our undertaking. *Endnote 009*

The fifth part is only temporary, or of use but till the rest are finished; whence we look upon it as interest till the principal be paid; for we do not propose to travel hoodwinked, so as to take no notice of what may occur of use in the way. This part, therefore, will consist of such things as we have invented, experienced, or added, by the same common use of the understanding that others employ. For as we have greater hopes from our constant conversation with nature than from our force of genius, the discoveries we shall thus make may serve as inns on the road, for the mind to repose in, during its progress to greater certainties. But this, without being at all disposed to abide by anything that is not discovered, or proved, by the true form of induction. Nor need any one be shocked at

this suspension of the judgment, in a doctrine which does not assert that nothing is knowable; but only that things cannot be known except in a certain order and method: while it allows particular degrees of certainty, for the sake of commodiousness and use, until the mind shall enter on the explanation of causes. Nor were those schools of philosophers, *Endnote 010* who held positive truth to be unattainable, inferior to others who dogmatized at will. They did not, however, like us, prepare helps for the guidance of the senses and understanding, as we have done, but at once abolished all belief and authority, which is a totally different and almost opposite matter.

The sixth and last part of our work, to which all the rest are subservient, is to lay down that philosophy which shall flow from the just, pure and strict inquiry hitherto proposed. But to perfect this, is beyond both our abilities and our hopes, yet we shall lay the foundations of it, and recommend the superstructure to posterity. We design no contemptible beginning to the work; and anticipate that the fortune of mankind will lead it to such a termination as is not possible for the present race of men to conceive. The point in view is not only the contemplative happiness, but the whole fortunes, and affairs, and powers, and works of men. For man being the minister and interpreter of nature, acts and understands so far as he has observed of the order, the works and mind of nature, and can proceed no further; for no power is able to loose or break the chain of causes, nor is nature to be conquered but by submission; whence those twin intentions, human knowledge and human power, are really coincident; and the greatest hindrance to works is the ignorance of causes.

The capital precept for the whole undertaking is this, that the eye of the mind be never taken off from things themselves, but receive their images truly as they are. And God forbid that ever we should offer the dreams of fancy

for a model of the world; but rather in his kindness vouchsafe to us the means of writing a revelation and true vision of the traces and molds of the Creator in his creatures.

May thou, therefore, O Father, who gavest the light of vision as the first fruit of creation, and who hast spread over the fall of man the light of thy understanding as the accomplishment of thy works, guard and direct this work, which, issuing from thy goodness, seeks in return thy glory! When thou hadst surveyed the works which thy hands had wrought, all seemed good in thy sight, and thou restedst. But when man turned to the works of his hands, he found all vanity and vexation of spirit, and experienced no rest. If, however, we labor in thy works, thou wilt make us to partake of thy vision and sabbath; we, therefore, humbly beseech thee to strengthen our purpose, that thou mayest be willing to endow thy family of mankind with new gifts, through our hands, and the hands of those in whom thou shalt implant the same spirit.

FIRST PART OF THE GREAT INSTAURATION

ON THE DIGNITY AND ADVANCEMENT OF LEARNING

FIRST BOOK

The Different Objections to Learning stated and confuted; its Dignity and Merit maintained

TO THE KING

AS UNDER the old law, most excellent king, there were daily sacrifices and free oblations *Endnote 011*—the one arising out of ritual observance, and the other from a pious generosity, so I deem that all faithful subjects owe their kings a double tribute of affection and duty. In the first I hope I shall never be found deficient, but as regards the latter, though doubtful of the worthiness of my choice, I thought it more befitting to tender to your Majesty that service which rather refers to the excellence of your individual person than to the business of the State.

In bearing your Majesty in mind, as is frequently my custom and duty, I have been often struck with admiration, apart from your other gifts of virtue and fortune, at the surprising development of that part of your nature which philosophers call intellectual. The deep and broad capacity of your mind, the grasp of your memory, the quickness of your apprehension, the penetration of your judgment, your lucid method of arrangement, and easy facility of speech—at such extraordinary endowments I am forcibly reminded of the saying of Plato, “that all science is but remembrance,” *Endnote 012* and that the human mind is originally imbued with all knowledge; that which she seems