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To Robert Fitcham Esquire
With Mr. Galsford's best compliments.

July 1844

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FRANCISCI
BARONIS DE VERULAMIO
NOVUM ORGANUM SCIENTIARUM:
SIVE
INDICIA VERA
DE INTERPRETATIONE NATURÆ:

TRANSLATED
By JAMES GLASSFORD, Esq.

EDINBURGH:
THE EDINBURGH PRINTING COMPANY.
M.DCCC.XLIV.

(1844)



Edinburgh Printing Company, 12, South St David Street.

ADVERTISEMENT.

It will be observed, from the date of the Introductory Notice, that the following Translation was executed many years ago.* A statement of the circumstances which occasioned the manuscript to be laid aside, and so long neglected, would possess no interest for the reader. He may rather be inclined to ask why it should now be committed to the press, and for what reason the task should have been at all undertaken. Perhaps the following considerations will be admitted in justification or excuse.

In the *first* place, a work so valuable in itself, and in its results and influence so important, and which is also more laboured and complete than the other philosophical treatises of the author, can scarcely be too often recalled to notice, more especially when presented with diversity of style and language.

In the *second* place, the *Novum Organum* is less

* It was completed early in 1812.

known, and less generally read, than the Advancement of Learning, and other works of Lord Bacon, written by himself in English.

Thirdly, At the time when the present translation was made, a correct version of these books, and executed with sufficient care, seemed to be wanting ; and even now, a Translation of the Organum, detached and separated from Bacon's works at large, and thereby, like the Two Books of the Advancement, more accessible to readers, may still be considered a *desideratum*.

The present version will be found to vary somewhat in plan and execution from those which have preceded its publication, by the endeavour to transfer the original, not only with the strict fidelity which is indispensable in such a work, but as nearly as could be attained in the style and language of the time when Bacon wrote ; a plan which occurred as being best adapted to the character of the original composition, and the peculiar form of aphorism. For in such writings, a style which may seem to want somewhat of polish, and filling up, is more suited to arrest the attention of the reader, and to strengthen the impression upon his mind, through the necessity which it imposes of a slower perusal, not without occasional pause and repetition. On this account, a language and construction somewhat removed from modern phraseology has been thought not inappropriate. The translator was confirmed in this view by the opinion.

among others, of an early master and much respected friend,* by whom part of the manuscript was read; and whose approbation, and the terms in which it was expressed, became one of the chief inducements for continuing the task.

1st July 1844.

* Professor Dugald Stewart.

INTRODUCTION.

THE "New Instrument of Science, or True Directions for the Interpretation of Nature," forms the Second Division of that great work projected by the comprehensive mind of Lord Bacon, and in part executed by himself, for the advancement of learning. It is one of what may be distinguished, along with the Treatise "De Augmentis Scientiarum," as Preliminary Parts of the Instauration; being intended not as a portion of science or discovery, but as a Directory and Help; or, an exposition of the true course which ought to be followed in the investigation of nature, and the pursuit of knowledge generally. *

The nature of that Instrument for the mind, thus proposed, as well as the necessity for having recourse to it, form the subject peculiarly of the

* "Equidem Organum præbui; verum materies a rebus ipsis petenda est."—*Letter of Dedication to King James.*

First Book. The Second, in which the author proceeds to illustrate the manner of conducting physical inquiry by more special rules and particular instances, would fall with equal, or, perhaps, greater propriety, under the Third Part of the *Instauratio*; namely, Interpretation of Nature, with which division it is more closely connected. But this is a question of arrangement or classification merely.

The general principles laid down by Lord Bacon in this work, and so clearly stated by him, are in themselves few and simple; although the author found it necessary, in consequence of the false systems and deeply rooted prejudices which he was assailing, to enforce them by frequent repetition, and with much and varied illustration. He was contending with a giant error, and was happily endowed with strength for the encounter.

If we could suppose this universe in which we are placed to be altogether made up of individuals, single in their nature, and having no mutual relations or community, our knowledge of its several parts would be obtained by the direct examination of those individuals separately, and in succession; in the same manner as we should read a list of unconnected names.

But when, from the observation and description

of objects considered as unrelated, we turn to contemplate the subjects of our knowledge as they actually exist, the scene is very different, and the field of inquiry seems to be unlimited. By the greater part of mankind, indeed, it is a few only of the relations existing among the things around them, or among the subjects of their consciousness, which are immediately perceived or known; for a more perfect acquaintance with these is the fruit of continued research, and one of the ultimate objects of human science. There is, however, no being, possessed of intellectual endowment however bounded, to whom a considerable part of these relations is not made known at an early period of his existence.

When, by an attention to several objects successively, we discover some quality which belongs to each of them, and give a name to this quality, and reason concerning it, the knowledge thus obtained has evidently been reached in the way of inference or induction; and it is plain that the acquisition of what are called general notions can be made in this manner alone; since we cannot conceive the origin of a general term, or the existence of the notion which accompanies its use, without believing that a previous observation of several objects of sense or of consciousness has

taken place in the mind. The use of general and abstract terms necessarily, and in all cases, implies this process of thought. Such process may be accounted the first step which is made by the mind after it receives the information communicated by the external senses. And the most important knowledge which is acquired by mankind in the first stages of their cultivation, whether this knowledge consists in the attainment and use of language, or in the exercise and direction of their physical and moral powers, is the result of an induction more or less perfect. Proverbial sayings are the axioms of life and conduct; and, as these are drawn from materials on which the attention of mankind in every state and progress of culture is primarily, and with little interruption, employed, they are not less perfect, according to the extent of these materials, in rude societies, than in those which are more philosophical and refined. To this head, in short, is to be referred all that knowledge generally, which consists in the deductions made from repeated observation and experience.

In this sense, the inductive method is the philosophy of nature. It is used by the child at a very early period of his mental growth, and by the untutored savage, according to the extent of their faculties and the nature of their wants; the hus-

bandman forms his axioms by this process of observation :

Quid faciat lætas segetes ; quo sidere terram

Vertere ; quæ cura boum, &c.

And so with the mariner and the mechanic, and all others, in those cases where they have not been instructed by science and the precepts of art. It is the philosopher who is most apt to depart from this natural method. For, although in the acquisition of general notions, or the constitution of common maxims, the intellect thus proceeds by the way of induction ; and such must be accounted the most universal process in the first expansion of the mind, and its natural course, when advancing onward from simple perceptions of the external sense, or simple acts of consciousness ; the intellect pursues this road only for a time, and to a limited extent. As a knowledge of the more obvious, and what may be accounted the ordinary relations among things, serves the common purposes of human life, the majority of mankind do not carry their observation farther. And even those who are more prone to contemplation and research are, by the operation of other causes, either stopped short, or misled in the pursuit. For, in proportion as the view is enlarged, and the combinations of things are found to multiply, it

necessarily becomes more difficult, and requires a more painful attention to prosecute the examination of them. Nor do the various dependencies and connections which subsist in the universe, and those endless chains of being and of thought which are every where presented, more excite and animate our inquiries, than they embarrass and detain us in them. If the vulgar, from want of curiosity, therefore, or from want of occasion, are satisfied with a limited view of their own minds, and of the world at large, not having the same "dira cupido videndi," the philosopher, who has already embraced a wider range, is yet diverted from a continuance of his labours by an impatience under the increasing difficulty, or by that vanity which the first considerable advances in knowledge are calculated to produce. He goes some steps beyond the vulgar, but equally with them is inclined to pronounce and decide; and his decisions proceed, like theirs, upon a partial observation and knowledge of few particulars. But *they* go no farther in experiment, because they are satisfied; *he* stops short in it, from ambition of drawing his conclusions speedily. Nor are the errors which are thus occasioned by an over-hasty and incautious deduction peculiar to the most advanced periods of science, but take place even in

the earlier stages of human knowledge and contemplation. In the latter instances, however, the mistake admits, more easily than in the former, of being corrected by new observation; and, even while it exists, is in one respect not equally detrimental, since a lesser fabric has been reared, and the influence of the error may not be so widely extended.

The process of generalizing, therefore, whether exhibited in the formation of abstract terms, or the constitution of rules and axioms, seems to be nearly coeval with observation and experience. Those rules, which experience dictates for the direction of moral conduct, and what is called the ordinary business of human life, are derived from sources comparatively few and simple. And although, in all deductions whatever, and the formation of general principles, whether for the prosecution of knowledge, or the management of affairs, there is a propensity to error from an ill-conducted inquiry or a premature conclusion; yet, in the pursuit of private interest, and in the daily transactions of life, there is less danger of ignorance arising from a want either of activity or of circumspection. But when, extending the view and embracing a larger circuit, we examine, for instance, the complicated forms of political

government, and endeavour to fix their principles or calculate their effects ; and still more, when we proceed to search the seemingly unbounded field of the natural creation, and to separate or class the productions and changes there exhibited, the mind is bewildered in the attempt, and nearly at a stand. But it cannot rest satisfied without endeavouring to overcome this difficulty, and to reach those general conclusions on which it hopes to rest as a solution of its doubts, and a gratification of its curiosity. And there are two ways, as Lord Bacon has stated, by which we may conceive the intellect to proceed for this end.

The first of these methods is to examine carefully the facts and appearances which are within the reach of our observation ; and, after such examination, to draw those conclusions or inferences which are exactly conformable to the particulars examined, and neither exceed nor fall short of them. And, in like manner, after new and larger examination, to form new conclusions and more enlarged propositions, limited still by the observation antecedent.

It is plain that this order of proceeding may, in proportion to the multiplicity or the abstruseness of those things which are subjected to the investigation, require a long period of time before it leads

to any great progress of science. Nor is it by the labours of one man, or of one generation of men, that such a course of knowledge is to be perfected. Accordingly, it is more natural for the mind, through an ardour of curiosity pressing forward without due precaution, or from a vanity which seeks the appearance of knowledge, although the reality of it should be wanting, to adopt the second method of proceeding: Namely, after an examination of some facts and phenomena, being such as are the most prominent and remarkable, to draw at once those general conclusions which it is the ultimate aim of the intellect to reach for a satisfaction of its uncertainties; and, for this purpose, to establish propositions, the terms of which are not limited by the observations hitherto made.

According to this latter mode of procedure, when such general propositions have been formed, and theories proposed, the attention is not thereafter directed to the investigation of new phenomena, so much as to the explanation and support of the propositions.

There does not seem to be any method of proceeding, in the acquisition of knowledge, which may not be resolved into one of these. For the proposal of withholding the assent altogether, if such a state of mind could be attained, would

lead not to the enlargement of knowledge, but to its extinction.

As an entire suspension of judgment is not less impracticable than a total disregard of the information given by outward sense ; and as, in forming these judgments regarding physical truth, it is not possible to wait and withhold the assent till all the accessible stores, which are the material of reasoning, shall have been gathered and compared ; there is, of course, a necessity for drawing conclusions, and forming opinions, which may be received as intermediate axioms for the time, but subject to correction by farther discoveries. It is in the magisterial and dogmatical delivery of such axioms, and when they are received as conclusions, not conditional but positive, that the error lies, and from which the evil consequences result.

The constitution of general axioms, not based upon experiment, or based upon experiment not sufficiently extended, or conducted with due care, had been the course most frequently pursued by the ancient philosophers and their followers, even while endeavouring to ascertain the frame and order of the material world, and the system of laws according to which it is upheld and regulated ; a subject in which observation and ex-

periment are not only the most important, but also the most attainable. In the attempts to introduce a greater certainty, both in physical and moral science, more especially in the former, the scholastic or logical method of reasoning entirely failed. For in that reasoning the real order of discovery is reversed, and the general truth, which ought to be the conclusion, is taken for the premise or postulate. It was, accordingly, the great scope of Lord Bacon's philosophical writings, and to which he bent with so much effect the force and power of his intellect, to expose the error of that method, and its total unfitness for the discovery of truth, being only a method, in certain cases, of proving truths which have already been discovered. His leading opinions upon this subject, and many of his chief arguments and illustrations, are to be found dispersed in various parts of his writings, particularly in his *Cogitata et Visa*, and the prefaces to different parts of the *Instauratio*, but are collected and delivered in the present book more condensed, and arranged more according to method; or, in his own language, they are "the same argument sunk deep."

Whatever judgment may be formed as to the practical results of the inductive method in philosophy, and the amount of what has been attained

by its use, there is no difference of opinion regarding its peculiar fitness for physical inquiry. The reasons upon which it is grounded are so generally acknowledged, and its advantages so manifest, that the question more naturally arises now, as in other and parallel cases, how they could at any time have been matter of doubt, and how rules so just, and directions so important, should have so long been overlooked or neglected. To what extent other writers, who were engaged nearly at the same time with Lord Bacon in similar researches, may have contributed to the work which he so signally achieved, of unfolding the just course of physical inquiry, or whether the disclosure of the errors then prevailing would not have been made, at no distant period, by others in the progress of the human mind, and was not preparing elsewhere even when Bacon wrote, are questions which do not affect the value and importance of his labours, or the estimate of his pre-eminent place in true philosophy. For thus it is in all cases of the kind, as he himself remarked. The first wonder is at the disclosure of a right principle or important truth; and the next, which follows very soon, is wonder at the lateness of the discovery.

As the futile nature of the ancient philosophical

theories afforded an evidence of the mistaken course which had been followed by their founders and patrons, many of them remarkable both for genius and learning, so may the stop which has been put to those empty speculations and vague theories in physics be regarded as evidence to the correctness of the views unfolded in the *Organum* of Bacon, and an ample tribute to the mind of its author. For whatever, among later discoveries in science, may have been the fruit of accident or fortune, so called, as distinguished from study or design, the principle is now clearly understood and established, which had not been previously recognized, that no efforts of the human mind, working upon few materials, and a limited observation of the material world, much less its most strenuous efforts, if unconnected with the latter and detached from it, can lead to any important discovery, or true knowledge of nature. In any discussion connected with this subject, it is not the correctness of the principle which is in question, but the extent of its application. For while it is allowed by all, that induction is applied with peculiar advantage to the subject of physical inquiry, and that experiment can there be carried to a comparative perfection unattainable in others, it is much more doubtful whether,

in the pursuit of those truths not immediately connected with the material world, it is of equal value. For, although even then the method may be no less excellent in itself, the application of it is more difficult, and the results less important.

J. G.

Edinburgh, April 1812.

THE *Novum Organum* was presented to King James on the 12th October 1620 ; and acknowledged in the following letter, written by the King's hand :—

“ MY LORD,

“ I have received your letter and your book, than the which you could not have sent a more acceptable present unto me. How thankful I am for it cannot better be expressed by me, than by a firm resolution I have taken ; first, to read it through with care and attention, though I should steal some hours from my sleep ; having otherwise as little spare time to read it as you had to write it. And then, to use the liberty of a true friend, in not sparing to ask you the question in any point whereof I shall stand in doubt ; *nam ejus est explicare cujus est condere* : as, on the other part, I will willingly give a due commendation to such places as in my opinion shall deserve it. In the mean time, I can, with comfort, assure you, that you could not have made choice of a subject more befitting your place, and your universal and methodical knowledge ; and in the general, I have already observed, that you jump with me *in keeping the midway between the two extremes* ; as also, in some particulars, I have found

that you agree fully with my opinion. And so, praying God to give your work as good success as your heart can wish, and your labours deserve, I bid you heartily farewell.

JAMES R.

“ October 16, 1620.”

Bacon's Works, fol. 1730, vol. iv. p. 580.

Sir Henry Wotton, in a letter acknowledging copies received by him of the same work, expresses himself thus :—

“ RIGHT HONOURABLE AND MY VERY GOOD LORD,

“ I have your Lordship's letters, dated October 20; and I have withal, by the care of my cousin Meautys, and by your own special favour, three copies of that work, wherewith your Lordship hath done a great and ever-living benefit to all the children of nature, and to nature herself, in her uttermost extent and latitude, who never before had so noble nor so true an interpreter, or (as I am ready to style your Lordship) never *so inward a secretary of her cabinet*. But of your said work (which came but this week to my hands) I shall find occasion to speak more hereafter; having yet read only the first book thereof, and a few aphorisms of the second. For it is not a banquet that men may superficially taste, and put up the rest in their pockets; but, in truth, a solid feast, which requireth due mastication.”—*Ibid*.

LORD BACON'S
NOVUM ORGANUM SCIENTIARUM,
TRANSLATED.

BOOK FIRST.



BACON'S NOVUM ORGANUM,
TRANSLATED.

BOOK FIRST.

APHORISM

I. MAN, the servant and interpreter of nature, does and understands only so far as he may have observed, by sense or mentally, of the order of nature; beyond this he neither knows nor can.*

* To *can* or *conne*, Teutonic, and Scotticè *kenne* or *kythe*, with their derivatives, signified equally to be *able*, or have power; and to *know*, or learn: thus verifying one of Bacon's favourite Aphorisms, as founded both in natural reason and the experience of men, that knowledge and power coincide, and in physical attainment are often identical.

For the double use of the word *can*, although now employed only to express a mood of other verbs, there are numerous authorities, both early and later.

“He that *knoweth* well, and *con* se
What he is, was, and shall be,
A wisere man may be told,
Whether he be young or old,
Then he that *con* al other thing.
And of hymself hath no *knowyng*.”

Hampole.

A

II. Neither the naked hand, nor the unassisted intellect, avail much: it is by instruments and aids that we accomplish; and these are needed not less for the intellect than the hand. And as instruments of the hand either excite or govern the motion, so likewise instruments of the mind either suggest to the intellect or caution it.

"I *canne* but small grammere."—*Chaucer, Prol. to Sire Topas.*
 "Till he the firste verse *coude* all by rote."—*Ibid.*

"That lord hath litel of discretion
 That in swiche cas *can* no division."—*Knights Tale.*

See other examples, in great number, from the same source, and from Douglas's Translation of Virgil. Thus also Spencer; "Of muses, Hobbinol, I *canne* no skill." And Shakspeare; "Have you not been acquainted with goldsmiths' wives, and *conned* them out of rings?" *As You Like It.* And in *Romeo and Juliet*, "Go hire me twenty *cunning* cooks;" knowing, skilful. Thus also in *Twelfth Night*,

"'Tis beauty, truly blent, whose red and white
 Nature's own sweet and *cunning* hand laid on."

"*Cunning* in music and the mathematics."—*Tam. of the Shrew.*

With many other examples from the same poet, and other writers of the period; where the word is used in its primitive sense; and which use was retained till a much later time. "In evil, the best condition is not to will; the second not to *can*," or have power. *Bacon; Essay, Of great place.* So also in Dryden,

"Mecænas and Agrippa, who *can* most
 With Cæsar."

It has been rightly observed, that this alliance between knowledge, and ability to do or perform, is found equally in the French language, where the verb *savoir* has the same double signification; *savoir*, to know, to have knowledge of; and *savoir*, to know how, to be able, to *can*.

III. Human knowledge and power coincide ; because ignorance of the cause disappoints the effect. For nature is not conquered except by obeying ; and what in contemplation has the likeness of a cause, the same in working has the likeness of a rule.*

IV. In regard to works, man can do no more than approach † and remove natural bodies : the rest nature transacts inwardly. ‡

* Any change or appearance in nature, which is observed to be uniformly followed by some other, is involuntarily considered as possessing a power or agency in regard to that other, and related to it as its cause. And although the inference is liable to objection, as implying an unseen connection, not admitting of direct proof, it serves with sufficient accuracy as a direction in practice, and guide to discovery ; being founded on the assurance which observation furnishes of the established Order of Nature, and its continuance. So that when the antecedent is employed, or found to be present, the consequent may be expected to follow. What is received, therefore, in contemplation as a cause may justly, in practical application or working, be taken for a rule. In other words, a hypothetical cause may be safely used for a guide to farther discovery, conformably to a just logical method, independent of metaphysical questions as to the nature of the *nexus*.

† See Brown's *Vulgar Errors*, Boyle, and other authorities, for this use of the verb ; and for which, in its active sense, there is no synonymous word in our language. Fr. *approcher, mettre proche*.

‡ Man discovers, and separates, and combines what is in Nature, but does not add to the sum. By figure of language he is said to do so ; but the nature and the limit of these his "unreal" *creations*, are not less philosophically than eloquently marked by the greatest artist in that kind.

V. They who use to intermeddle with nature (as to works) are the mechanic, the mathematician, the

Perd. The fairest flowers o' the season
Are our carnations, and streaked gillyflowers.

————— I have heard it said
There is an art which in their piedness shares
With great *creating* Nature.

Polix. Say, there be ;
Yet nature is made better by no mean,
But *nature makes* that mean ; so, o'er that art,
Which you say adds to nature, is an art
That nature makes. You see, sweet maid, we marry
A gentler seion to the wildest stock,
And make conceive a bark of baser kind
By bud of nobler race : This is an art
Which does mend nature—*change* it rather ; but
The art itself *is nature*.—*Winter's Tale*.

And in that passage so often quoted, and so exquisite in itself :

—And as *Imagination* bodies forth
The *forms* of things *unknown*, the poet's pen
Turns them to *shapes*, and gives to *airy nothing*
A *local* habitation, and a *name*.—*Mids. Night's Dream*.

Bacon has elsewhere expressed the import of this Fourth Aphorism in these words: "This certain truth should be thoroughly settled in the minds of men, that artificials differ not from natural in form and essence, but in the efficient only: for man hath no power over nature save only in her motion; that is, to mingle, or put together natural bodies, and to separate, or put them asunder: wherefore, where there is apposition and separation of bodies natural, conjoining (as they term it) active with passive, man may do all things; this not done he can do nothing."—*De Augmentis*. lib. ii. cap. 2. To the same effect is a passage in the *Descriptio Globi Intellectualis*, cap. 2.

physician, the alchemist, and the magician; but all (as things now are) with a light endeavour and a trivial success.

VI. It would be something out of reason, and contradictory, to suppose that things which have never yet been done can be done except by methods never yet tried.

VII. Very many issues of the mind and hand are seen in books and fabrics. But all this variety is placed in exceeding subtilty, and the derivations of a few things which have come to be much known; not in number of axioms.

VIII. Even the works, which have hitherto been invented, are beholden to accident and experience more than to science; for the sciences we have at present are no other than certain collections, or assortments of things before discovered; not methods of invention, or designations of new works.

IX. But the cause and root of nearly all distempers

The first four Aphorisms are found, with some diversities of expression, in the fragments entitled, "Aphorismi et Consilia de auxilio mentis," and "De Interpretatione Naturæ Sententiæ xii." And the substance of these and other important maxims which he laboured most to inculcate is repeated, under various forms, in many parts of his writings.

in learning is this one ; that, while we falsely admire and extol the powers of the human mind, we seek not its real aids.

X. The subtilty of nature surpasses, by many points, the subtilty of sense and intellect ; so as those beautiful meditations, and speculations, and reasonings of men, were a hurtful thing, but that no one is found adverting to them.

XI. As the sciences which we now have are un-serviceable for invention of works, so also the logic which we have is un-serviceable for invention of sciences.

XII. The logic which is in use avails rather for establishing and fastening errors (which are founded in vulgar notions) than for inquisition of truth ; so it is hurtful more than profitable.

XIII. Syllogism is not applied to the entrances and rudiments of the sciences, and to mediate axioms is applied in vain ; since it is by many degrees unequal to the subtilty of nature. Accordingly, it binds assent, not things.*

* The Syllogism of Aristotle may now be regarded rather as a curiosity in literature than a part of learning ; and the defence of it, excepting in some of its ancient seats and houses of refuge, is virtually abandoned. It does not, from its nature, admit of

XIV. Syllogism consists of propositions, propositions of words, words are the symbols of notions.

being made an instrument for the *discovery* of truth, except indirectly by detection of error, or what is opposed to truth, in the statement of propositions, and which, to a certain extent, it can accomplish. But it leads no farther, or to any positive acquisition; for it does not establish or introduce premises, but only reasons from those granted or assumed. Its operation is thus confined within narrow bounds; nor even there is its power great, far less absolute. For as there are other ways besides syllogism, which serve as effectually for the detection of fallacies, whether in thought or in words, so there are fallacies of both kinds which syllogism does not reach, and which baffle its rules. "How little invention," says Feltham, "is required to put false matter into a true syllogism!" The same author observes thus on the subject of the scholastic logic, as distinguished from that which is according to sound reason; for there is a sound science of words as well as an unsound: "Nothing has spoiled truth more than the invention of logic. It has found out so many distinctions, that reason is often inwrapt by it in a mist of doubts. Logic is reason drawn into too fine a thread, tying up truth in a twist of words, which, being hard to unloosen, carry her away as a prisoner. It is a net to entangle her, or an art to instruct you how to tell a *reasonable lie*."—*Resolves*. 1628.

The opinions of Bacon as to the scholastic logic are, with very few exceptions or limitations, now generally assented to, and in their full extent; more especially that it avails nothing for *invention* in art or science. When he adds farther, that it has rather tended to establish and confirm errors, he seems to intend, that it may be applied equally for that purpose as for the establishment of truth; and that by confining the wits of men within its trammels, and inuring them to habits of verbal disputation, it has prevented them from following the true roads of invention, and thus confirmed them in errors.

Although Aristotle's right to absolute dominion in philosophy

Therefore, if notions themselves (which are the ground of the matter) be confused and hastily taken up from things, there is no solidity in what is built upon them. The only hope, then, is in a true *induction*.

XV. In the notions, whether of logic or physic, there is nothing sound: *substance* is not a just notion, nor *quality*, nor *acting*, *suffering*, nor even *being*; much less *heavy*, *light*, *thick*, *thin*, *moist*, *dry*, *generation*, *corruption*, *attraction*, *repulsion*, *element*, *matter*, *form*, and the like; but all are fanciful and ill-defined.

XVI. The notions of lower species, as of *man*, *dog*, *pigeon*, and of immediate apprehensions of sense. *warm*, *cold*, *white*, *black*, do not greatly mislead: yet even these by the flux of matter, and the en-

and letters, which had been claimed by his followers, was no longer acknowledged even by the age in which Bacon wrote, or, at all events, was called in question by various writers of that period. it was with evident hesitation and reluctance. "The Aristotelians say, all truth is contained in Aristotle, in one place or another. Galileo makes Simplicius say so, but shows the absurdity of that speech, by answering, all truth is contained in a lesser compass, namely, in the alphabet. Aristotle is not blamed for mistaking sometimes, but Aristotelians for maintaining those mistakes. They should acknowledge the good they have from him, and leave him when he is in the wrong. There never breathed that person to whom mankind was more beholden."—*Selden*. Born 1584. Died 1654.

counter of things, are at times confounded ; the rest (which men have hitherto used) are all aberrations, and not abstracted and drawn out of things by due methods.

XVII. Nor is the license and aberration less in the constituting of axioms than the abstracting of notions ; and that in the very principles which rest on the common induction ; but much more is it thus in the axioms and lower propositions which are educed by syllogism.

XVIII. What things have yet been discovered in scienco are of such kind as lie nearly open to the vulgar notions. But for penetrating to the more inward secrecies and retirements of nature, it is necessary that both notions and axioms be drawn from things by a surer and more guarded method, and that the intellect be brought to use a manner of working altogether better and more certain.

XIX. The ways are two, and can be no more, for the search and discovery of truth. One, from sense and particulars flies to axioms the most general, and from these principles, and their unshaken truth, determines and invents axioms intermediate ; and this method is in use. The other, from sense and particulars builds up axioms, ascending continuedly and gradually, that in the end it may arrive at the most

general; and this is the true method, but unattempted.

XX. The intellect, left to itself, enters on the same way, (the former, namely,) which it does according to the order of logic. For the mind delights to spring forward to what is more general, that it may rest; and after a little stop distastes experiment. But these evils have been yet augmented by logic, for pomp of disputations.

XXI. The undirected intellect, in a nature that is sober, and patient, and gravo, (especially if not entangled by received doctrines,) offers in some kind at that other and right way; but with little proficience: for the intellect, unless it be guided and helped, is an unequal thing, and altogether unable to conquer the obscurity of things.*

* In this work of Lord Bacon, there is evidently no labour of style, and little indulgence in that rich imagery which so luxuriantly adorns many of his English compositions. His object here is to impress the truths which he is inculcating with force and clearness, and to this object everything else is postponed. Hence the great simplicity of the language: the frequent recurrence of the same thought, with some variation merely of the light in which it is placed; and often a repetition of the same word in one passage, or even sentence. The work is eminently didactic: and there are many equivalents in oratory which would not be synonymes in reasoning or precept. A solidity of style, plain, and divested of ornament, is more especially suited to that form of writing which the author prescribed to himself in this part of

XXII. Either method begins from sense and particulars, and rests finally in what is most general: Yet they differ some how immeasurably; for the one touches only and glances on experiment and particulars; the other is rightly and orderly employed upon them. Again, the one already constitutes in the

his *Instauratio*; namely, by Aphorisms. "For," as he has himself observed in a characteristic passage of the "Advancement of Learning," "Aphorisms, except they should be ridiculous, cannot be made but of the pith and heart of science; for discourse of illustration is cut off; recitals of examples are cut off; discourse of connection and order is cut off; descriptions of practice are cut off; so there remaineth nothing to fill the aphorisms but some good quantity of observation."

The style which Bacon considered suitable for such a subject is well characterized by Archbishop Tennison, in reference to the translation into Latin of the "Advancement of Learning," for which he had first applied to Dr Playfer, an elegant scholar, then Margaret Professor of Divinity at Cambridge; but who sent him a specimen "of such superfine latinity, that the Lord Bacon did not encourage him to labour further in that work, in the penning of which he desired not so much neat and polite, as clear, masculine, and apt expression."

In the whole department, indeed, of physical inquiry, and the record of physical discovery, as well as in the constitution of axioms, Bacon enjoined upon himself as a condition indispensable, the total prohibition not only of ornament, but of any extraneous help or adjunct whatever. "Primo igitur facessant antiquitates, et citationes, aut suffragia authorum; etiam lites et controversiæ, et opiniones discrepantes; omnia denique philologica.—Quæ vero ad ornamenta orationis, et similitudines, et eloquentiæ thesaurum, et hujusmodi inania spectant, omnino abjiciantur."—*Parasceve ad Hist. Natur. Exper. Aph. iii.*

beginning certain abstract and unprofitable generalities ; the other rises by degrees to those things which are truly more intimate in nature.

XXIII. The difference is not trivial between the *idola* of the human mind and the ideas of the Divine mind ; that is, between certain empty opinions, and the true signatures and impresses made upon the creatures as they are found.

XXIV. It can no way be that axioms, constituted by argumentation, should avail for discovery of new works ; because the subtilty of nature exceeds, by many degrees, the subtilty of argumentation. But axioms, abstracted rightly and in order from particulars, do again, with ease, indicate and designate new particulars ; and so render the sciences active.

XXV. The axioms which are in use have their derivation from a slender and manipular experience, and a few particulars of most ordinary occurrence, and are nearly fashioned and extended to the measure of these ; so it is nothing wonderful if they do not lead to new particulars. But if an instance, not before adverted to or known, chances to present itself, the axiom is saved by some frivolous distinction, where itself would be more justly mended.

XXVI. The human method and reasoning which

we employ upon nature, (because it is a rash thing and premature,) we have been used, for instruction, to call *anticipations of nature*; but that method and reason which is, by due means, elicited from things, *interpretation of nature*.

XXVII. *Anticipations* are sufficiently sure for consent; since if men should even rave after one manner, and with conformity, they might well enough agree among themselves.

XXVIII. Moreover, *anticipations* are far more effectual to subject assent than *interpretations*; because, collected out of a few things, and these chiefly of familiar occurrence, they straight dazzle the intellect and fill the imagination;* where, otherwise, *interpretations*, being collected dispersedly from things exceedingly various and widely separate, cannot strike the mind with suddenness; so that, to common opinion and repute, they will needs appear harsh and untunable, nearly as mysteries to the faith.

XXIX. In the learning which is bottomed on opinions and resolves, the employment of *anticipations* and dialectics is profitable; since the assent is to be subdued, not things.

XXX. Not if all wits of all ages should agree and

* Qui ad pauca respicit facile pronunciat.

confer, and transmit their labours, could knowledge be greatly advanced by *anticipations* ; because radical errors, and in the first digestion of the mind, are not cured by excellence of the functions and remedies which follow.*

XXXI. It is vain to look for much augment of knowledge by the superinduction and grafting of new things upon the old ; but an instauration and renewal is to be made from the lowest foundations, if we would not be for ever carried round in a circle, with a trivial and somehow contemptible progress.

* It is obvious that the anticipations justly condemned by Bacon are those which profess to be conclusive explanations of natural phenomena, and that the remarks do not apply to such as are suggestive merely. For in many cases the mind is involuntarily led to form suppositions regarding those natural laws, and the explanation of appearances, even while as yet imperfectly known and partially observed. And it cannot be doubted, that after the principle of the experimental or inductive philosophy has been adopted, and its importance fully recognised, such anticipations and hypotheses, as distinguished from any theory which would terminate inquiry, are not only free from objection, but may conduce materially to more remote discoveries. They are, indeed, spontaneous and unavoidable, being steps of the mind in its progress of inquiry. And, by the author himself, such anticipations, or intermediate theories, are interspersed in the Treatise, "De Interpretatione Naturæ;" as in his *Thema Cæli*, and other fragments. The distinction is clearly indicated by him in the fragment, entitled *Abecedarium Naturæ*. "Etiam canones, sed tamen mobiles, et axiomata inchoata, qualia nobis inquirentibus, non pronunciantibus, se offerunt, constituimus: Utilia enim sunt, si non prorsus vera."

XXXII. To the ancient authors their praise remains, and so to all; for the comparison induced is not of wits or faculties, but of method; and we sustain not the character of judge, but of monitor.

XXXIII. No judgment (for it is to be spoken out) can be rightly made, either concerning our way, or concerning the things which are discovered through it, by *anticipations*, that is to say, the method now in use; because it is not to be asked that we should stand by the judgment of that which is itself arraigned.

XXXIV. Neither is it an easy course to deliver or explicate what we adduce; because things, in themselves new, will yet be understood with analogy to the old.

XXXV. Borgia said, concerning the expedition of the French into Italy,* that they came with chalk in their hands to mark up their lodgings, not with arms to enforce them. It is our order, in like manner, that our doctrine should enter quietly into minds disposed and capable. For there is no fruit of confutations where we dissent about the principles and very notions, and even the forms of demonstrations.

* The march of the French army of Louis XII. upon the Milanese in the middle of the fifteenth century.

XXXVI. There is left to us, however, one and a simple way of delivery ; that we lead men to the particulars themselves, and their series and orders ; and, again, that they command their minds for a time to the utter refusal of opinions,* and begin to have an acquaintanco with things themselves.

XXXVII. The way of those who have held the *acatalepsia* † and our way do somewhat consent in the beginnings ; in the end they are immeasurably separate and opposed. For they nakedly avouch that nothing can be known : Wo, that not much in nature can be known by the method which is in use. But they go on to destroy the authority of sense and intellect : We contrive and subministrate helps to them.

XXXVIII. Tho *idola* and false notions which have hitherto occupied the human intellect, and cloave doeply to it, not only beset the minds of men so as to loavo a difficult avonue for truth ; but, ovon after passago has boen given and allowed, they will, in the

* “ Abnegationem notionum.” It is in this sense of judicial cognizance and decision, that the context requires the word *notio* to be understood, not in the more common acceptation of idea, or simple conception. “ Censorium iudicium ac notio.”—*Cic.*

† Doctrine of universal doubt ; absolute scepticism. The author translates it by the word “ incomprehensibleness” in his *Advancement*, and elsewhere, as “ the suspending of all asseveration.”

renewal itself of the sciences, again offer and be troublesome ; unless men, being premonished, make provision as far as possible against them.

XXXIX. There are four kinds of *idols* [or false images] which beset the minds of men. To these (for instruction) we have given names ; calling the first kind *Idols of the Tribe* ; the second, *Idols of the Cave* ; the third, *Idols of the Forum* ; the fourth, *Idols of the Theatre*.* .

XL. The excitation of notions and axioms by true *induction* is certainly the fit remedy for discharge and removal of *idols* : and yet an indication of the *idols*

* The author elsewhere classes and describes them thus :—
“The first sort I call Idols of the Nation or Tribe ; the second, Idols of the Palace ; the third, Idols of the Cave ; and the fourth, Idols of the Theatre.” By the Palace must be understood here the Tribunals, or Courts of Justice.

The use of the word *Idolum*, in this sense, of erroneous or false notion, is peculiar to Bacon ; nor does it admit of a literal translation, such as to convey the exact meaning which he here attaches to it. The corresponding and equivalent expressions which he has himself employed in the “Advancement of Learning,” namely, “Fallacies,” or “False Appearances,” would convey the idea with less ambiguity. The word “Idol,” however, has been so long established in connection with Bacon’s philosophy, and is so currently repeated as the language of its founder, that it is retained in the translation ; and its meaning is sufficiently guarded by the whole tenor of the author’s reasoning, while its abbreviate form renders it otherwise convenient.

is of much profit ; for the doctrine concerning *idols* has a like regard to the *interpretation of nature*, as the doctrine concerning sophistical confutations has to the common logic.

XLI. *Idols of the Tribe* are planted in the human nature itself, and in the very tribe or nation of mankind. For it is untruly asserted, that human sense is the measure of things ; nay, contrariwise, all the perceptions, whether of sense or mind, are from analogy of man, not from analogy of the universe. And the human intellect is like an uneven mirror to the rays of things, which mingles its own nature with the nature of things, and distorts and corrupts it.

XLII. *Idols of the Cave* are *idols* of the individual man. For every one, besides aberrations of the human nature in kind, has a den also or certain individual cave, which breaks and vitiates the light of nature ; either through the peculiar and individual nature of any one, or through his education and converse with others, or through his reading in books, and authorities of those he studies and admires ; or through differences of impressions, as they happen in a mind preoccupied and predisposed, or in one equal and sedate ; and the like. So that, plainly, the human spirit (as it is disposed in several men) is an inconstant thing, and every way disordered, and, as it were, casual. Hence Heraclitus has it well, that men seek

for knowledge in their own little worlds, and not in the great and common world.*

XLIII. There are *idols*, too, as if by agreement and mutual confederacy of the human kind; which, on account of the commerce and consort of men, we call *Idols* of the market-place or *Forum*. For mankind associate by discourse: but words are imposed from the apprehension of the vulgar. Accordingly, the evil and foolish imposition of words besets the intellect in strange ways. Neither do the definitions or explications, by which learned men have been used to fortify and clear themselves in some, at all retrieve the matter. But words plainly put a force upon the intellect, and trouble all things, and draw men away to idle and numberless controversies and fictions.

XLIV. There are *idols*, lastly, which have immigrated into the minds of men from the sundry dogmas of philosophy, and even from perverted laws of demonstrations; and these we call *Idols* of the *Theatre*: because, as many philosophies as have been received or invented, we count so many fables produced and

* This reproach of the ancient philosopher has place equally, if not with greater propriety, under the preceding class of fallacies, the *idola tribus*. For the partial and contracted view is common to the race of mankind, in reference to the universe of creation.

acted, which have furnished fictitious and scenic worlds. Neither do we talk only of the present, or even ancient philosophies and sects, since many other such fables may be framed and compacted; for of errors wholly different the causes are yet nearly common. Nor, again, do we understand this only of universal or entire philosophies, but of the many principles also and axioms of science which have grown to strength from tradition, and trust, and negligence. But of these several sorts of *idols* we are to speak more at large and separately, for caution of the human intellect.*

XLV. The human intellect, in accordance with what is proper to itself, readily supposes a greater uniformity and equality in things than is found. And whereas there are in nature many things *monodica*, or single, and full of imparity, it, nevertheless, feigns parallels to them, and correspondents and relatives which exist not. Hence those conceits, "that in the celestials all motion is by perfect circles;" spiral and

* It is evident that the fallacies which beset the mind in physical inquiry are the same in kind with those prejudices, and prepossessions, and other sources of error, which mislead the judgment in moral and intellectual subjects, and impede in them the discovery of truth; although they may differ in degree and extent of their influence in these several departments respectively.

serpentine lines (except in name only) being utterly disallowed. Hence the element of fire, with its orb, is introduced for constitution of the quaternion, and to square with those other three which are subjected to the senso.* Even on the elements (so called) is imposed, at their pleasure, a tenfold proportion of excess in rarity, each to each; and many such dreams. Nor does this vanity prevail in opinions only, but even in simple notions.

XLVI. The human intellect, in things which have once pleased, (either because they are received and credited, or because they delight,) draws all others, likewise, to a suffrage and consent with them; and

* The author evidently refers to the doctrine according to which these four were held to be the constituent parts, or first principles and seeds of the material world; not merely as being the largest component parts or masses in the globe of this earth. And it is in that former sense that the poet presents them:—

Air, and ye elements, the eldest birth
Of Nature's womb, that in quaternion run
Perpetual cirele, multiform; and mix
And nourish all things.—*Par. Lost.*

But Bacon makes the distinction explicitly in a passage of his *Parasceve ad Hist. Nat.*, which clearly explains the allusion in this Forty-fifth Aphorism. He is stating the divisions of *historia generationum*. “Quarta, elementorum (quæ vocant) flammæ, sive ignis, aeris, aquæ, et terræ. Elementa autem eo sensu accipi volumus, ut intelligantur, non pro primordiis rerum, sed pro corporum naturalium massis majoribus,” &c.

though contrary instances which occur be more in strength and number, yet these it either marks not, or contemns, or by distinguishing removes, and rejects, not without a great and most hurtful prejudice, that so the authority of those earlier apprehensions may remain inviolate. Ho* answered rightly, therefore, who being shown the pictures, hung up in a temple, of those who had escaped the peril of shipwreck, and had paid their vows, and pressed with the question, if he would yet deny a providence of the gods, asked in the end, "But where are they painted, who, after vowing, perished?" The same is the manner nearly of all superstition; as in astrologies, dreams, omens, judgments, and the like; in which men, delighted with these empty shows, advert to the issues where there is fulfilment, but where they fail, (though it be much oftener,) neglect, and blanch them. But this evil creeps far more subtilly into philosophy and science: wherein that which has once pleased depraves the rest, (though greatly better and more solid,) and reduces them to a level. Nay, even though that delight and vanity, which we spoke of, should be wanting, yet is this error proper and constant to the human mind, that it is moved and excited more by affirmatives than negatives; whereas it is fitting duly and in course to lend itself with equal

* Diagoras: In the temple of Neptune.

favour to each ; yea rather, in the constitution of every true axiom, the force is greater of the negative instance.*

XLVII. The human intellect is most of all moved by those things which have power to strike and enter the mind at once and suddenly ; by which the fancy is accustomed to be filled and inflated ; but the rest, in some way though imperceptible, it feigns and supposes to subsist in the manner those few subsist by which the mind is beset. But for that transcurſion to remote and heterogeneous instances, through which axioms are tried as it were by fire, the intellect is altogether slow and unready, if it be not enforced thereto by severe laws and a masterful command.

XLVIII. The human intellect spreads and stretches itself ; neither has power to stop, or accomplish its rest, but seeks something beyond, yet in vain. Thus it is not imaginable that any thing should be the last or farthest of the world ; but it always occurs, by a

* In physical inquiry, where a conclusion is to be drawn from facts of nature, the negative instance has greatest weight. In reasoning from testimony, or the evidence of history, it is otherwise ; for there a negation may often amount to nothing more than absence of proof, and be outweighed by an affirmative. An averment, given as testimony, may also be in the form of an affirmative, and yet amount in reality to a negative only.

sort of necessity, that there is something farther.* Nor, again, can it be conceived how eternity has flowed down to this present; since that distinction

* This desire and effort take place equally in both directions, so to speak, by the attempt to penetrate into what is least and most elemental in nature, as well as to expand and grasp what is most general and complex. "On se croit naturellement bien plus capable d'arriver au centre des choses, que d'embrasser leur circonference. L'étendue visible du monde nous surpasse visiblement; mais comme c'est nous qui surpassons les petites choses, nous nous croyons plus capable de les posséder: et cependant, il ne faut pas moins de capacité pour aller jusqu'au néant que jusqu'au tout. Il la faut infinie dans l'un et dans l'autre; et il me semble que qui auroit compris les derniers principes de choses pourroit aussi arriver jusqu'à connoître l'infini."—*Pascal. Pensées diverses.* It would be a difficult matter to determine whether the discoveries of the microscope or the telescope are the most extensive, and which penetrate farthest into nature. Any one, accustomed to the effort, who shall attend to the operations of his own mind, and the current of his thoughts, will assent at once to the truth of the aphorism, and experience this unavoidable tendency to inquiry without limit; that every discovery, and the solution of every doubt, will immediately suggest others, and open up new subjects of inquiry. And it is so with regard to knowledge of every kind on which the intellect is exercised. It appears at first to be otherwise in the abstract sciences, where demonstration closes the inquiry. But even here, though the conclusions, which are shut up in the magical circles of the geometer, are decisive, the satisfaction is only derived in regard to the particular demonstrations. Other circles touch these, and are continued still without bound; the latest demonstration leads to a new problem; and, although mathematical reasoning is different from moral in kind, there is no boundary with which the mind is satisfied in the discoveries made by either, but it still stretches to something farther.

which has grown to be received, of an infinito *a parte ante*, and *a parte post*, (an eternity past, and an eternity to come,) has no manner of congruity; for it would thence follow that there should be one infinite greater than another infinito, and that an infinite should waste and verge to a finite. Alike is the subtilty concerning lines always divisible, from the impotency of thought;* but this impotence of mind comes in with a greater prejudice in the discovery of causes; for, although the things which are most universal in nature ought to be positive, and so are found, and are not in truth causable,† yet the human intellect desires still what is more known and apparent. But then, not resting satisfied, reaching to the more remote, it falls back upon the nearer, that is, on final causes; which plainly derive from the na-

* Such are the attempts of the mind to conceive of what is infinite in other ways; as infinity of *number*, *distance*, or *motion*, whether in celerity or slowness; and, generally, of *degree* in other things. In short, the notion, if it can be so called, of *infinity*, whether in space, or succession of time, or in dimension, or number, or any measurable quantity, has no distinctness. It is rather one of those terms to which there are not corresponding conceptions, and resolves into a negation of finite. And there are various other cases, where the nearest approach which our present faculties can make to a comprehension of truth is through the medium of negative statement; a form which occurs not unfrequently in the declarations of Scripture.

† That is, not having a *natural* cause; where there is not, and ought not to be expected, anything in the order of nature which stands to them in the relation of a cause.

ture of man, rather than of the universe ; and out of this fountain have strangely corrupted philosophy.*

* That is to say, physical science. It is not to be supposed, from what is expressed in this short passage, or what is stated to the same effect in the treatise *De Augmentis*, that the author intended to discourage inquiry into what are called final causes, or to undervalue its importance. To draw this inference would be to contradict what he has himself explicitly stated in various parts of his writings, and to oppose the strain and current of some of his noblest contemplations. The discovery of final causes, understanding by this term an observation of the uses of things, and their adaptation to the purposes which they are found to serve, must always accompany the progressive knowledge of those things as they physically exist ; and such disclosures possess the deepest interest, adding, as they do, to the contemplation of creative power, contemplation also of the " manifold " wisdom and goodness of the great Creator. The animadversion conveyed briefly in the aphorism, from which form of writing dilatation and restriction are nearly excluded, has relation, as elsewhere explained, to the abuses of the doctrine by some of the preceding philosophers, both ancient and of later times, and the mistaken direction thereby given to physical inquiry ; particularly, among the ancients, by Plato and Aristotle ; who turned their attention to this as an ultimate object of inquiry, to the exclusion or neglect of the study of physical causes, or the real connections of things as they exist in nature. The object of physical investigation is to discover and ascertain the *facts* and order of nature. The discovery of the purposes to which particular parts of this order are, directly or indirectly, subservient, is posterior in time, though not secondary in importance. Many things exist in nature, and fall within man's cognizance, of which the uses are not immediately, and, in some cases, may never be discovered by him ; and many others exist, the uses of which he only discovers partially, and perhaps after long intervals of time. Yet these things are all to be inquired into, and treasured as material of

But it is equally an ignorant and a light thing in philosophising, to ask a cause in what is most universal,

knowledge. And the larger the range of inquiry, and the greater the number of those particulars which can be examined and stored, the fuller will ultimately be the discovery also of those ends to which they are adapted. From the knowledge which we are enabled to obtain of the works of creation, we conclude, without hesitation, that they are complicated in their purposes as well as relations, and that every one of them conduces to many ends. In this sense, nothing is single and isolated. "O that he would show me the secrets of wisdom, that they are double to that which is," Job xi. 6. The hypothesis of a final cause is *secundum hominem*, and liable to the fallacies of the tribe or human mind in general, which is prone to consider man as the centre of creation, towards which all things were intended to incline, and in which to close. But, in reality, the discovery of any materiate thing, or any process in nature, and discovery of the purposes to which it answers, and which we reasonably believe that it was intended to answer, so far from being opposed, are altogether consonant: although, in order of inquiry, the former is the first object, and the guide also which for both purposes conducts farthest and most surely. The final causes of things will be discovered in greatest abundance and variety, not when they are made the plain scope and direct aim of inquiry, but when they are disclosed in the prosecution of physical causes; that is to say, of the facts and order of nature; for nature is more ingenious, and subtle, and diversified, than the intellect of man.

That such were the views of Lord Bacon, although the plan of the Organum did not admit of explications, is evident from the following passage in the "Advancement of Learning." Book Second; where, after noticing the evil consequences of mixing the doctrine of final causes with physical inquiries, he observes thus:—"Not because those final causes are not true and worthy to be inquired, being kept within their own province, but because their excursions into the limits of physical causes hath bred a

and not to desire a cause in what is subordinate and inferior.*

vastness and solitude in that track. For otherwise, keeping their precincts and borders, men are extremely deceived if they think there is an enmity or repugnancy at all between them." And, after some instances given to illustrate his meaning, he adds a further caution, scarcely necessary, indeed, to show that the distinction which he has made does not "call in question, or derogate from divine providence, but highly confirms and exalts it," referring to the indirect methods by which God accomplishes his purposes, through instruments unconscious of his design. See also, to the same effect, his exposition of the "Fable of Pan."—*Anc. Wisd.*; see also his essay "Of Atheism." The inference to which a survey of all things in the natural world so directly leads, of design and adaptation to their ends, is among the earliest exercises of the human intellect, and could at all times fill the mind even of the philosophical inquirer whose light and inspiration were from nature only. Witness, among others, the sublime and most poetical ejaculation of the Roman orator, in the Second Book of his treatise, "De Natura Deorum."—"Licet enim, jam remota subtilitate disputandi, oculis quodammodo contemplari pulchritudinem rerum earum quas divina providentia dicimus constitutas. Ac principio terra universa cernatur, vestita floribus, herbis, arboribus, frugibus; quorum omnium incredibilis multitudo *insatiabili* varietate distinguitur. Adde hinc fontium *gelidas pereunitates, liquores perlucidos* amnium, riparum *vestibus viridissimos*, speluncarum *concavas altitudines*, saxorum *asperitates. impendentium* montium altitudines, *immensitatesque* camporum. Adde etiam reconditas auri argenticque venas, infinitamque *vim marmoris*. Quæ vero, et quam varia genera bestiarum, vel cœnorum, vel ferarum? qui volnerum *lapsus*, atque cantus? qui pœcudum *pastus*? quæ *vita silvestrium*? Quid jam de hominum

* See Apnorism LXVI. to the same effect with what is here stated.

XLIX. The human intellect is not a dry light, but takes infusion from the will and affections; which thing generates knowledge *ad quod vult*, (according to that which it affects;) for what a man rather wishes to be true that he more easily believes. Accordingly, he rejects the difficult, through impatience of inquiry; the sober, because they straiten hope; the deeps of nature, through superstition; the light of experience, through loftiness and pride, lest the mind should seem to dwell in things mean and flux; paradoxes, through opinion of the vulgar; in fine, by numberless ways,

genere dicam? qui, quasi cultores terræ *constituti*, non patientur eam nec *immanitate* beluarum efferari, nec stirpium asperitate vastari; quorumque operibus agri, insulæ, littoraque *collucent*, distincta tectis, et urbibus. Quæ si, ut animis, sic oculis videre possemus, nemo eunctam intuens terram, de *divina ratione* dubitaret. At vero quanta maris pulchritudo? quæ species universi? quæ multitudo et varietas insularum? quæ amœnitates orarum et litorum?—Ipsam autem mare sic terram appetens litoribus eludit, ut una ex *duabus naturis conflata* videatur.* And after a description of the heavenly luminaries as then understood,—“Hæc omnis descriptio siderum, atque hic tantus cœli ornatus, ex corporibus huc et illuc, casu, et temere concursantibus potuisse effici, cuiquam sano videri potest? Aut vero alia quæ natura mentis et rationis experts hæc efficere potuit, quæ non modo ut fierent ratione egerunt, sed intelligi qualia sint, sine summa ratione non possunt? Nec vero hæc solum admirabilia, sed nihil majus, quam quod ita stabilis est mundus, atque ita coheret ad permanendum, ut nihil ne excogitare quidem possit *aptius*.”

* The boundary appears at times doubtful.

“The waves so gently wash each rising hill,
The land seems floating, and the ocean still.”—GARTH.

and these at times unperceivable, the intellect is imbued and stained by affection. *

L. But the far greatest impediment and aberration of the human intellect comes by the dulness, and weakness, and fallacies of the senses ; so that things which strike upon the sense outweigh those, though more excellent, which strike not the sense immediately. And thus contemplation nearly ends with sight ; so that of things invisible there is little or no observance. Hence all operation of spirits † shut in bodies tangible is hidden, and escapes men. Every more subtile change, also, of disposition in the parts of grosser things, (which commonly they call alteration, though it be truly a

* "All, all alike, find reason on their side."

† "Operatio spirituum in corporibus tangibilibus." The significations of the word *spiritus* are so various, that it is difficult to assign to this passage the precise meaning of the author. For, in an extended sense, it will include the intellectual and spiritual agency in man as operating upon, or rather within, his corporeal frame, not less than the invisible agencies which operate inwardly upon inert matter, effecting changes in its structure and qualities. But it seems to be in the latter sense that the passage is to be understood, as referring to the changes effected upon material bodies, through agencies not subjected to sense, and therefore overlooked.

With respect to what follows, as to the nature of the common air, and of other matter exceeding the air in fineness and tenuity, it is obvious what great advances have been made in these inquiries by the discoveries of later time, inquiries conducted upon the principles of the inductive philosophy.

conveyance *per minima*,) lurks in like manner unseen ; and yet, unless these two, which we have spoken of, should be explored and produced to the light, nothing great can be done in nature as to works. Again, the nature itself of the common air, and of all bodies which surpass the air in tenuity, (and these are very many,) is almost unknown. For sense of itself is a thing infirm and erring ; nor do instruments for enlarging or sharpening the senses avail much ; but every juster interpretation of nature is accomplished by instances, and fit and apposite experiments ; where the sense determines only of the experiment, but the experiment determines of nature, and the thing itself.

LI. The human intellect is carried to abstracts by reason of its own nature ; and things which are flux it feigns to be constant ; but it is better to cut than abstract nature ; as the school of Democritus* did, which penetrated into nature more than the rest. Matter ought rather to be considered, and its dispositions and changes of disposition, † and simple act and

* *Democriti schola*. “Vir magnus in primis, cujus fontibus Epicurus hortulos suos irrigavit.”—*Cic. de Nat. Deor.*

† “Schematismus :” “Metaschematismus :” Form or figure ; transition into different form or figure. This must be understood of the inward conformation ; not of the external figure, as appearing to the sense, which is the more usual acceptation of the word. “The earth *without form*, and void,”—*Gen. i. 2* ; that is, yet unshapen, without arrangement, or disposition of parts ; and not yet replenished.

law of action, or motion ; since forms are devices of man's mind, unless it be allowed to call those laws of action forms.*

LII. Such, then, are the *idols*, which we call *Idols of the Tribe*, which have their rise either from parity of substance of the human spirit, or from its prepossession, or from its straitnesses, or from its disquiet motion, or from infusion of affections, or from incompetency of the senses, or from the manner of the impression.

LIII. *Idols of the Cave* have their rise from any one's proper nature, whether of mind or body ; and again from education, custom, and accidents. Which kind, though it be various and manifold, yet we shall set forth those wherein is most caution needed, and by

* It is evident that, in this passage, as well as some others, Bacon speaks of the doctrine of forms as a metaphysical speculation ; namely, of ideal forms or architypes abstract and unconnected with matter, as in the philosophy of Plato. For with respect to forms of things existing in the material universe, in the sense which he attaches to the word, these, under certain limitations, and as explained by himself, he not only allowed as just objects of inquiry, but considered the discovery of them to be of all points of knowledge "the worthiest to be sought, if it be possible to be found."—*Adv. of Learning*. And accordingly, it is the professed purpose, in great part, of the Second Book of the *Novum Organum* to lead to this latter inquiry. The distinction, though it is to be gathered from the context, and still more by comparison of his other writings, is not so directly made in this aphorism as to prevent ambiguity.

which, above others, the intellect may take pollution, and bate of its purity.

LIV. Men are lovers of particular sciences and contemplations, either because they believe themselves authors and inventors of them, or because they have put most of their travail in them, and become chiefly accustomed to them. And men of this sort, if they should betake themselves to philosophy and universal contemplations, distort and corrupt these out of their former fantasies; which thing is seen most conspicuous in Aristotle, who altogether enslaved his natural philosophy to his logic, so as nearly to render it unprofitable and contentious. The class of the chemists, again, from a few experiments of the furnace, have constituted a fanciful philosophy, and regarding a few particulars: Nay, even Gilbert, after he had exercised himself most laboriously in contemplations on the magnet, straightway constructed a philosophy consentaneous to that which had the mastery with himself.

LV. The greatest, and, as it were, radical distinction of minds, as to philosophy and science, is, that

The Platonic forms, or primordial types, are happily hinted by Butler; whose scholastic squire

“professed

He had *first matter* seen undrest,
And found it naked and alone,
Before one rag of *form* was on.”

some natures have more strength and aptness to mark the differences of things, others to note their similitudes. For persevering and ingenious wits are able to fix their contemplations, and stay and fasten in every subtlety of differences ; whereas wits, that are lofty and discursive, seize at once, and compare even the most delicate and general likenesses of things ; but both dispositions easily slide into excess, catching either at the degrees of things, or at their shades.

LVI. Some natures are found unbridled in admiration of antiquity, others in the love and embrace of novelty ; and few are of that temperament that they can hold a mean ; but either they rend up what is rightly planted by the old, or condemn what is rightly contributed by the new. Now, this happens to the great detriment of learning and philosophy ; since these, of antiquity and novelty, are likings rather than discernments ; and truth is to be sought, not from the felicity of any time, which is a thing inconstant, but from the light of nature and experience, which is eternal. Therefore are these inclinations to be utterly refused, and care taken that the intellect be not hurried to a consent with them.

LVII. Contemplations of nature and bodies, in their singleness, break and abate the intellect ; while contemplations of nature and bodies, in their composition and configuration, amaze and relax the intellect.

Which thing is best seen in the school of Leucippus and Democritus compared with the other philosophies. For the former is so busied in the particulars of things as nearly to forget the fabrics; while the others look with that wonder on the fabrics, that they penetrate not to the simplicity of nature. Therefore are these contemplations to be alternated and taken in turn, that the mind may be rendered at once penetrating and capacious, and the discommodities we spoke of be shunned, and the fallacies proceeding from them.

LVIII. Let such then be speculative forecast in avoidance and discharge of *Idols* of the *Cave*; which, for the most part, have their rise from predominancy, or excess of composition and division, or from favour of times, or from largeness or minuteness of the objects presented. But generally it is fit that every one, contemplating the nature of things, hold suspected whatever has the most power to occupy and detain his intellect; and so much the greater caution is to be applied in his judgments of this sort, that the intellect be kept even and pure.

LIX. But *Idols* of the *Forum** are the most troublesome of all; which have stolen into the intellect from

* Place of general resort; as the market-place, or courts of justice, or other assemblage.

compact of words and names. For men believe their reason to have the command over words, whereas it happens, too, that words shoot back and reflect their power upon the intellect, which has rendered philosophy and learning sophisticated and unactive. But words are, for the most part, imposed according to the capacity and apprehension of the vulgar sort, and cut things by lines most apparent to the vulgar understanding. And when a more acute intellect, or a more diligent observation, would transfer these lines, so as more to accord with nature, the words clamour and oppose. Whence it comes, that great and solemn disputations of learned men oft close and break off in controversies about words and names; whereas it would be more advised (according to the custom and foresight of the mathematicians) to begin with these, and bring them into a due order by definitions. Which definitions, however, in things natural and materiate, cannot relieve the distemper; since even definitions themselves are framed of words, and words beget words. So that there is a necessity of recurring to particular instances, and their sequences and orders, as will be discoursed when we shall have come to the method and rule of constituting notions and axioms.*

* Language is said, and truly, to be an imperfect and uncertain instrument. And it has baffled, and must always baffle, the efforts of the most acute minds to invent a language which shall be altogether precise and free from ambiguity. But the imperfection is not alone or peculiarly in the instrument. The am-

LX. *Idols* which are fastened on the intellect by words are of two kinds ; for either they are names of things which exist not, (and as there are things which want name through inadvertence, so are there names also which want things through a fanciful supposition,) or they are names of things which exist, but confused and ill defined, and rashly and unequally taken up from things. Of the former kind are *fortune*, *primum mobile*, *planetary orbs*, *element of fire*, and such conceits, which have their rise from vain and false theories. And this sort of *idols* is more easily ejected, because, through a constant disowning, and the obsolescence of theories, they may be rooted out.*

biguity is not necessarily in the sign more than in that which is signified ; and an attempt to perfect the sign, while the conceptions are themselves indistinct, must of course fail ; for a notion which is indistinct cannot become clear by any endeavour to communicate or express it. One additional difficulty, indeed, exists in regard to the sign, that a distinct conception of one mind may, by the flexibility of language, be indistinctly apprehended by another, or understood with a difference. Unless all men, therefore, can be brought to have the same notions, they cannot all use even the same word in the same sense. To agree in words, they must agree in thoughts. The attainment in this, as in other parts of science, is comparative, and lies *in mediis*. And the corrective, referred to in the aphorism, appears to be the only one competent ; namely, to bring back the sign as often and as closely as possible into juxtaposition with the thing signified.

* Many other terms, equally vague and unmeaning, are introduced from time to time as a veil to ignorance ; such are *Vivifying Principle*, *Subtle Fluid*, *Intellectual Irradiation*, and others ; which having their rise from permanent causes, namely, ambition

But the other kind is perplex, and cleaves deep :
which is raised out of a vicious and unskilful abstrac-

of knowledge and limit of power, are ever recurring ; one that is exploded being soon replaced by some other :

Uno avulso, non deficit alter.

But it is equally true, that there is a large and important class of words in constant use, which are not representatives of any thing of which we can form a clear conception. For we do not form distinct conceptions of any thing as existing, or even possible in nature, which we do not, and cannot, conceive practicable in operation. When matter is said to be divisible without end, we have no distinct idea of what is so expressed ; and however conclusive the metaphysical deduction may appear to be, in other words, how impossible to contradict it, we give no real assent to the proposition. So also with respect to the properties of Space and of Time, so called, though never defined, and not admitting definition, whether space has a boundary in nature, or is without bound, or how time could have a beginning, or can have an end, are subjects which the mind does not reach, and about which, if we reason, we reason in words only, without a definite meaning. And thus it is in all our reasonings concerning what is infinite, whether it be of extension, or number, or time ; in all which, notwithstanding the endeavour of metaphysicians to reduce our conceptions to distinctness, they do in fact elude the grasp, as objects of thought. No strain or effort of mind gives a distinct idea of eternity ; *first* and *last* are relative ideas, obtained by comparison with what comes after, or what goes before, but are not in themselves absolute, and only conceived clearly when limited to a portion of time measured by events. The same difficulty exists in the case of other relations abstractly considered, as that expressed by *height*, (or *depth*,) to the degrees of which we can place no limit ; and the same of *motion*, to the possible acceleration or retardation of which we cannot affix a boundary.

May it not be hoped that the study of natural philosophy, and

tion. To give an instance, let some word be taken, for example, *humidum*, (*wet* or *moist*,) and let us see what consistency there is in the things that are signified by this word; and the word *humid*, or *moist*, will be found

the researches of natural history, pursued with diligence and success by the learned in later times, will at length supersede and displace the unprofitable discussion of those questions, purely abstract and metaphysical, in the philosophy of mind, which, though they have occupied the learned for so many ages, have been entirely fruitless, and availed nothing to the advancement of any real knowledge? more especially when it is considered that they are occupied solely with the limited contemplation of certain mental acts and operations, in which it is not conceivable, as in the field of external nature, that new discoveries can be made or new conclusions drawn. And such evidently have been the character and issue both of the controverted questions referred to in the metaphysics of the *intellect*, and of those equally abstract and equally barren in the metaphysics of the *will*; for in both, the debate being "apart upon a *hill*," has proved abortive,

"And found no end in wandering mazes lost."

It is desirable that these *vexate questiones* should at last be abandoned, and, by general consent, placed *extra commercium*. "Pars scientiæ est nescire."—*Erasm.*

Even in cases where the assent is called not to conclusions purely abstract, but to those of which evidence is adduced from physical phenomena, and the deductions drawn directly from them, as in the passages of the heavenly bodies, and the velocities with which they are moved, and even as to their relative distances, the attempt to represent these distinctly to the mind or imagination exceeds the force of the human faculties. Thus it is also with certain metaphysical and abstract propositions of the geometer, to the conclusions of which, though demonstrated to be true, the mind has not power to give a real and practical assent; the utmost extent of its acquiescence being not to deny them.

no other than a confused sign of various actions, which will admit no fixedness or reduction to rule. For it equally signifies what circumfuses itself with ease round another body, and what in itself is indeterminable and cannot consist, and what easily gives way in every direction, and what easily parts itself and disperses, and what easily unites and gathers, and what easily flows and is put in motion, and what easily adheres to another body and wets it, and what is easily reduced to liquid, or colligated, which before consisted. When we come, therefore, to the predication and imposition of this word; if you take some, flame is moist; if you take others, air is not moist; if others, fine dust is moist; if others, glass; so it is manifest at once how this notion has been unwarily taken from water only, and the common and ordinary liquids, without any due verification.*

In words, however, there are certain degrees of pravity and error. A less vicious kind is of the names of some substance, especially of the lower and well deduced species, (for the notion, of *chalk*, or of *clay*, is good, that of *earth* ill;) a more vicious kind is, of actions; as, to *generate*, to *corrupt*, to *alter*. The most vicious is of qualities, (the immediate objects of sense excepted;) as, *heavy*, *light*, *thin*, *thick*, and so

* This illustration is rather an example of indistinct and vague notion than of an ambiguous word; for the Latin *humidum* is not used in these various senses; and the same is the case of its representatives in our own language.

on. And yet in all these it cannot be but some notions are better by a little than others, according as the copiousness of things falls upon the human sense.*

* The difference is material between definitions of words and definitions of things. For words, being the expression of thoughts or mental operations, are arbitrary in their nature and use; and, in reasoning upon any doubtful or controverted question, it is in the power of the writer or speaker, with respect to any word which is ambiguous or otherwise uncertain, to begin by stating the signification which he attaches to it, and by which his reasoning is to be measured. And this, while it is often of the greatest importance, it is always in his power to do with a degree of accuracy sufficient to prevent misconception of his meaning, although it may not always be of importance for the discovery of truth. But in physical inquiry it is otherwise, or rather, it is the reverse. For there the question is concerning facts, or the nature of a particular substance or matter of investigation as actually existing, with its distinctive properties, which cannot be assumed till proved; and, till these are ascertained, there can be no just definition. The advantage of defining, therefore, cannot be obtained in reasoning upon the phenomena of nature; where the process, instead of beginning with definition, as in the case of logical terms, must close with it. Hence a peculiar objection to those terms, whether intended as definitions, or merely as nomenclature, which, in some cases, learned and scientific men have introduced in their physical inquiries and reasonings; and which, by involving a *theory* in the construction of the *words*, may be not only worthless, but prejudicial.

In one sense, all *reasoning* is hypothetical; for it depends on premises which are in the choice of the reasoner, and which are either to be granted or assumed. But it is altogether different with physical inquiry, where the question is concerning facts of nature; and to define any material object or quality otherwise than it is found really to exist, so far from promoting accuracy in farther research, would only perpetuate error. No definition at-

LXI. But *Idols of the Theatre* are not innate, nor covertly winded into the intellect; but, by fabulous

tempted of such real objects, as distinguished from verbal signs, can be given till their nature and properties are known and understood. Definition is not the beginning, but the end, in physical inquiry; and a premature definition is prejudicial in the same way as a premature axiom.

But, in truth, this obstacle to the progress of knowledge, occasioned by the ambiguity and other imperfections of language, and the consequent difficulty of accurate definition, applies not only to physical researches, and the reasoning employed on material nature, but, in like manner, to logical discussion, and to reasoning in all science.

How far the obscurities and fallacies arising from this source may be obviated by care, is a question of degree. As words are the only media for interchange of thought, an attempt to define with precision every term to be employed in an after train of reasoning is an attempt to correct what is ambiguous, or circumscribe what is vague and lax, by means of that which cannot itself be divested of ambiguity, or indistinctness of limit. For this defect, the only complete remedy would be that of Swift's philosophers in Lagado, who conversed not by the *medium* of words, which are ambiguous signs of things, and vary among different nations, but by *medium* of the things themselves, which is a language free from ambiguity, and universal. The satirist's ingenuity, however, only reaches to external objects; whereas the great danger of ambiguity is in expressing mental operations, and in the use of general terms.

The logician attempts this perfect exactness in the elements of his reasoning; but the mathematician alone attains it. The reasonings of the latter begin with hypotheses, and are limited as to the subjects of them; and these are divested of mixture; so that the conclusions resolve ultimately into propositions, the denial of which would be a contradiction: and hence, but in no other sense, they are necessary truths. Even in this

theories and perverted laws of demonstrations, openly put in and received. Yet to endeavour and under-

class, however, definition has its limits; for there are simple and common terms which do not admit of being made more evident by an attempt at definition, than they already are to every mind by the mere announcement. But, besides such terms, there are, in all other subjects of reasoning, very many notions and corresponding words of a character directly the reverse. In regard to the power of definition, therefore, and its advantages, the logician and moralist stand upon very different ground from the mathematician, both from the greater extent of their field, and its greater complexity. For when the intellect is exercised, not upon questions of abstract and necessary truth, that is to say, necessarily following from the premises assumed, as the properties and relations of number and extension, but in reasoning upon the subjects of mixed science, and truths which are complex and contingent, the range is unlimited; and the difficulties occasioned by ambiguity of language, and the consequent risk of error and fallacy, are incalculably augmented, and always recurring. The conclusions of geometry are facts, but the conclusions of moral and logical reasoning are opinions; capable, indeed, of such evidence as may induce an entire assent, and often resulting in a full conviction of their truth; truths, too, of greater importance to human life and conduct than the conclusions of abstract science; yet, in the strict sense of the word demonstration, they are truths which cannot be demonstrated. When the number of terms necessary to be introduced in a train of discursive reasoning is considered, with the limitations and exceptions equally necessary for the prevention of fallacies, refutation of common errors, and removal of objections anticipated, it is evident that the construction of a perfect logical chain, in the manner of demonstration, that is to say, where every term shall be exactly defined, and nothing be assumed which is not either self-evident and postulate, or established by antecedent propositions already so proved, and where the definition may in all cases be

take confutations in these, is no way congruous to what has been said by us. For as we agree neither

substituted for the thing defined, would, supposing it possible, be in reality a work of greater difficulty, and require a more powerful effort of mind than the longest and finest series in the demonstrations of the mathematician.

Another very important advantage possessed by the mathematical reasoner, and peculiar to himself, is, that no one has either an interest or desire to dispute his conclusions. There are many, indeed, who cannot give a real assent to these conclusions, from incapacity to follow his train of reasoning; but there can be none who have an inclination to deny or controvert them, either among those who can, or those who cannot, accompany him in the process. How different it may be, and often is, with the conclusions of reasoning in moral questions, is sufficiently plain. For there are multitudes who would willingly escape from a moral conclusion, however well deduced. And even where the reasoning is altogether intellectual, and exempt from moral influences, there may be an inclination in others to doubt, or even deny, its conclusions, from pride of intellect, and claim to superior discernment, on a comparison of mental power. But no individual, whatever his opinions or his pretensions may be, has ever been found having a personal interest, or an intellectual ambition, to maintain that the angles of a triangle are not in all cases equal to two right angles.

But although the difficulties of the logician and moralist are thus great and formidable, and his accuracy in reasoning thus impeded, his object is not thereby altered, nor the necessity of his efforts relaxed, but rather incited. And as in natural philosophy there is no assignable limit to the progress of discovery and invention, so there is no assignable limit to the degrees of accuracy which may be attained in logical philosophy, or the art of correct reasoning. These two are necessarily commensurate; for the extent of accurate definition depends upon the extent of accurate knowledge. The aim cannot, in either case, be too

concerning principles, nor concerning demonstrations, all debate is at an end. And this falls out happily, that the ancients may have their due. For nothing is detracted from them where the question is altogether of the way. For (as it is said) he that goes halting in the way outstrips him that runs not in the way. Nay, this is manifestly clear, that he who so runs without the way, by how much he is abler and swifter, falls thereby into the greater aberration.

But our method for discovery of knowledge is such, that a great deal is not left to edge and strength of wits, but it goes near to level minds and intellects. For, whereas towards the making a right line, or the describing a perfect circle, there is much in steadiness and practice of the hand, if it be done by the proper power of the hand alone, but if a square or compass be applied, little or nothing; our method is entirely alike. But although there be no fruit of the particular confutations, yet something is to be said

high, though in both the attainment must necessarily be *in medio*.

The aphorisms of Bacon upon this subject, although applicable generally to all science, have a more immediate and special reference to physical research, and the methods of discovery in the material world. And it is evident, that, in many cases under this department, a greater degree of accuracy may eventually be reached in the definition of terms than is practicable in other cases of reasoning; because every step of the process may be repeated, and every conclusion drawn be thus brought again to a sufficient test, and circumscribed or qualified by recurrence to actual experiment.

regarding the sects and sorts of such theories ; and, a little after, even of their outward signs, where they are distempered ; and, lastly, of the causes of such an infelicity, and so lasting and general a consent in error ; so that the avenue may be less difficult to truth, and the human intellect be more willingly purged, and part with its *idols*.

LXII. *Idols of the Theatre*, or of theories, are many, and may be many more, and, perhaps, at some time will be. For unless the wits of men had been now, for many ages, occupied about religion and theology, and moreover civil governments (monarchies particularly) had been averse from novelties of this cast, even in contemplations, so that men apply to them with a peril and detriment of their fortunes, not barely missing reward, but exposed besides to contempt and hate, there is no doubt but very many other sects of philosophies and theories would have been introduced, like those which flourished of old in great variety with the Greeks. For in the same way that many *themata*, or schemes of the heaven, may be framed on the phenomena of the sky ; so, and much more, on the phenomena of philosophy may be bot-tomed and constituted a variety of opinions or *dogmata*. And the fables of this kind of theatre have that too which commonly befalls in the theatre of the poets : namely, tales imagined for the stage are more polished and compact than the narratives from true story, and more elegant, and such as one would rather have.

But, in general, there is taken for the material of philosophy, either much from few things, or a little from many; so that either way philosophy is founded on too narrow a platform of experience and natural history, and pronounces from fewer things than is just.* For the reasoning sort of philosophers, out of particular experiences, catch at the inconstant and vulgar, and these neither surely ascertained, nor carefully examined, or much weighed; placing the rest in meditation, and the agitations of thought.

There is also another sort of philosophizers who have sedulously and exactly laboured a few experiments, and thence had the front to educe and frame philosophies, bowing and twisting the rest in strange ways to them.

There is a third sort again, who, out of belief and reverence, intermix theology and traditions; among whom the vanity of some has turned aside to the search and derivation of knowledge from spirits, namely, and genii. So that this root of errors and false philosophy is in kind threefold; *sophistical*, *empiric*, and *superstitious*.

LXIII. Of the first kind, the most conspicuous example is in Aristotle, who corrupted natural philosophy by his dialectic, while he worked out the world

* The announcements which are made, from time to time, of supposed discoveries in medicine afford, perhaps, the most frequent illustration of this remark.

from categories ; assigned to the human soul, that most noble substance, its class from terms of the second intention ; settled the business of *dense* and *rare*, by which bodies enter to greater and lesser dimensions or spaces ; assigned to each several body its distinct and proper motion, and if it partakes of another motion, that motion to be from elsewhere ; and imposed on the nature of things innumerable others at his pleasured ; more solicitous every where how one may explicate himself by answer, and something be rendered positive in words, than for the inward truth of things ; which is excellently seen besides in a comparison of his philosophy with other philosophies that were celebrated among the Greeks. For the *homoiomera** (constituent particles) of Anaxa-

*

Homocomeriam ;

*Quam Græci memorant, nec nostri dicere lingua
Concedit nobis patrū sermonis egestas.*

Lucret. De Rerum Natura, L. i. v. 831, 2.

The same excuse is offered by Cicero for the tardiness of Roman philosophy in the prosecution of physical science :—*Complures enim Græcis institutionibus eruditi, ea quæ didicerunt cum civibus suis communicare non poterant, quod illa quæ à Græcis accipissent Latine dici posse diffiderent.*—De Nat. Deor. L. i. He justly observes elsewhere, “ Et id quidem commune omnium fere est artium. Aut enim nova sunt rerum novarum faciendæ nomina, aut ex aliis transferenda. Quod si Græci faciunt, qui in iis rebus tot jam sæcula versantur, quanto id magis nobis concedendum est, qui hæc nunc primum tractare conamur ? ”—*Academ. Quest.* L. i. Although the homage to Grecian philosophy has ceased, or been greatly qualified in modern times, it is a remark-

goras, the *atomi* (indivisibles) of Leucippus and Democritus, the *cælum et terra* (heaven and earth) of Parmenides, the *lis et amicitia* (strife and amity) of Empedocles, the *resolutio corporum in adiaphoram naturam ignis, et replicatio eorundem ad densum* (resolution of bodies into the neutral (or indifferent) nature of fire, and their resilience to dense) of Heraclitus,* hold something of the natural philosopher, and have a relish of the nature of things, and experiment, and material bodies; whereas the *physics* of Aristotle sound, for the most part, nothing else but the divisions of logic; and which, in his metaphysic, he has treated again under a more wonted name, and, as it were, something more real and not nominal. Nor let it move any one, that in his books of animals, and in

able testimony to the achievements in learning of that cultivated people, that their *scientific language* has been transmitted, and its dominion preserved entire to the present day, both in philosophy and the arts. By the Roman philosophers it came, after a time, to be Latinized. "Quo in genere [in dictione nempe] tantum profecisse videmur, ut a Græcis ne verborum quidem copia vinceremur."—*Cic. De Nat. Deor.* L. i. And, again, "*Decet augentem linguam Latinam nominare Moralem,*" [non ἤθη, Græcè.]—*De Fato*. Whether the language thus transmitted has been Englished in the same degree, or whether it would be of any advantage that it should, are different questions, and of secondary importance.

* *Adiaphora natura ignis*. "Ignea vis," as rendered by the Roman followers of this philosopher. But what is obscure in an author's meaning can never be made clear by any attempt at translation; *quoniam quid diceret ipse intelligi noluit*.

his problems, and in other his treatises, there is a frequent handling of experiments. For he had first determined, nor duly consulted experience for constitution of his resolves and axioms ; but, after he had decreed at his pleasure, he draws over experience, tortured and captive to his conceits : so that, on this count, he is more accusable even than his modern followers (the kind of scholastic philosophers) who forsook experiment altogether.

LXIV. But the *empiric* sort of philosophy educes aphorisms more deform and monstrous than the *sophistic* or reasoning sort ; for it is planted, not in the light of common notions, (which, though it be weak and superficial, yet is somehow universal and pertinent to many things,) but in the straits and darkness of a few experiments. So that to them who are daily busied in experiments of the kind, and by means of them have corrupted their fancy, such a philosophy seems probable, and, as it were, certain ; to the rest, incredible and vain. Of which the notable example is in the chemists and their dogmas, but elsewhere is scarcely found in our day, save, perhaps, in the philosophy of Gilbert. But, however, concerning philosophies of this kind, a caution was on no account to be overlooked ; because already we foresee it in mind, and augur, that if at any time, stirred by our admonitions, men (taking leave of the sophistical learning) shall, in earnest, shape themselves to experi-

ment, then will it certainly happen, on account of the premature and overhasty speed of the mind, and its spring and flight to generalities and the principles of things, that there will be an imminent danger from such philosophies ; and this evil it is fit even now to meet.*

LXV. But the corruption of philosophy from *superstition* and admixture of theology spreads wider every way, and carries the most mischief, whether into entire philosophies or their parts. For the human intellect is not less obnoxious to impressions of imagina-

* Has not this prediction been fully verified? Are there not many examples afforded, among other departments, in theories of medicine, and most remarkably in the curative part, resting for their authority on a few experiments, or a very limited number only, nor these duly verified ; while the conclusions drawn from these partial results are assumed as general, and necessarily end in delusion and empiricism? Are not also the theoretical conclusions of *phrenology*, so called, substantially of this description? being raised upon the basis of some experiments only, and rejecting cases where the result is less favourable ; thus partaking more of anticipation than of true induction and the interpretation of nature. This propensity, to draw premature conclusions from a few particulars only, is a fertile source of error in other matters as well as in physical inquiry. Thus it is in some branches of philology, that slight analogies are traced, and vague theories formed ; as in the etymology and derivations of words, where conclusions are so often drawn from a correspondence in sound merely, or some faint shade of resemblance. It is the same in the more important subject of morals ; and, particularly, in the estimates formed of the character, whether of individuals, or of nations.

tion, than to impressions of vulgar notions. For the pugnaeous and *sophistical* sort of philosophy entangles the intellect ; but that other fanciful and tumid, and, as it were, poetical, more flatters it. For there is in man a certain ambition of the understanding not less than of the will, especially in high and elevated minds.

Now, of this kind, the conspicuous example is among the Greeks, in Pythagoras principally, yet conjoined with a grosser and more burthensomo superstition ; but tho more dangerous and subtlo in Plato and his school. This kind of distemper is found also in portions of the other philosophies, by introduction of abstract forms, and final causes, and first causes, omitting oftenest the mediate : and such like. But in this matter is the highest caution to be adhibited. For the *apotheosis* (or deifying) of errors is a thing most mischievous ; and, where reverence accrues to vanities, is to be counted for a pest of the intellect. Yet in this weakness some of the moderns have indulged with greatest levity ; so as on the first chapter of the Genesis, and on the book of Job, and other the sacred Scriptures, to endeavour the grounding a natural philosophy ; “ seeking the dead among the living.” And this vanity comes so much the rather in need to be bridled and coerced, that by the unwholesome mixture of divino and human, not only is educed a fantastical philosophy, but an heretical religion also. Therefore it is a great point of health, if, with a sober mind, wo commit to faith what things only belong to faith.

LXVI. And thus have we spoken of the unsound judgments in philosophies, as they are grounded either in *vulgar notions*, or in *scanty experiment*, or in *superstition*. We are to speak next concerning the vicious matter of contemplations, especially in the natural philosophy. Now the human mind is infected by the view of what passes in the mechanic arts, in which bodies are mostly altered by compositions or separations; coming to think that some such takes place likewise in the universal nature of things. Whence flowed that fiction of the elements, and their concurrence, for constitution of natural bodies. Again, when man contemplates the freedom of nature, he lights upon the species of things, of animals, plants, minerals; from whence he readily slides into this conceit, of thinking that there are in nature certain primary* forms of things which nature casts to educe, and that the other variety comes out of the hindrances and aberrations of nature in the accomplishment of her work, or out of the conflict of diverse species,

* Here again, as in a preceding aphorism, the author evidently refers to forms or prototypes in the metaphysical and abstract sense of the ancient theorists, such as Plato's "*first good, first perfect, and first fair*;" not to the conformations of material bodies and their laws, as existing in nature, and which may be made, as he conceived, the subject of experiment. In this sense, the forms of material things are synonymous with the laws of their being, or their essences; in other words, the form of a certain substance is the cause by which it subsists in a particular manner, as distinct from any other.

and the transplantation of one into another. And by the former imagination, we have had the birth of first elementary qualities, by the other that of occult properties and specific virtues; both which pertain to the empty devices of contemplation, wherein the mind takes up its rest, and is turned away from the more solid. But the physicians, in their second qualities and operations of things, *attraction, repulsion, attenuation, inspissation, dilatation, astringency, discussion, maturation*, and the like, labour more worthily; and, unless that out of those two summaries which I spoke of, (namely, elementary qualities and specific virtues,) they corrupt the others, (which are rightly observed,) by reducing them to first qualities, and their subtle and incommensurate mixtures, or by not carrying them out with a greater and more diligent observation to third and fourth qualities, but breaking off the contemplation unseasonably, they would have made a much better proficiencie. Nor are virtues of this sort (I do not say these but the like) to be sought only in the medicines of the human body, but in changes also of the rest of natural bodies.

But it happens, with a much greater detriment still, that they contemplate and inquire of the quiescent principles of things, *ex quibus*, (from which,) and not the movent, *per quæ*, (by which,) things arrive. For the former have respect to discourses, these to works. And truly those common differences of motion, which are noted in the natural philosophy

received, of *generation*, *corruption*, *augmentation*, *diminution*, *alteration*, and *remove*, are of no worth. For what they intend is this : if a body, not changed otherwise, is made to quit its place, this is *latio*, (or *remove* ;) if, place and species continuing, it be changed in quality, this is *alteration* ; if, again, by that change the bulk itself and quantity of body remains not the same, this is motion of *augmentation* and *diminution* ; if they be so far changed that they change species itself and substance, and migrate into others, this is *generation* and *corruption*. Now, these are merely popular, and no way penetrate into nature ; and are measures and periods only, not kinds of motion. For they point to the *huc usque*, (or how far,) not to the how, *quomodo*, or the source, *ex quo fonte*. Nor yet do they signify any thing of the appetite of bodies, or the process of their parts ; but only whereas that motion exhibits the thing, otherwiso than before, in a gross manner to the sense, from thence they take the prognostic of their division. Even where they would signify something of the causes of motions, and institute a separation out of such, they introduce, most slovenly, a difference of motion natural and violent, which, itself, is altogether after the vulgar apprehension ; since all forcible motion is likewise truly natural, namely, when an external efficient puts nature in act otherwise than before.

But leaving these ; if one (for an instance) should observe that there is in bodies a reciprocal appetite

of contact, so as they suffer not the unity of nature to be quite dissevered or cut off, and a vacuum afforded; or if one should say, that there is in bodies an appetite of recovering themselves into their natural dimension or tensure, so that being distended or compressed beyond it, or within it, they forthwith purpose and endeavour retrieving and remitting themselves into their former sphere and expanse; or if one say that there is in bodies an appetite of congregating into masses of their connaturals, the dense that is towards the orb of the earth, the more thin and rare towards the ambit of the sky; these, and the like, are truly physical sorts of motions. But those other are plainly logical and scholastic, as from this collation of them manifestly appears.

Neither is it a lesser evil, that, in their philosophies and contemplations, the labour is expended in tracing out and handling the principles of things, and ultimities of nature; whereas all the usefulness and power of operating lies in the mediate. Hence it is that men do not cease to abstract nature till they have come to potential and unshaped matter; nor again cease to divide nature till they have come to the atom; which things, though they should be true, can yet do little to further the fortunes of mankind.

LXVII. The intellect is likewise to be cautioned touching the intemperances of philosophy in giving or withholding of assent; because intemperancies of this

sort are seen to fix, and, in a manner, perpetuate *idols*, allowing no approach for removal of them.

Now the extreme is twofold: one is of those who readily *pronounce*, and render knowledge positive and magisterial; the other of those who have introduced unlimited *scepsis*, and a vague inquisition without term: The first of whom depresses the intellect; the other enervates. For the philosophy of Aristotle, after it had (in the manner of the Ottomans to their brethren) by its pugnacious confutations butchered the other philosophies, pronounced of all particulars; and himself, again, suborns questions at his will, thereafter dispatches; that all may be certain and adjudged: which also stands with his successors, and is in use.

But the school of Plato brought in the *Scepsis*; at first by way of jest, as it were, and irony; in odium of the old sophists, Protagoras, Hippias, and the rest, who feared nothing so as appearing to doubt in any thing.* But the new academy dogmatised this doctrine, and held it professedly. Which, though the method be honester than license of *pronouncing*, since they say for themselves, that they do in no degree confound inquiry as Pirrho did and the sceptics, but have what they may follow as probable, though they have

* "Tum Velleius, fidenter sane, ut solent isti, nihil tam verens quam ne dubitare aliqua de re videretur; tanquam modo ex deorum concilio, et ex Epicuri intermundiis descendisset, Audite, inquit."—*Cic. De Nat. Deor.* L. 1.

not what they may hold as true ;* yet, after the human mind shall have once despaired concerning discovery of truth, all things become every way more languid. Whence it arrives that men turn aside rather to delightful disputations and discourses, and a certain rambling among things, than sustain themselves in a severity of inquisition. But, which we have said from the first, and have constantly in view, the authority of human sense and intellect is not to be despised and lessened, but their infirmity to be furnished with helps.†

* “Cum autem proprium sit Academiae judicium suum nullum interponere; ea probare quæ simillima vero videantur; conferre causas, et quid in quamque sententiam dici possit exprimere, nulla adhibita sua auctoritate, judicium audientium relinquere integrum ac liberum; tenebimus hanc consuetudinem à Socrate traditam.”—*Cic. De Divinatione*, L. 2.

† It is scarcely necessary to observe, that the statements of the author, in relation to the Idola, and other forms of error which beset the human mind, have no tendency to disparage the faculties of man, or lower the estimate of his nature. This was not the colour of Bacon's mind. All his philosophy, on the contrary, tends to enhance and elevate the human intellect, and to enlarge its action by removing the obstacles which hinder its exercise, and mislead us in our judgments.

Man may be viewed in two aspects, and as holding two great relations in the universe of which he has information. He may be considered as an inhabitant of the earth on which he dwells, and in his relations to that sphere and his present state; as we consider the other creatures by which, however different and inferior in faculties, that earth is peopled. Or he may be considered

LXVIII. And now we have spoken concerning the several kinds of *idols* and their equipage ; all which

in his relation to that state which is not confined to earth, but extends beyond it, and which he is connected with by the faculties bestowed upon him. Philosophical writers, according to their different views, have differently classed him in their distribution of knowledge, as part of the physical, or of the psychological world. The question is immaterial, for he must, in reality, be included under each ; nor, in this or other cases, can any classification be made of things in nature by lines which do not cross or mingle. Even in his present condition, and his relation to the world around him and within him, his powers are large and his views elevated ; for the inspiration of the Almighty has given him understanding, and qualified him to observe and comprehend much of the works of creation, and operations of Providence. But, considered in his other relation, he rises above the earth ; and in the scale of the universe the earth becomes subordinate to him, and may be viewed by him in the language of the poet as a mere "punctual spot." Or, in the language of another author, who writes poetically, though not in numbers, and whose deep reflection compensates fully for his occasional aberrations ; "The earth is a point, not only in respect of the heavens above us, but of that heavenly and celestial part within us. ——— Whilst I study to find how I am a microcosm, or little world," referring to the fantastical philosophy which, discovered in man's frame, parallels and correspondencies to all things natural in the frame of the world, "I find myself something more than the great.* There is surely in

* The simile of the *microcosm*, first used by the Stoics, and industriously laboured in after times, is an example of those plausible theories or analogies which, according to Bacon, (Aph. XXVIII,) "ex paucis collectæ intellectum statim perstringunt, et phantasiam implent." For the allegory became a common-place in learning, and the term classical in literature. Milton, however, puts it in the mouth of the great sophist, when, commenting on the storm which himself had raised, he describes its effects to be

"harmless, if not wholesome, as a sneeze
To man's less universe."—*Par. Reg.* B. IV.

are, by a firm and stated resolve, to be abrogated and renounced, and the intellect to be utterly delivered of them and purged out; so that there may scarcely be any other avenue to the kingdom of man, which is founded in knowledge, than to the kingdom of heaven,

us something that was before the elements, and owes no homage unto the sun."—*Rel. Med.* In this latter aspect man is, even while upon the earth, comparatively unconnected with it, and independent of it.

"The soul is its own *place*, and in itself
Can make a heaven of hell, a hell of heaven."—*Par. Lost.*

The satirist, who is oftenest a poet, whether he expresses himself in verse or not, while he acknowledges the enlarged faculties of man, views him chiefly in connection with his present state, and selects for topics his vices and errors, his weaknesses and inconsistencies; presenting him, in epigram, as

"The glory, jest, and riddle of the world."*

The poet of human sympathies draws a different picture:—
"What a piece of work is man! how noble in reason! how infinite in faculties! in form and moving, how express and admirable! in action, how like an angel! in apprehension, how like a god! the beauty of the world! the paragon of animals!"—*Hamlet.*

The object of Bacon's philosophy is neither to extenuate nor set down in malice; but, in the words of soberness, to point out what is the real character, and what the extent of man's intellectual powers, and how they may be directed and helped in the pursuit of truth; not merely what ought to be his object, which had been done before, but how to attain it, and wherein his strength lies.

* Pope, in his *Essay on Man*: a composition abounding with sentiments both just, and expressed by the artist with consummate skill; but to the entire plan and design of which the poet's own words may not inaptly be applied; that

"True no meaning puzzles more than wit."

into which it is not granted to enter, save under the likeness of a child.*

LXIX. But corrupt demonstrations are, as it were, among the munitions and fortresses of *idols*; and those which we have in dialectic stop little short of plainly addicting and mancipating the world to human

* It may well be questioned whether this entire disfranchisement of the mind from all preconceived systems and theories can be accomplished even in physical inquiry. It is certain that, in all other cases, the attempt will fail. Attachment to particular opinions, like attachment to individuals, is not regulated alone by intrinsic merit and character in each case, but is insensibly formed otherwise, and does not wait for examination of the grounds on which it rests. And it will ever be so where opinions and doctrines are concerned which are not addressed exclusively to the intellect;

“For affection,
Mistress of passion, sways us to the mood
Of what it likes or loathes.”—*Shakspeare*.

And even in questions which ought to be decided by the intellect alone, unless they are purely abstract, the bias will be found. Reasoning is not at all times, or with all persons, a fit instrument of conviction. Different tempers and dispositions obstruct its influence, as well as prejudices of judgment; so that with many persons, even of sound understanding, it is altogether vain to engage in argument upon subjects which interest them greatly. Prejudice and error cannot be dislodged by an effort of mind even though sincerely attempted; but it must be accomplished by other means. The author himself has elsewhere truly observed, that *whereas we must efface the former impressions from a canvass before we can lay on a new colouring, it is otherwise with the mind; for it is by new impressions only that we can efface the old.*

cogitations, and cogitations to words. Now demonstrations are, through a certain potency, themselves philosophy and science. For such as they are, and as well or ill instituted, such philosophies and contemplations come to be. But those are deceitful and insufficient, which we now employ in that universal process, leading from sense and things to axioms and conclusions. And this process is fourfold, and its vices so many. First, impressions of sense itself are vicious; for sense both comes short and misleads. But to its failures substitutions are needed, to its fallacies rectifications.* Secondly, notions are ill ab-

* It must be understood that, by fallacies of the senses, as the term is used in this and some preceding aphorisms, Bacon meant to express fallacies of judgment through information of sense: false conclusions which the mind forms through that medium, when other evidence and correctives are not used. The organs of sense are limited in their power, even when aided by the most efficient instruments which art has produced; their information, therefore, is limited in the same proportion, and they are dull when compared with the subtilty of nature. The impressions, at the same time, are more immediate than the deductions of reason, and by the suddenness, as well as imperfection, lead to erroneous conclusions. But it cannot be said, with propriety, that their actual information is false. The report is true in so far as it goes; and the fallacy, where it takes place, is a fallacy in the mind itself, when it draws conclusions prematurely, or such as are not warranted by the report of the sense. Even where the natural functions of sight, or touch, or hearing, are disordered by disease of the organ, still that organ makes a real report of the impressions which it has received. It is the province of the mental faculties to sit in judgment upon the case, to discover the

stracted from impressions of the senses ; and they are indeterminate and confused, which it were needful to be determinate and well defined. Thirdly, the induction is bad which concludes the principles of knowledge through a simple enumeration ; not adhibiting the exclusions and solutions,* or due separations of nature. Lastly, that manner of inventing and prov-

disease, and to correct or qualify the information of sense by means of other evidence. The mistake, then, is in the intellect. Accordingly, in a preceding aphorism on this subject, (Aphor. L.) the statement begins in these words :—" At longe maximum impedimentum et aberratio intellectus humani provenit a stupore et incompetencia, et fallaciis sensuum ; ut ea quæ sensum feriant illis quæ sensum immediate non feriant, licet potioribus, præponderent." In the " Advancement of Learning," he expresses himself as follows on this subject, making the just distinction. After observing that many, both of the Old and New Academy, held the doctrine of *acatalepsia*, or incomprehensible, he adds, " But here was their chief error ; they charged the deceit upon the senses, which, in my judgment, notwithstanding all their cavillations, are very sufficient to certify and report truth, though not always immediately, yet by comparison, by help of instrument, and by producing and urging such things as are too subtle for the sense to some effect comprehensible by the sense, and other like assistance. But they ought to have charged the deceit upon the weakness of the intellectual powers, and upon the manner of collecting and concluding upon the reports of the senses." *Book Second.*

To use the information of the outward sense rightly is, in truth, a task for the intellect ; and, in this respect, we *learn to see* and to *hear* as really as we learn to speak, and to use our other faculties, whether of body or mind, although the lesson and the rectification begin at a time to which memory does not revert.

* Analysis into constituent parts ; disjunction.

ing, by which principles the most general are first constituted, and thereafter middle axioms applied to them and proved, is the mother of errors, and calamity of all science. But of these, which we have now glanced in passage, we shall speak more largely, when, having perfected those expiations and expurgations of the mind, we come to propound the true method for interpretation of nature.

LXX. But by far the best demonstration is experience, or trial ; provided it cleave to the very experiment. For if it be translated to others which are accounted like, unless that translation be justly and orderly made, it is a deceitful thing. Now, the manner of experimenting which men use at present is blind and stupid. Accordingly, while they stray and wander by no certain road, but take counsel only from occurrence or jumble of things, they are carried about to many things, but advance little ; and sometimes they are elate, sometimes are perplexed or confounded, and always find what to seek farther. And so it nearly happens, that, in experiment, men assay with levity, and, as it were, in play ; just a little changing experiments already known ; and if the affair misgives, distasting and forsaking the endeavour. Or if, with more gravity, and fixedness, and pains, they gird themselves to experiment, they yet bestow their labour in digging and turning over some one experience ; as Gilbert in the loadstone, the chemists in gold. Now, this men

do with a purpose and direction not less unskilled than futile. For no one explores the nature of anything with felicity in the thing itself; but the inquiry is to be enlarged to what are more general.

Or, even if they do endeavour at a sort of science and positive doctrine from experiments; yet, almost in every case, through an over-hasty and untimely eagerness, they turn aside to practical application of them; not only because of the profit and fruit of such practice, but that in some new work they may, as it were, snatch a pledge to themselves, that they are about to be not unprofitably employed in the rest; and also insinuate themselves with others, for the purchase of a better repute concerning those things in which they are engaged. Thus it happens that, in the manner of Atalanta, they go aside to take up the golden apple; but, in doing so, interrupt the course, and let victory slip from their hands. Whereas, in the true lists of experiment, and carrying it forward to production of new works, the divine wisdom and order are, by all means, to be taken for the pattern. But, on the first day of the creation, God created light only, and to that work allotted the entire day; nor created on that day any materiate work. In like manner, and by experiments in every kind, the discovery of causes and true axioms is first to be elicited; and experiments of light, not of fruit, to be inquired. Axioms again, when rightly deduced and constituted, supply uses of practice, not straitened or scantily, but in numbers;

and draw after them bands and troops of works. But of the ways of experimenting, which, not less than the ways of judging, are blocked up and intercluded, we shall discourse afterwards; having, for the present, only spoken of the common experience as of a faulty demonstration. And now the order of things requires, that we subjoin somewhat concerning those signs (or indications) which we mentioned a little before, (of distemperature in the received philosophies and contemplations,) and concerning the causes of a thing at first view so surprising and incredible. For the cognizance of signs prepares assent, but the explication of causes removes wonder.* Which two conduce greatly towards the more easy and mild extirpation of *idols* from the intellect.

LXXI. The learning which we have has flowed principally from the Greeks. For what the Roman writers, or the Arabic, or the more recent, have added, is not much, nor of great weight; and, whatsoever they be, are grounded on the platform of what was discovered by the Greeks. But the wisdom of the Greeks was showy, and wasted on disputations, which kind is most adverse to the inquisition of truth. And, therefore, that name of Sophists, which by those who would have themselves be accounted the philosophers, was in way of contempt referred back, and turned

* "Ignorance begets wonder, but knowledge admiration."

against the ancient rhetoricians, Gorgias, Protagoras, Hippias, and Polus, is truly proper to the whole kind; to Plato, Aristotle, Zeno, Epicurus, Theophrastus, and their successors, Chrysippus, Carneades, and the rest. There was but this difference, that the former kind was unsettled and mercenary, strolling round countries, and making show of their wisdom, and exacting a price; but the other, more stated and generous, being such as had their fixed seats, and opened their schools, and philosophized gratis. However, both kinds (though otherwise unlike) were professory, and carried the matter to controversies, and established and fought for certain sects and heresies of philosophy; so that this learning was nearly (what Dionysius not ill scoffed upon Plato) "the talk of idle old men to ignorant young ones."* But those more ancient of the Greeks, Empedocles, Anaxagoras, Leucippus, Democritus, Parmenides, Heraclitus, Xenophanes, Philolaus, and the rest, (for Pythagoras we pass over as superstitious,) opened not schools, (that we know,) but betook themselves to the inquiry of truth with greater silence, and more severely and simply; that is, with a lesser affectation and ostentation. And herein was their carriage, too, in our judgment, more commendable, if their works had not, through tract of time, been put out by those lighter, which are more answering and agreeable to the vulgar

* Rather, of old men who dote: "Οἱ λόγοι σοῦ γερωντιῶσι."

apprehension and liking ; time (like a river) carrying down to us what things are lighter and more blown, and drowning the weightier and solid. Yet neither were they altogether exempt from the vice of the nation and country ; for they leaned too much towards the ambition and vanity of building a sect, and catching the popular breath. But the inquiry of truth is to be set down for desperate when it turns aside to so worthless trifles. Neither is that sentence to be forgotten, or presage rather of the Egyptian priest† concerning the Groeks, “ that they were ever children, without either antiquity of knowledge, or knowledge of antiquity.” And certainly they have that property of children, that they are ready to prate, but unable to generate ; for their wisdom seems wordy, and barren of works. The signs, then, taken from the rise and family of the philosophy in use, are not good.

LXXII. Nor are the signs much better which may be taken from the nature of the time and age, than those other from the nature of the place and nation. For the information during that age, whether in regard of time or of the globe, was confined and slender ; which is by far the greatest evil, especially for those who rest all upon experience. For neither had they history of a thousand years, which was deserving the name of history, but fables and rumours of antiquity.

* Answer of the Egyptian priest to Solon ; in Plato.

And of the regions and tracts of the world they had acquaintance with a very little part; calling, without distinction, all the northerns, Seythians; all the westerns, Celts: knew nothing in Africa beyond the hithermost part of Ethiopia; nothing in Asia beyond the Ganges; much less had knowledge of the provinces of the New World even by report, or any certain and constant fame: nay, more, very many climates and zones, where infinite peoples breathe and live, are by them pronounced for uninhabitable;* yea, further, the peregrinations of Democritus, Plato, and Pythagoras, not distant assuredly, but rather suburban, are voiced as something great. But in our times, both very many parts of the New World, and the extremes on every side of the Old, are come to be well known, and the pile of experiments infinitely grown. Wherefore, if signs are to be taken (after the manner of astrologers) from the time of nativity or

* “Quinque tenent cœlum zonæ, quarum una corusco
Semper sole rubens, et torrida semper ab igni:
Quam circum extremæ dextra lævaque trahuntur,
Cærulea glaciæ concretæ atque imbribus atris.
Has inter medianque duæ mortalibus ægris
Munere concessæ divum.”—*Georg.* L. 1.

“Utque duæ dextra cœlum, totidemque sinistra
Parte secant zonæ,—
Quarum quæ media est, non est habitabilis æstu,” &c.
Or. I. Met.

“Cernis autem terram eandem quasi quibusdam redimitam et circumdatam circulis. — Duo sunt habitabiles,” &c.

Cic. Somm. Scip.

birth, nothing great seems to be signified concerning these philosophies.

LXXIII. Among signs, none is more certain or noble than that from fruits. For fruits and invented works are, as it were, sponsors and sureties for the truth of philosophy. Now, from those philosophies of the Greeks, and their derivations through particular sciences, for periods now of so many years, hardly one experiment can be adduced which tends to the relief and benefit of man's estate, and may truly be reported as due to the speculations and opinions of philosophy. And Celsus ingenuously and wisely confesses it; namely, that experiments of medicine were found in the first place, and afterwards men philosophized about them, and hunted out and assigned their causes; not falling out by the inverse order, that from philosophy, and a knowledge of causes, the experiments themselves were discovered or fetched. Accordingly, it is not to be wondered, that among the Egyptians (who allowed to the inventors of things divinity and consecration) were more images of brute animals than of men; seeing that brute animals, by natural instincts, have given birth to many discoveries, where men, by discourses and conclusions of reason, have exhibited few or none.

The industry of the chemists, indeed, has brought forth some, but, as it were, casually, and in passage: or by somewhat varying their experiments, (as the

mechanicians are wont,) not out of any art or theory ; for that which they have framed disturbs experiment more than assists. Of those, again, who have been occupied in natural magic, (as they call it,) few inventions are found, and these trivial, and nearer to imposture. Wherefore, as it is cautioned in religion, that faith be shown by works, the same is excellently transferred, likewise, to philosophy ; that it be judged by its fruits, and the sterile be counted vain ; and the more so if, in place of fruits of the grape and olive, it produces but thistles and thorns of disputations and strife.

LXXIV. Signs are also to be taken from the increments and progresses of philosophy and science. For what things are founded in nature grow and are augmented ; but what in opinion are varied only, not augmented.* Accordingly, if this learning had not plainly been like a plant torn from its roots, but adhered to the womb of nature, and been nourished by her, that might not possibly have come to pass which we see to have held now for two thousand years ; namely, that learning treads ever in its former steps, and remains nearly in the same state, nor has taken any memorable growth ; yea, rather has flourished most in the first authors, and afterward declined.†

* *Opinionum commenta delet dies, nature judicium confirmat.*—Cic.

† Natural philosophy, like Antæus, when held from contact with its parent, earth, is deprived of power, and finally strangled.

But in the mechanical arts, which are founded in nature and the light of experience, we see it happen oppositely; which, (while they continue to please,) replete, as it were, with a sort of spirit, never cease to vegetate and increase; at first rude, then exact, thereafter polished, and perpetually improved.

LXXV. Again, another sign (or indication) is to be taken, (if, indeed, it can properly be called a sign, since it is rather a testimony, and, what is more, of all testimonies the strongest;) namely, the confession itself of the authors whom men now follow. For even they who pronounce of things with so much confidence, yet at seasons intermediate, and coming again to themselves, have recourse to complaints against the subtilty of nature, the obscurity of things, and the infirmity of human wit. And, truly, if this were done with simplicity, though it chanced to deter such as are more timid from a farther inquiry, might yet whet and provoke others who are of a brisker and more confident spirit to new advances. But it satisfies them not to make the confession for themselves: but whatever shall be unknown to themselves or their masters, or unattempted by them, that they place without the limits of the possible, and, as a point of art, pronounce impossible to be known or done; with greatest arrogance and detraction, turning the weakness of their own inventions to calumny of nature herself, and to the desperation of all others.

Hence the school of the new academy, which held the Sceptis professedly, and condemned mankind to everlasting darkness.* Hence the opinion that forms, or the true differences of things, (which are, indeed, the laws of pure act,) are impossible to be found, and beyond man. Hence those opinions in the active and operative part, that the heat of the sun and of fire differ

* It is scarcely necessary to say, that a condition of entire and absolute Pyrronism, or unlimited doubt, cannot *exist*, even in imagination, however it may be *stated* in words. For it would recede not only from every *conclusion* of the intellect, but from every *operation* of the mind; continuing to abstract and withhold till it closed in the suspension and ultimate annihilation of all things and all faculties; an attempt even to conceive which, if persisted in, can only derange the intellectual fabric, if it does not more fortunately throw us back into existence and activity. Pyrronism may exist in verbal theory, and for debate, as atheism may; though with this difference, that the atheist may conceal his conviction, which the sceptic cannot; for every word, as well as motion, betrays him. In reality, there never have been, or can be, any who are absolute in either doctrine. No useful truth is to be reached by continued dint of thinking, or mere effort of the mind inwardly exerted, and without other aid. Intellect is only a part of those faculties by means of which our judgments are formed; and a perseverance in abstracting, with a hope of reaching the beginnings of thought, unmixed and without alloy from impressions of sense or colour of the affections, would be destructive of actual knowledge, not less than of happiness; for both will perish under the vain attempt thus to analyze them; as the child loses his toy through desire to get at the secret of its machinery. The mind will discourse its music, and preserve its harmony, not by taking the fabric to pieces, but by continuing to sound the stops.

wholly in kind ; so that men may not think themselves capable, by works of fire, to educe and form anything resembling those which pass in nature. Hence that conclusion, that composition only is the work of man, but mixtion the work of nature alone : so that men may not hope from art any generation or transformation of natural bodies. Through this sign,* therefore, men will easily suffer themselves to be persuaded out of intermixing their fortunes and labour with opinions, not desperate merely, but even devoted to desperation.†

LXXVI. Nor is that sign to be omitted, that there was of old so great a dissent among philosophers, and variety of schools themselves ; which reports sufficiently the way from sense to intellect having been ill fenced ; when the same material of philosophy (the nature of things namely) was rent and pulled asunder into so vague and multiplied errors. And although, in these our times, disagreements and diversities of

* *i. e.* Through the influence now indicated.

† A similar influence has proved an obstacle to improvement in moral cases, also ; particularly as regards the intellectual constitution of man ; in so much, that the states of insanity and idiocy have too long been supposed beyond the reach, not of cure only, but even alleviation, and their subjects consigned to hopelessness, and excluded from the pale of science, as well as of society. And such, too, was long considered to be the case, as to mental culture, with that large class of human beings, the blind and the dumb.

opinions about principles themselves and entire philosophies are, for the most part, extinct, yet about portions of philosophy innumerable questions and controversies remain ; so as it plainly appears, that neither in philosophy itself, nor in the modes of demonstration, is there any thing certain or sound.

LXXVII. Then, as for the opinion of men, that there is, without question, a great agreement in the philosophy of Aristotle ; since, after it was published, the philosophies of the more ancient ceased and wore out, while, in the succeeding times, nothing better was invented, so that it seems to be so firmly set down and planted as to have drawn either time to itself : First, what men suppose of the failure or cease of ancient philosophies, after the works of Aristotle came out, is untrue ; for long after, down to the times of Cicero and the ages following, the works of the old philosophers remained. But in the times that ensued, when, by inundation of the barbarians upon the Roman empire, human knowledge had suffered shipwreck, as it were, then indeed the philosophies of Aristotle and Plato, as planks of a lighter and less solid material, were saved among the floods of time.* That of con-

* “ Errors, like straws, upon the surface flow ;

He who would search for pearls must dive below.”—*Dryden*.

In the use of this figure, here and elsewhere, the poetical mind of Bacon seems to lead him somewhat astray : for it is true as often, that things light and unsubstantial are, in course of time, dissipated and lost, while the more weighty remain.

sent itself also deceives men, if they look more narrowly into the case. For that is true consent which takes place by freedom of judgment coming to the same conclusion, (in a matter first explored.) But by far the greatest number of those who have consented in the philosophy of Aristotle have enslaved themselves to him out of pre-judgment and authority of others; which is rather a sequacity and concurrence than a consent.* Moreover, although that had

* "Pedibus ire in sententiam."

The value of Bacon's remarks, upon this and some other general topics, does not so much consist in novelty of opinion as in the importance of the caution, and its particular application to the period in which he wrote; for, in this later age, an undue deference to authority, in matters of science and reasoning, is not to be apprehended, and, in that respect, the human mind may be considered as *hors de page*. A right to decline authority, in matter of opinion, has been early and often asserted. "*Obest plerumque iis qui discere volunt auctoritas eorum qui se docere profitentur. Desinunt enim suum iudicium adhibere; id habent ratum quod ab eo quem probant iudicatum vident. Nec vero probare soleo id quod de Pythagoricis accepinus; quos ferunt, si quid affirmarent in disputando, cum ex iis quæreretur quare ita esset, respondere solitos, IPSE DIXIT. IPSE autem erat Pythagoras: tantum opinio præjudicata poterat, ut etiam sine ratione valeret auctoritas.*"—Cic. De Nat. Deor. B. I. It is somewhat remarkable that Cicero himself, after thus condemning a blind submission, should, in his own philosophical writings, have professedly surrendered his judgment without disguise to the dogmas of one school.—See *Acad. Qu.*

The just limits of human authority are sufficiently obvious; that it is never conclusive to bind the assent of others in any matter which is subjected to their reasoning and judgment; although it must often be received as a material on which the judgment is formed, namely, the evidence of testimony. The

been a true agreement, and widely spread, so little ought consent to be held for a real and solid authority,

decision, even of a fallible teacher, must also be received *ad interim* by the scholar; for the *raison suffisante* of Pythagoras must always be an element of school discipline, to the effect of preventing dispute within that arena; not as a warrant of belief, but as a rule of submission and obedience for a limited period. "An argument from authority to wiser examinations is but a weaker kind of proof, it being but a topical probation, and, as we term it, an inartificial argument, depending upon a naked asseveration; wherein, neither declaring the causes, affections, or adjuncts of what we believe, it carrieth not with it the reasonable inducements of knowledge. And, therefore, *contra negantem principia, Ipse dixit, or Oportet discentem credere*, although Postulates very accommodable unto Junior indoctrinations, yet are their authorities but temporary, and not to be embraced beyond the minority of our intellectuals."—*Brown's Vulgar Errors. Ch. Of Authority.* "The opinion of the world's decay is so generally received, not only among the vulgar, but of the learned, both divines and others, that the very commonness of it makes it current with many without farther examination. They cannot quickly be persuaded, that he who is in reputation for knowledge and wisdom, and whose doctrine is admired in weighty matters, should mistake in points of lesser consequence; and the greatest part of the world is rather led with the names of their masters, and with the reverend respect they bear their persons or memories, than with the soundness and truth of the things they teach. Whiles we are young, our judgment is raw and green; and when we are old, it is forestalled: by which means, it comes often to pass, that "*inter juvenile judicium, et senile præjudicium, veritas corrumpitur.*"—Hakewill's Apology. Oxford and London. 1630. B. I. C. 1.

"The influence of names," according to Paley, "is in exact proportion to the want of knowledge."—*Mor. Philos.*

Bacon has elsewhere remarked, with his usual power of illus-

that it even begets a violent presumption the contrary way. For, of all auguries, that is the worst which is

tration: "Vix datur auctores simul et admirari, et superare. Sed fit, aquarum more, quæ non altius ascendunt quam ex quo descenderunt," &c.—*Inst. Mag. Prefatio*.

It is justly remarked by Locke, in regard to that sequacity and adherence to the opinion of others, which is observed among men daily, and to a great extent, that there are not so many men in error, and entertaining wrong opinions, as is commonly supposed: not that they understand and receive the truth, but that they have no opinion at all upon the matters which are in question. And the remark can scarcely be extended too far. For, undoubtedly, it is a very small proportion of mankind who even attempt to think for themselves in questions of a general nature upon which they pronounce, if the subject is, in the least degree, remote from their individual pursuits, or beneath the surface of common observation. In these latter they may draw right conclusions, or wrong; but in anything else the conclusions are drawn not by them, but for them. Notwithstanding the caution, however, which is necessary against giving undue weight to human authority in matters falling equally within the cognizance of all, it is nevertheless true, that much of the knowledge possessed by every individual, however capable of exercising his own reason, must ultimately be received upon the experience and information of others. For he who, in the pursuit of physical inquiry, should attempt to verify every result by actual repetition of the experiments which have led to some general conclusion in science, and the constitution of some received axiom, would lose himself in a labyrinth without issue. In those subjects, whether physical or moral, which, with a view to personal or social duty, are of chief importance in life, each individual is capable of conducting the reasoning or experiment for himself to the extent that is necessary. But in more abstruse subjects of inquiry, whether of physical or intellectual truth, the discoveries and results, if received at all, must, like the information of the

taken from consent in things intellectual; the divine and political excepted, wherein is right of suffrages.

historian and the traveller, be received by every one to some extent, and by the majority of inquirers altogether, upon the testimony of others, that is to say upon authority.

But it is in moral and political subjects chiefly that the majority are apt to be led by human authority, and ruled by the influence of a name. And it is certain that the importance attached to individual character, whether obtained at first by real merit, or the result of adventitious circumstances, is often productive in the end of much evil. A great name converts the possessor into a measure and standard for others, both of judgment and conduct; superseding, with a great majority, the exercise of individual reason, and formation of individual opinion; so that expediency, if not even truth itself, comes to be regulated by the voice of one man. This, of course, is an *idolum* in the usual and worst sense of the word; and the influence of which is daily manifested in the intercourse of social life, but more especially in political questions and the management of national affairs.

It is scarcely necessary to observe how often this unhappy influence of a name has a similar effect in matters of taste; and that a style of writing, however strained and unnatural, however gaudy and overloaded, or otherwise false, will, under sufficient patronage, not only be excused, but also praised, "and that highly," and have its crowd both of admirers and imitators for no inconsiderable period of time, till displaced by some new claimant of equal power and authority.

The sequacity is the same in wit, or sententious sayings, or opinions on whatever subject. Montaigne is probably not the only person who has made the experiment of repeating as from himself, without producing any impression, a passage of distinguished beauty and power from an author little known; or, by reversing the process, has obtained marked applause by giving an empty jest as the saying of a public favourite. The poetry of

For nothing pleases the many unless it strikes the imagination, or binds the intellect with the ties of common notions ; as was said above. Therefore is that of Phocion excellently transferred from morals to intellectuals ; “ that it is fit men straightway examine themselves wherein they have erred or offended, if the multitude consents and applauds.” This sign, therefore, is one of the most adverse. And thus have we discoursed wherein the signs or indications of truth and sanity in the philosophy and learning now received are naught ; whether they be taken from the sources of these, or from their fruits, or from their progresses, or from the confessions of the authors, or from consent.

LXXVIII. And now we come to the causes of the errors, and of this so long continuance in them through such number of ages : and these are very many, and most powerful ; so that all admiration is at an end, how these things we adduce should have hitherto lurked and escaped the notice of men ; and the wonder only remains, that now at length they could have come into the mind of any mortal, or found a way to any one's thoughts ; which, indeed, (as we conceive

Milton is not relished by the multitude of readers, nor admits of being so ; yet his works have a certain degree of popularity, from this habit of imitation, and a reluctance not to express admiration of what others so highly appreciate. And so it is in many other cases of a similar kind.

it,) is more by a certain felicity than any excelling faculty, and should be held for a birth of time rather than a birth of wit.

First, then, to one who rightly considers the matter, this so long curso of ages falls back to great straits. For out of twenty-five centuries of years, on which the memory and learning of men are for the most part employed, scarcely six centuries can be separated and picked which have been fertile of sciences, or serviceable to their advancement. For there are deserts and wastes not less of times than of regions. And three revolutions only, and periods of learning, can be rightly numbered: one with the Greeks; a second with the Romans; the last with us, that is, the western nations of Europe; and to each of them hardly two centuries of years can deservedly be allotted. The middle ages of the world were not happy in any rich or joyful harvest of knowledge. For there is no reason to make mention either of the Arabians, or of the Schoolmen, who, in those intermediate times, by numerous tractates rather fretted down than added to the weight of science. The first cause, therefore, of so small a proficiencie in knowledge, is, justly and in order, referred to the narrowness of the time propitious to it.

LXXIX. But, in the second place, that cause presents itself, certainly of great moment, every way; namely, that during those ages themselves, in which

the wit and learning of men principally, or even moderately, flourished, natural philosophy obtained the smallest share of human industry. Yet is she nevertheless justly to be held the great mother of science. For all arts and knowledge, torn away from this stock, are polished, it may be, and fashioned to use, but grow not at all. Now, it is manifest that, after the Christian faith had been received, and waxed strong, by far the greatest number of the most surpassing minds betook themselves to theology; and to this matter both the amplest rewards were proposed, and helps of every kind most copiously subministered; and that this study of theology chiefly occupied that third partition, or period of time, with us the occidental Europeans, the more on this account, that nearly at the same time letters equally began to flourish, and controversies about religion to sprout. But in the preceding age, during that second period among the Romans, the chiefest meditations and labours of philosophers were engaged and consumed on the moral philosophy, (which to the heathens was in room of theology.) Besides that, in these times, the highest natures for the most applied themselves to the civil part, because of the magnitudo of the Roman empire, which needed the service of the greatest number. Again, that age in which natural philosophy is seen to have flourished most among the Greeks was a particle of time scarcely of any endurance; since both in the more ancient times, those Seven who were called

Wise, all (beside Thales) applied themselves to moral philosophy and civil learning ; and in the later times, after Socrates had brought down philosophy from the heaven to the earth, moral philosophy still prevailed the most, and averted the regards of men from the natural.

But that very period of time, during which the inquiries into nature have flourished, and been in vogue, is itself, by contradictions and ambition of new opinions, corrupted and rendered unprofitable. Seeing, therefore, that, during these three periods, natural philosophy has endured a greater neglect or interruption, it is no wonder if men have advanced little in the matter, being altogether bent on something else.

LXXX. It is to be added that, among those very men who have laboured in it, natural philosophy has scarcely found, especially in these later times, any altogether disengaged and wholly given to it, unless one shall happen to bring an instance of some monk lucubrating in his cell, or noble in his villa ; but natural philosophy has, in truth, become like a sort of passage and bridge to other matters.

Thus, with amazing contumely, has this great mother of knowledge been thrust down to the offices of a menial, who should wait upon medicine, works, or mathematics ; and, again, should wash the unripe wits of youth, and imbue them as with a sort of first tincture, that they may afterwards more happily and conve-

niently receive some other. Meantime, let not any one look for a great progress of knowledge, (espeially the operativo part,) unless natural philosophy shall have been drawn out to the particular sciences, and again the particular sciences drawn back to natural philosophy. For hence it is that astronomy, optic, music, very many of the mechanical arts, and medicine itself, and (one may wonder more) the moral and civil philosophy, and science of logic, have scarcely any depth of root, but glide merely over a surface and variety of things; because, after these particular knowledges have been distributed and ranged, they are nourished no longer by natural philosophy, which, from the fountains and true contemplations of motions, rays, sounds, texture and figuration of bodies, affections, and intellectual apprehensions, might impart to them new strength and enlargement. There is no wonder, then, if knowledge grows not, being parted from its roots.

LXXXI. Again, another great and powerful cause offers why knowledge makes little proficiencie. And it is this, that a right advance cannot possibly be made in the course when the goal itself is not rightly placed and fixed down. But the true and lawful goal of all learning is no other than that human life be endowed with new inventions and wealth. Now, by far the greatest multitude relishes nothing of this, being plainly merenary and professional, unless it chanees to occur at any time that some artist of greater mettle

and spirit, and ambitious of celebrity, bestows his labour on some new invention, which, for the most part, is with a ruin of his substance. But, among the greater number, so little do men propose to themselves augmenting the mass of knowledge and arts, that, of the mass which is prepared, they take and seek for nothing more than what they may be able to convert into use of profession, or to lucre, or reputation; or the like advantages. Or if any, out of so great a crowd, be a suitor to learning from a true affection, and for its own sake, yet even he shall be found rather to pursue the changes of contemplations and doctrines, than a severe and rigid inquisition of the truth. Again, if any other happen to be a more severe inquisitor of truth, yet even he too shall propose to himself such condition of truth as may satisfy his mind and intellect, in rendering the causes of things which are already known; not that which may attain to new pledges of works, and new light of axioms. Therefore, if the end of knowledge has not hitherto been rightly fixed by any one, it is not strange that an aberration should ensue in things which are subordinate to the end.

LXXXII. But, again, as the end and goal of science have been ill placed by men, so even if these had been rightly placed, yet men have chosen a way for themselves entirely mistaken, and impervious. Which would strike the mind of one duly revolving the mat-

ter with a sort of stupor ; how it should not have engaged the care or heart of any mortal, that a way should be opened up and fenced for the human intellect, rightly ordered and founded from sense itself and experiment ; but that all should be left, either to the darkness of traditions, or the eddy and whirl of arguments, or to the waves and turns of accident, and a rambling and unsettled experience. For let any one, soberly and diligently, advert what kind of way it is which men have been accustomed to use for the search and discovery of any matter. And, first, he will undoubtedly mark the simple and unskilful method of invention which is most familiar to men. And this is no other, than that he who prepares and buckles himself for any discovery, first examines and unfolds whatever has been said about it by others, and then adds his proper meditation ; and with much working of mind solicits, and, as it were, evokes his own spirit to disclose oracles to him ; which thing is altogether without a foundation, and rounds in opinions only.

Or, if some other should call dialectic to the aid of invention, yet it belongs but in name to what is in hand. Since the invention by dialectic is not of principles and capital axioms of which arts consist, but of those only which appear to agree with them. For such as are more curious and importune, and would give it trouble, appealing to it for proofs and disclosures of principles or first axioms, for giving

an assurance and gage, as it were, to whatever art, these dialectic puts off, with some most trite and familiar response.

Remains pure experience ; which, if it happen, is called accident ; if it be sought, experiment. But this kind of experience is nothing else than shooting at rovers, (as they call it,) and mere groping, such as men use in the night, trying every way, if haply they be allowed to fall upon the right road ; whereas it would be much better, and more advised, to wait the day, or to kindle a light, and so to enter on the road. For, contrary to theirs, the true order of experience first kindles the light, then shows the way by the light, beginning with experiments ordered and digested, and the least preposterous or erratic ; and thence educing axioms, and from axioms constituted new experiments again ; for not even the Divine word operated on the mass of things without order.

Let men cease to admire, then, how the course of knowledge is not accomplished, when they have altogether wandered from the way, experiment being utterly left and forsaken, or intricating themselves, and circling in it, (as in a labyrinth ;) whereas a rightly instituted order leads, by an unvarying path, through the thickets of experiment into the open field of axioms.

LXXXIII. But that disease has grown to a strange

height out of a certain opinion or inveterate esteem, though empty and hurtful ; namely, that the majesty of the human mind is lowered, if it be long and much employed in experiments, and particular things subject to sense, and bounded in matter ; especially as such use to be in the search toilsome, in the meditation ignoble, in the relation rugged, in practice illiberal, infinite in number, and trivial by subtlety. So that matters have come to this at last, that the true way is not only forsaken, but even shut up and barred ; experiment being disdained, not left merely, or ill conducted.

LXXXIV. Again, men have been stayed and almost enchanted from a progress in knowledge, by a reverence of antiquity, and the authority of men who are of great account in philosophy, and a consequent consent with them. And of consent we have spoken above.

But, for antiquity, the opinion which men cherish concerning it is altogether negligent,* and scarcely congruous, even to the name. For the old age and grandevity of the world are to be truly counted as antiquity ; which are properly to be ascribed to our times, not to the younger age of the world, such as it

* " Say thou not what is the cause that the former days were better than these? For thou dost not *inquire* wisely concerning this."—Eccles. vii. 10. Such inquiry into the *cause* assumes that the former times *were* better.

was with the ancients. Since that age is, in respect to us, indeed, ancient and greater, but in respect to the world itself was new and lesser. And, in reality, as we look for a greater acquaintance with human affairs, and matureness of judgment, from an old than a young man, on account of experience and the variety and abundance of the things which he has seen, and heard, and considered; just so it is fit, also, that much greater things be expected from our age (if it knew its strength, and would endeavour and apply) than from the old times; as being a more advanced age of the world, and enlarged and accumulate with numberless experiences and observations.*

* "*Falsa est enim atque inepta illa quorundam similitudo, quam multi tanquam acutissimam atque appositissimam excipiunt, nos ad priores collatos esse ut nanos in humeris gigantum; non est ita, nec nos sumus nani, nec illi homines gigantes, sed omnes ejusdem stature, et quidem nos altius eveci eorum beneficio; maneat modo in nobis quod in illis studium, attentio animi, vigilantia, et amor veri; quæ si absint, jam non nani sumus, nec in gigantum humeris sedemus, sed homines justæ magnitudinis humi prostrati.*"—Ludov. Vives. *De corruptis artibus, &c.* Died in 1536.

Although the blind admiration of ancient learning had begun to give way before Bacon wrote, he found it necessary still to enforce his views upon this subject with frequency and earnestness. The illustration, given in this and other passages, was eagerly adopted by other writers of that and the succeeding time, and occurs repeatedly in their works.

"The other pioneer, as I may so call it, which, by secret undermining, makes way for this opinion of the world's decay, is an excessive admiration of antiquity, together with a base and envious conceit of whatsoever this present age affords, or possibly

Neither is it to be accounted for nothing, that through distant navigations and peregrinations, (which,

can afford, in comparison thereof. "*Vetulam præferunt immortalitati.*" Yet if we will speak properly and punctually, *antiquity rather consists in the old age, than infancy or youth of the world.*—*Hakewill's Apol.*, B. i. ch. ii. sec. 5.

"Men that adore times past, consider not that those times were once present; that is, as our own are at this instant, and we ourselves unto those to come, as they unto us at present; as we rely on them, even so will those on us, and magnifie us thereafter, who at present condemn ourselves."—*Vulgy. Errors.*

In his Advancement of Learning, Bacon had expressed the sentiment nearly in the same terms which he has employed in this aphorism. "Antiquity deserveth that reverence, that men should make a stand thereupon, and discover what is the best way; but when the discovery is well taken, then to make progression," [transferring thus to physics what is said by the prophet in things divine,—*Stand ye in the ways and see, and ask for the old paths, where is the good way, and walk therein:*] "And to speak truly, *Antiquitas sæculi juventus mundi*, (the ancient times were the infancy of the world.) These times are the ancient times when the world is ancient, and not those which we account ancient, *ordine retrogrado*, (in a retrograde order,) by a computation backward from ourselves."—B. i.

It appears, at first view, somewhat strange that those ancient nations which, in the fields of intellect and imagination, as in rhetoric and poetry, attained to heights which have seldom been equalled in after times, should in natural philosophy have made a progress comparatively small, and discoveries comparatively few and imperfect. But the difference of the two cases is apparent and great. In the former, every thing depends upon the powers of mind in the individual; and the highest degrees of excellence may be attained in the course of his individual life, through the exercise of his faculties upon those materials which are within the reach of a quick and penetrating mind; namely,

in our times, have become so frequent,) very many things in nature have been laid open and discovered,

the outward appearances of nature, and the condition and fortunes of man, with the varieties of human passions and affections, which are nearly the same in all times. The poet and orator do not derive much additional material or topic from the arcana of nature, that is, from acquaintance with the internal structure and laws of motion in material things, and are not dependent upon such discoveries for success. They derive little from philosophy as a system or theory. And if the poet does seek for material and illustration from science, it is not to the advantage of his compositions. The poetical genius of Lucretius, sublime and powerful though it is, vainly struggles with his subject when he attempts to embody in his work the philosophical and abstract tenets of Epicurus. His true poetry is to be found, not in his exposition of that Cosmogony, but in his digressions from it. And the later muse of Darwin has not been able to convert even botanical philosophy, though of greater promise, into an auxiliary of much or permanent value.

In like manner, what is called wit, or discovery of the relations of thoughts and of terms, their resemblances, differences, and combinations, being altogether a mental process, may, in proportion to the known varieties of things, be as perfect in an early as in a later age; and the more so that the relations, on which wit is exercised, are chiefly of a kind which lie near the surface. In the employment of this inventive faculty, therefore, no reason appears why the ancient should not equal, or, it may be, surpass, the modern writers.

Productions in what are called the Fine Arts resemble, in this respect, those arts mechanical, the perfection of which depends upon address and dexterity of the hand, independent of other instruments, except of simple contrivance; and which latter arts are found accordingly to be carried to the greatest perfection even among rude and unlettered nations, according to the material possessed; and sometimes with the finest results; as in the ma-

by which new light may be cast upon philosophy. Nay, it would be disgraceful to men, if tracts of the

manufactures of India and the Chinese. But the advance of most branches of natural science and philosophy depends, it is evident, not so much upon the force of intellect possessed by individuals, as upon the gradual and continued disclosures which are made of the more inward agencies of nature, and which, though they have all existed previously, are only discovered in succession, and may long pass unobserved, and in a manner unsuspected. "*Omnia sunt, sed tempore absunt.*"

It is allowed, that, even in this natural or physical knowledge, the advances made by the ancients were great; and have only become, or appear to be, inconsiderable, from the much greater advances that have since been made; and it is not to be supposed impossible, that the discoveries in natural philosophy, which have been made by the later and present ages in this boundless field, may, in their turn, pass into comparative insignificance, through those discoveries which are yet to follow.

On this subject, Pascal makes the following observations. He is drawing a line of distinction between the regard justly due to the learning of the ancients, and an undue deference to their authority, as if nothing remained to be added to their discoveries; as if human reason was upon a level with the instinct of animals, which is perfect for its purposes from the first, and continues permanent, not admitting of improvement or accession: "*Il n'en est pas ainsi de l'homme, qui n'est produit que pour l'infinité. Il est dans l'ignorance au premier âge de sa vie; mais il s'instruit sans cesse dans son progrès; car il tire avantage, non seulement de sa propre expérience, mais encore de celle de ses prédécesseurs; parcequ'il garde toujours dans sa mémoire les connoissances qu'il s'est une fois acquises, et que celles des anciens lui sont toujours présentes dans les livres qu'ils en ont laissés. Et comme il conserve ces connoissances, il peut aussi les augmenter facilement; de sorte que les hommes sont aujourd'hui en quelque sorte dans le même état où se trouveroient ces anciens philosophes,*

material globe, that is, of countries, and seas, and stars, were, in our times, immeasurably disclosed and illus-

s'ils pouvoient avoir vieilli jusque à present, en ajoutant aux connoissances qu'ils avoient celles que leurs études auroient pu leur acquérir à la faveur de tant de siècles. De là vient que par une prérogative particulière, non seulement chacun des hommes s'avance de jour en jour dans les sciences, mais que tous les hommes ensemble y font un continuel progrès, à mesure que l'univers vieillit, parceque la même chose arrive dans la succession des hommes que dans les âges différents d'un particulier. De sorte que toute la suite des hommes, pendant le cours de tant de siècles, doit être considérée comme *un même homme* qui subsiste toujours, et qui apprend continuellement : d'où l'on voit avec combien d'injustice nous respectons l'antiquité dans ces philosophes ; car, comme la vieillesse est l'âge le plus distant de l'enfance, qui ne voit que la vieillesse de cet homme universel ne doit pas être cherchée dans les temps proches de sa naissance, mais dans ceux qui en sont les plus éloignés ? Ceux que nous appellons anciens étoient véritablement nouveaux en toutes choses, et formoient l'enfance des hommes proprement ; et comme nous avons joint à leurs connoissances l'expérience des siècles qui les ont suivis, c'est en nous que l'on peut trouver cette antiquité que nous révérons dans les autres. Ils doivent être admirés dans les conséquences qu'ils ont bien tirées du peu de principes qu'ils avoient, et ils doivent être excusés dans celles où ils ont plutôt manqué du bonheur de l'expérience que de la force du raisonnement."—*Pensées de Pascal. Partie 1^{ere}*

The argument which would thus invest the whole human race with individual character, and confer upon this "universal man" the power of adding continually to his previous stores of knowledge by new accessions, can only be received under many limitations. But it is observable, that, in the whole of the article from which these sentences are quoted, "*De l'autorité en matière de Philosophie,*" as well as in other parts of the author's writings, there is much similarity both to the sentiments and language

trated, yet the boundaries of the intellectual globe were confined within the discoveries and straits of the old.

Then, as touching authorities, it is the greatest

of his great predecessor in philosophy, who bequeathed "his name and memory to foreign nations."

Lord Bacon was born in 1560, and died in 1626. The treatise, "De Augmentis," was published in 1623, and again in 1624; and at Leyden in 1652: and was translated into French in 1632. The "Novum Organum" was published in 1620; and was reprinted in 1637: in Holland in 1645, and again in 1650.

The date of Pascal's birth was 1623; and of his death 1662.

Of that favour with which the ancient times are viewed, not only by poets as a topic of art, but often by moralists also, that *laudatio temporis acti*, which the world, in its comparative old age, as well as the individual, is apt to express, some of the natural, if not the chief reasons, are thus assigned by a writer who made the subject a study in all its parts: "So then, as our ordinary wont is to prosecute the virtue we see in others either with fear or envy, and neither of these can take hold upon things anciently done, two of the weightiest motives for the blaming of antiquity seem to be wanting, considering it is now not able to hurt, nor can be liable to the stroke of envy."—*Hakewill: Apologie, &c.*

Akin to this, though arising from a different state of mind, is the tendency to overrate in affection what has passed from our possession; more especially if not duly valued in the possession: a state of mind alluded to in various aspects by the poet of nature, to whom all her springs were open.

"For it so falls out

That what we have we prize not to the worth,
Whiles we enjoy it; but being lacked and lost,
Why then we rack the value."—*Much Ado.*

"What our contempts do often hurl from us,
We wish it ours again."—*Anth. and Cleop.*

pusillanimity to defer infinitely to authors, and yet from time, the author of these, and so of all authority, to withhold his due. For truth is rightly said to be the daughter of time, not of authority. Thus it is no wonder if these spells of antiquity, authority, and consent, have so tied the faculties of men, that (like those maleficate and bewitched) they may not hold converse with things themselves.

LXXXV. Nor is it only the admiration of antiquity, and authority, and agreement, which has constrained the industry of men to rest in what has been already discovered, but an admiration also of the works themselves which have already been furnished in abundance to mankind. For if any shall bring under his review the variety of things, and that most beautiful apparatus which by the mechanic arts has been collected, and introduced for man's use and adornment, he will certainly incline coming over to an admiration rather of human wealth than to a sense of its poverty; not at all adverting, that the earliest observations of man, and works of nature, (which are like the soul and first motive to all that variety,) are neither many, nor drawn from any depth; all the rest having relation only to men's perseverance, and the subtile and ordered motion of the hand or of instruments. Thus (for an example) the making of clocks, and other horologies, is truly a subtile and accurate thing, such, namely, as in its

wheels appears to copy the celestials, in its successive and regulated movement the pulse of animals ; which thing yet wholly depends on one or another axiom of nature.

And, again, if one contemplates that subtilty which belongs to the liberal arts, or should even look to that which regards the preparation of natural bodies by the mechanic arts, and other such ; as the discovery of the celestial motions in astronomy ; of concords in music ; of the alphabet letters in grammar, (which even yet are not used in the kingdom of the Chinese ;) or again, in meehaucals, of the works of Bacchus and Ceres, that is, the preparation of wine and beer, the making of breads, or even the delicacies of the table, and distillations, and the like ; if he also considers with himself, and turns in his mind, through what revolutions of times these things have been advanced to the culture in which we now have them, (for these all are ancient except distillations ;) and (as already noted of horologies) how little they hold of observations and axioms of nature, and how easily, and as it were by occasions presented, and concurrent observations, these might be discovered ; he will (I say) readily throw off all wonder, and rather compassionate the human condition, that for so many ages there should have been such a penury and barrenness of things and inventions. And yet these very inventions, of which we now made mention, were ancients than philosophy and the intellectual arts ; so much, (if

the truth must be spoken,) that, when these reasoning and dogmatical learnings came in, the invention of useful works ended.

Or if any one should turn from the workshops to the libraries, and hold in admiration the immense variety which we see of books ; when he has examined, and looked more into the matters and contents of the books themselves, he will assuredly be filled with an opposite amazement : and after he shall have seen how endless are the repetitions, and that men act and speak still the same things, he will pass from admiration of the variety to astonishment at the indigence and paucity of those things which have hitherto detained and occupied the intellects of men.

Or, if one shall let down his mind to the contemplation of what things are esteemed rather curious than sound, and shall look more inwardly to the works of the alchemists or magicians, he will doubt perhaps whether they are more deserving of laughter or of tears. For the alchemist nurses an eternal hope, and, when the affair succeeds not, impeaches rather his own mistakes, revolving in self-accusation how he has either not sufficiently understood the terms of the art, or of the authors, and therefore applies his mind to traditions and auricular whispers ; or that he has tripped something in scruples and moments of his practice, and therefore repeats his experiments without end ; and meanwhile, as among the dies of experiment he lights upon some, either new in their very feature, or

for some usefulness not to be slighted, with such pledges he feeds his mind, and these he most upholds and celebrates; the rest he keeps alive by hope. And yet it is not to be denied that the alchemists have discovered not a few things, and endowed men with profitable inventions. However, that fable squares not ill with them, of the old man who left to his sons gold buried under ground in his vineyard, (but pretending ignorance of the spot;) wherefore they diligently applied themselves in digging the vineyard, and no gold indeed was found, but the vintage was made richer by the culture.

But the cultivators of natural magic, who rid all by sympathies and antipathies of things, have, through idle and most supine conjectures, affixed to things wonderful virtues and operations; and if they have, at any time, exhibited works, they are such as suit to admiration and novelty, not to fruit and usefulness.*

* And it is not the vulgar alone who have given credit to such things, but the edneated and learned also. "Souls that go out of their bodies with affection to those objects they leave behind them, do retain still, even in their separation, a bias and a languishing towards them, which is the reason why such terrene souls appear oftenest in cemeteries and charnel-houses. And to this cause, peradventure, may be reduced the strange effect, *which is frequently seen in England*, when at the approach of the murderer, the slain body suddenly bleedeth afresh," &c.—*Sir Ken. Digby*. Let this and other such passages be compared with the nobler philosophy of a greater mind.

"For murder, though it have no tongue, can speak
With most miraculous organ."

Again, in the superstitious magic (if we must speak even of this) it is to be specially adverted, that the

“ Augurs, and *understood relations* have
By magpies, eoughs, and rooks, brought forth
The seeretst man of blood.”

Coincidence is at all times apt to suggest the supposition of relative cause and effect, or other natural *connection*. Hence such proverbial sayings, as, Wines work best when vines are in the flower; and many others.

Hales, writing in 1630 of the pretended cure by the Weapon Salve, a fallacy which might either be classed with magical sympathies, or with false inductions by simple enumeration, says well; “ It is hard so to make trial of any conclusion, at least of many, by reason of diverse *concurrences of many particulars*, which are seen in most experiments; amongst which *concurrents* it is a hard matter to discover what it is that *works the effect*. And often times that falls out in nature which befel the poet,

Hos ego versiculos feci, tulit alter honores.

A better instance than this cannot be found than this very ease which is now in handling. A man is wounded, the weapon taken, and a wonder-working salve laid to it. In the meanwhile, the wounded person is commanded to use *abstinence* as much as may be, and to keep the wound *clean*; whilst he thus doth, he heals; and the Weapon Salve bears the bell away; whereas it is most certain,” &c.—“ Now, whereas it is pleaded that for further experience’ sake it hath been tried; the salve being thus applied, the party grieved hath been at ease; but immediately upon the *removal of the salve* the party hath fallen into *torment and pain*; who sees not that this only remains to be said to make the tale good? For naturally a man would look to this part of the story, to hold up the couples, as King James was wont to say.”—*Letter to an honourable person concerning the Weapon Salve*. Eton, 1630. *Hale’s Miscellanies*. This letter, as well as other parts of his “ Remains,” affords throughout sufficient evidence of the author’s

subjects are of some fixed and determined sort only, in which the curious and superstitious arts, through-

penetrating judgment struggling with the scholastic fetters; and it is interesting as connected with the doctrines of Bacon and the philosophy of Induction.

Under this class of fallacies is to be ranked the superstitious belief in charms and amulets, and the communication of secret influences; which formed part of the popular creed. The detection of these and other errors of the kind occupied the labours of Brown, and other learned writers of the same period. And though many of the gross mistakes in natural history, and deceptions practised on the imaginations of the ignorant, which their works expose, may now seem too gross to have merited a serious refutation, it is to be recollected that they wrote for an age in which these false notions were prevalent. It may well be questioned, indeed, if the period is even yet past for the belief in natural magic, and occult sympathies, with their pretended influences; and whether Chaucer's Doctour of Phisike does not still practise,—

“Who kept his patients a ful gret del
In houres by his magike natural.”—*Prol.*

Fantastic doctrines and theories of this description reappear from time to time, being alternately forgotten and revived. Such, among others, is that which has been designated *animal magnetism*; a name not very happily contrived, except for its appropriate mystery.

With respect to the fallacious theories and superstitious notions condemned in this and the two following aphorisms, and the general belief in them, Burton, after describing among the natural signs of melancholy those taken from astrology, metoposcopy, and chiromancy, observes thus: “But I am over tedious in these toys, which (howsoever, in some men's too severe answers, they may be held absurd and ridiculous) I am the bolder to insert, as not borrowed from circumforanian rogues and Gypsies, but out of the

out all nations and ages and even religions, have exercised any influence or delusion. Let these, accordingly, be dismissed. Meantime, it is nothing strange if opinion of plenty has been a reason of scarceness.

LXXXVI. Farther, that wonder with which men regard theories and arts, in itself simple enough and nearly childish, has been yet more increased through

writings of worthy philosophers and physicians, yet living some of them, and religious professors in famous universities, who are able to patronize that which they have said, and vindicate themselves from all cavillers and ignorant persons."—*Anat. of Mel.* Part i. sec. 2, § 5. Printed in 1621. That he did not himself consider the horoscope to be an unmeaning trifle, may be inferred from the calculation which he made of his own nativity, with prediction of the day of his death; and which was represented on his monument. Burton was born in 1576, and died in 1639.

As to the *efficacy* of charms and amulets in preserving health, or restoring from disease, the test, it is well known, will be found always in the degree of *reliance* which is placed in them. Some traces of the mind's natural captivity to these curiosities may be found even in the writings of Bacon, when he applies himself to practical physics: as in his *Natural History*, and his *Medical Remains*. In rude times, the superstitious use of empirical remedies in medicine may often prove beneficial; for, along with the pretended charm, is frequently conveyed some true and useful ingredient or concomitant; and the ignorant are easily prevailed with to put their trust in a cure having something of mystery, who would despise or neglect to use the true ingredient if not thus accompanied. It requires an advance in knowledge to understand and value what is *simple*. And this is true, not in one department, but in all; in moral character, in taste, in everything.

the cunning and artifice of those who have handled and delivered the sciences. For they propose them with that ambition and affectation, and produce them to men's eyes expressed after such fashion, and in a manner staged, as if they were in all their parts complete, and brought to a consummation. For, if you look at their method and partitions, they seem quite to embrace and conclude every thing which can fall under that subject. And though these parts be insufficiently filled, and a sort of husks or empty shells, yet to the vulgar apprehension they carry with them the countenance and proportions of an entire science.

But the first and earliest inquirers after truth, with a better assurance and issue, were accustomed to throw that knowledge which they minded to gather from the contemplations of things, and store up for use, into *aphorisms* or short sentences, and these scattered and not bound up in a method; nor did they affect or profess to embrace an universal art. As the matter is now carried, however, it is no wonder if men do not seek farther in things which are delivered as perfect, and in all their parts long absolute and complete.

LXXXVII. Besides, the old have had a great access of estimation and credit, by the vanity and lightness of those who have advanced the new, particularly in the active and operative part of natural philosophy. For there have not been wanting fan-

tastical and vain-talkers who, partly out of credulity, partly imposture, have loaded the human kind with promises ; holding out to frequent view and expectation the prolongation of life, the retardation of age, relief of pains, repair of natural defects, deceptions of the senses, ligations and incitations of the affections, illuminations and exaltations of the intellectual powers, transmutations of substances, with roborations and multiplications of motions, *ad libitum*, impressions and alterations of the air, deducements and procurements of celestial influences, divinations of things future, representments of the remoto, revelations of the occult, and very many other such. But as to those bountiful givers, he will not much have erred who shall have made this sort of judgment ; namely, that there is the same difference, in the doctrines of philosophy, between the vanities of these men and the true arts, as there is in the relations of history, between the deeds of Julius Cæsar or Alexander the Great, and the exploits of Amadis of Gaul or Arthur of Britain. For those most illustrious commanders are found, in truth, to have performed greater things than these shadowy heroes are even feigned to have done ; but in the methods and roads, indeed, of real action, not at all in the fabled and prodigious.* Nor

* The comparison admits of being carried farther. For there are few individuals of the human race, if any, the narrative of whose lives, if given faithfully, and to the letter, through their events and changes, would not present a picture more remarkable

yet is it just, that we therefore derogate from the faith of true story, because it may be wounded at times and violated by fable. But, in the meanwhile, it is nothing marvellous if a great prejudice be done to propositions that are new, (particularly with mention of works,) by those impostors who have tried such things; since the excess of this vanity, and the disdain of it, have even now destroyed all bravery in attempts of this kind.*

than those which fill either the pages of the romancer, or of the national historian. It is thus in the moral as in the physical world; that nature is more subtle than intellect and art, and more fruitful of fine issues.

* It is certain that influences such as those referred to in this aphorism, however much the results may be held in suspicion, will not cease to operate in some form, even in times the most advanced in knowledge, and the least shackled by superstition. For there is a disputed territory, and "debateable ground," in man's intellectual globe, as there is in the material and visible upon which he is placed. In the latter, too, there may be an agreement finally as to the respective boundaries; but in the former not; for the relative operations and mutual action of body and mind do not admit of being accurately fixed; they are beyond the reach of sense, and the influences are too subtle to be ascertained with exactness even by the intellect.

In the cases referred to, in this and the two preceding aphorisms, the question at once arises, as in other cases of real or supposed discovery in physics, what is the amount of proof; whether the experiments have been conducted upon a scale sufficiently extensive, and with sufficient repetitions and variations of mode; and also, whether the inquiry has been conducted on the principles of a just induction; not by enumeration merely of cases where the result has seemed favourable to a theory, but, also, by exclusion

LXXXVIII. But far greater loss and damage has occurred to learning from pusillanimity, and the in-

and rejection of negative cases, and cases contradictory. By these means only will it be discovered what is to be received as fact ascertained, and what has been added to fill up the outline of a theory. Let the test, therefore, be applied, which Bacon gives in a following passage of this book,—Aphorism CV. : “Inductio quæ procedit per enumerationem simplicem res puerilis est, et precario concludit, et periculo exponitur ab instantia contradictoria, et plerumque secundum pauciora quam par est, et ex his tantummodo quæ præsto sunt, pronunciat. At inductio, quæ ad inventionem et demonstrationem scientiarum et artium erit utilis, naturam separare debet, per rejectiones et exclusiones debitas; ac deinde *post negativas tot quot sufficiunt*, super affirmativas concludere.” To the same effect is a preceding Aphorism, LXIX.

Let that other test also be applied, namely, that those things which are real and founded in nature grow and increase; but those which exist in supposition and fancy have no such regular increase or improvement; but have occurred at considerable intervals of time only, being alternately forgotten and revived; and assume nearly the same forms successively, with little change or augmentation.*

“Scientiæ quæ in natura fundatæ sunt, crescunt et augentur; quæ autem in opinione, variantur, non augentur.”—*Aph. LXXIV.*

“Omnes enim artes et scientiæ, ab hac stirpe” (*Nature Sc.*) “revulsæ, poliuntur fortasse, et in usum effinguntur; sed nil admodum crescunt.”—*Aph. LXXIX.*

But, above all, let the trial be made in every case; not impeded by prejudice, or suspected through ignorance. Theory

* In this class of theories there is seldom much novelty. Even the discoveries of Mesmer, for example, reported by the Medical Board of Paris in 1784, and the still greater pretensions of some of his followers or imitators, were not wanting, according to Butler, among the hidden treasures of an earlier school of philosophy:—

“For Rosicrucian Virtuosos
Could see with ears, and hear by noses.”—*Sir Hud.*

significance and slightness of the tasks which human industry has proposed to itself. And yet (which is the worst) this pusillanimity comes forward not without arrogance and pride.

For, in the first place, we find that fraud or trick become familiar now in all the arts, that the authors, in whatever art, turn the weakness of their art to the traducement of nature ; and what their art does not reach, this, by the same art, they pronounce to be in nature impossible. Nor certainly can art be condemned if herself be judge. Even the philosophy, which is now in hand, brings up in its lap certain resolves or maxims, by which (if the case is narrowly examined) they will have men be completely persuaded that from art, or work of man, nothing arduous or imperative, and sufficient over nature, ought to be looked for ; as was said above concerning heterogeneous nature of heat in the sun and fire, and of mixtion. Which axioms, if they be scanned more accurately, tend wholly to a malign circumscription of human power, and a studied and contrived desperation, which not only confounds the prognostics of hope, but, moreover, cuts all the spurs and sinews of endeavour, and flings away the dies of experience itself ; while they are solicitous about this one thing

often misleads, and prejudice must still oftener oppose ; but there is no instance in time past, or may be in times to come, when simple unprejudiced experiment, however often it may disappoint, has even once led to error, in its own character of *experiment*.

only, that their art should be counted perfect; concerning themselves for a most vain and most beggarly glory; namely, that whatever may not have been discovered or comprehended heretofore, that should be thought utterly impossible to be either discovered or comprehended in time to come. Or, if any one should attempt applying to realities, and aim at the discovery of some new matter; yet, in general, he will propose and destine for himself to search and turn over some one invention, (and no more;) as the nature of the loadstone, the float and refloat of the sea, the scheme of the heavens, and the like; which appear to have some secrecy, and have hitherto been treated not very happily. Whereas it is height of ignorance to explore the nature of anything in the thing itself; since the same nature, which, in some things, appears to be latent and occult, is in others manifest, and in a manner palpable; and yet in those moves admiration, in these not even attention. As it fares in the nature of consistence; which in wood or stone has no remark, and is passed under the appellation of solid, nor is there more question about the shunning a separation or solution of continuity; but in bubbles of water the same appears a subtle and shrewd thing; which bubbles throw themselves into certain pellicles, curiously expressed to the form of a hemisphere, so as for a moment of time to escape solution of continuity.

And it is undoubted that those very things, which are held for secret, have in others a manifest and

common nature, which never will disclose itself if the experiments or contemplations of men dwell only on those things themselves. In mechanical works, indeed, these are generally and vulgarly held for new inventions; if, for example, one shall more skilfully polish things before discovered, or adorn them more elegantly, or at once unite and compound them, or couple them more conveniently with use, or exhibit some work in a greater, or even in a lesser, bulk or volume, than wont to be; and the like.

Therefore it is no way strange, if noble inventions, and worthy of the human kind, be not discovered and drawn forth to the light, while men have been content with so small and puerile tasks, and delighted by them; nay, and think too, that in these they have followed or overtaken some great thing.*

LXXXIX. Nor is it to be overlooked, that natural philosophy has, in all ages, gotten a troublesome and difficult adversary; superstition, namely, and a blind

* Such labours, however, whether in chemistry or other subjects, although employed upon particular parts of learning specially, or even exclusively, are not certainly to be condemned in so far as they go, but applauded: for division of labour is here, as in other cases, of advantage. But the scope of inquiry, even as to the particular subject, may be too much confined, and thereby the conclusions imperfect; or, which is more injurious, a system may be constructed upon these partial results, of more enlarged and general application than is justified by the premises. This is not a faulty induction, but a premature conclusion.

and immoderate zeal of religion. For it is to be seen among the Greeks, that they who first proposed, to the yet unaccustomed ears of men, the natural causes of thunder and storms, were convicted on that count of impiety to their gods. Neither were those much better allowed by some of the ancient fathers of the Christian religion, who, from most certain demonstrations, (which no one of a sound mind to-day would contradict,) set it down that the earth is round, thereby holding the existenee of *Antipodes*.

Yea, as things now are, discourses concerning nature are in a harder circumstance, and a greater peril, through the conclusions and methods of the scholastic theologues; who having (to the extent of their power) brought down theology, and modelled it to the fashion of an art, have yet farther succeeded in mixing the pugnacious and thorny philosophy of Aristotle, more than was fitting, with the body of religion.

The same way, too, (though in a different manner,) look the glosses of those who have not feared to deduce and confirm the truth of the Christian religion from principles and authorities of the philosophers; celebrating, as they were lawful, with much pomp and solemnity, the nuptials of faith and sense, and with grateful diversity of things cajoling the minds of men; but, meanwhile, in ill-matched condition mingling the human with the divine. But in such mixtures, of theology with philosophy, those things only are comprehended which are presently received in

philosophy ; while the new, though changed to the better, are only not removed and exterminated.

In fine, through the unskilfulness of certain theologians, you shall find the avenue to some even amended philosophy well nigh blocked up. Certain of them, with more simplicity it may be, entertain a scruple lest haply the deeper searches into nature should penetrate beyond the allowed limit of sobriety ; converting and wrongfully twisting those things which, concerning divine mysteries, are spoken in the sacred Scripture against them that pry in the divine secrets, to the hidden things of nature, which by no prohibition are forbid. Others, with more cunning, cast about and turn it in their mind, that if the *media* be unknown, single points may, with more ease, be referred to the divine hand and rod, (which, as they apprehend, makes most for religion ;) which is nothing else than desiring *to please God by a lie*. Others dread the example, lest stirrings and changes regarding philosophy incur and terminate on religion. Others, in fine, seem to be concerned, lest, in the search of nature, anything might be found which (among the unlearned especially) should subvert, or at least shake and loosen religion. But to us these two fears, last mentioned, seem to savour altogether of natural wisdom ; as if, in the recesses of their mind and secret cogitations, men were distrustful and doubting of the stability of religion, and the dominion of faith over sense ; and, therefore, dreaded a danger to impend

over them from an inquiry of truth in things natural. But to one truly considering the case, natural philosophy, after the word of God, is the most certain medicine for superstition, and the same the most approved aliment of faith. Therefore is she deservedly given to religion as her faithfulest handmaid ; since one declares the will, and the other the power of God. And he verily erred not, who said, *Ye err, not knowing the Scriptures and the power of God* ; commixing thus, and coupling in one knot, information of his will and meditation on his power. In the meanwhile, it is less to be wondered if the growth of natural philosophy has been kept down, when religion, whose power is greatest over the minds of men, has, through the unskilfulness and the improvident zeal of some, gone over and been wrested to the other part.

XC. Again, in the habits and institutes of the schools, academies, colleges, and other such assemblies, which are designed for the seats of learned men and culture of erudition, all things are found adverse to the progress of knowledge. For the lections and exercises are so ordered, that any thing other than the accustomed may not easily come into the mind of any one to think or contemplate. Or if some one or another should, perhaps, have courage to exercise a freedom of judgment, he may charge himself singly with the work, but shall take no benefit from

concert of others. Or, if he should bear up under this also, yet he shall experience such his industry and magnanimity to be no light impediment to him in the achieving of his fortune. For, in places of this kind, the studies of men are shut up in the writings of certain authors, as it were into prisons; from which if any one dissent, he is straightway laid hold upon as a turbulent fellow, and a sower of sedition.* Yet certainly the difference is wide between civil concern and the arts; for the peril from new motion, and from new light, is not the same. And in points of civil estate a change, even for amendment, is suspect on account of the disturbance; since these rest upon authority, consent, reputation, and opinion, not upon demonstration. But in arts and science, as in mines and quarries, all should sound and ring with the noise of new works and farther improvements. And, according to right reason, so it is; yet it is not so practised; but this administration and polity of learning, which we spoke of, has used to press hardly upon the growth of science. †

* It is remarkable that the President Rollin, in his instructions on *Belles Lettres*, recommends the study of Locke, and avowedly borrows much from his writings. Let this opinion and testimony of a foreign authority, of a different faith, and living under a despotism, be contrasted with the proceedings against the philosopher in his own country, and that kind of repute in which his works were held, and still are, in his own Protestant university.

† It was not a satire merely in Swift, but the expression of a reasonable truth, that he dedicated his *Tale* to Prince Posterity.

XCI. Moreover, grant this ill opinion to cease ; yet it is enough for hindering the increase of learning,

as the most impartial critic ;* for in other parts of learning, as well as in natural philosophy, the reputation of the great inventors has often been a posthumous reputation only.

Instances of this tardy repute are numerous, and well known : whether in the discoveries of science and useful inventions of art, or in the works of the poet, and some other classes of literature, where the compositions have, in a succeeding time, attained not only a permanence, but, in some cases, even a popularity above all others. More especially has this happened where the discoveries and works have been the noblest and most important, and the genius which produced them was of the highest order. Nor is it difficult, in these latter cases, to assign the reason. For such men, and their productions, either surpassed the comprehension of their age, or encountered its prejudices, or were displeasing to powerful individuals, or powerful bodies, and through that influence depressed for a time, or undervalued. But it is for a time only, either in science or in literature. Injustice in the first is redressed through more learning and additional evidence. Injustice in the latter is redressed by appeal to the general feeling and taste of mankind.

“ En vain contre le Cid un ministre se ligue :

‘ Tout Paris pour Chimene a les yeux de Rodrigue. ’—*Boileau*.

The same critic has well observed, that although cabal and envy may, for a time, prevent the success of a new work of genius, their efforts cannot long be effectual ; and it happens to works of this description, *as it does to a piece of wood which we plunge under water : it remains at the bottom while it is held there ; but as soon as the hand is fatigued, and lets it go, it rises to the surface.*

In some departments, such as mechanical works, and certain of the liberal arts, as music and painting, where obstacles of this

* This observation is, of course, altogether independent of the character and tendency of the work itself.

that such endeavours and applications are without reward. For the improvement and the rewards of learning rest not with the same men. Since the enlargement of knowledge comes, indeed, from great wits, but the purchases and honours of it are with the common sort, or with the rulers, who (very rarely excepted) are scarce moderately learned. Nay more, proficiencies of this kind are disappointed, not only of the rewards and good deeds of men, but even of the popular applause itself. For they are above the catch of the greatest part of men, and easily overwhelmed and put out by the gusts of vulgar opinions. Therefore it is no way surprising if that should not have turned out prosperously, which was not in repute.*

nature can scarcely arise, the inventions are accordingly received without difficulty, and more justly appreciated from the first.

In this aphorism, penned two hundred years ago, is sufficient matter for reflection at the present day, in regard to seats of learning, the most notable in the country of the author; and in some of which it may yet be said, as it was by Hales at the same period, that their god is Aristotle; affording a remarkable example of the imbecility of reason in human affairs, when contending with interests nominally subordinate.

* The ruling authorities of Great Britain may well be included in the number of those on whom the reproach is cast; who, in their absorbing zeal for commercial and economical laws, have so unwisely neglected other important interests. The agriculturist, the merchant, and the trader, have engrossed the attention of the government and legislature, almost to the entire exclusion of what relates to the moral culture of the people at large; and the sums granted by the British parliament, whether for national education, or for the rewards of learning, have been at the lowest figures in the scale of the national expenditure.

XCII. But by far the greatest obstacle to the progress of knowledge, and the undertaking new tasks and provinces therein, is found in the desperation of men, and the supposition of impossibility. For prudent and severe men use downrightly to distrust in things of the kind; pondering with themselves the obscurity of nature, the shortness of life, the fallacies of the senses, the infirmity of reason, difficulties of experiment, and the like. Accordingly, they conceive that, in the revolutions of times and ages of the world, there are certain flows and ebbs of learning, at some times growing and flourishing, at others declining and flat; so as still, having reached to some certain degree and state, it may go no farther.

Hence, if one should believe or warrant greater things, they consider it as coming of some weak and crude mind; and that such endeavours have prosperous beginnings indeed, but uneasy advances and perplexed endings. And when such are the notions which readily light upon grave men, and those of excellent judgment, it is needful, truly, to beware lest, smit with the love of what is every way good and beautiful, we slacken or abate the severity of our judgment; and it is to be anxiously inquired what light there is of hope, and from what quarter it breaks; and, the more feeble glimmerings of hope being rejected, those which appear to have greater strength and permanency are by all means to be examined and well weighed. Nay, farther, civil pru-

dence is to be called in and admitted to the counsel, which distrusts by rule, and in human affairs augurs to the worse. Therefore, we are now to speak also concerning hope; especially since we are not promisers, neither intend violence, or contrive snares for the judgments of men, but would lead them by the hand and voluntarily. And although it will be the most powerful remedy of all for the rooting of hope, when we bring men to particulars, especially those digested and ordered in our tables of invention, (which partly belong to the second, but much more to the fourth part of our instauration,) since this, indeed, is not merely hope, but, as it were, the thing itself; yet, that all may be accomplished more smoothly and benignly, we are to go on with our institute for preparation of the minds of men; and of which preparation this unfolding of hope is no inconsiderable part. For without it other things go rather to the saddening of men, (that is to say, that they should have a worse and lower opinion than they have at present of the things now in use, and more feel and be acquainted with the unhappiness of their condition,) than to the inducing of any alacrity, or the whetting of industry in experiment. Therefore are our conjectures, giving ground of hope in this matter, to be opened up, and proposed, as Columbus did, before that his amazing navigation of the Atlantic sea; when he rendered his reasons why himself confided that new lands and continents, besides those formerly known, might be dis-

covered ; which reasons, though at first rejected, yet were afterwards approved by experiment, and were the causes and beginnings of the greatest things.

XCIII. But the spring and rise is to be taken from God ; meaning, that the present work, on account of the excellent nature of the good that is in it, manifestly is from God, who is the author of good, and the father of lights. But in the divine operations every the most slender beginnings assuredly draw to issue. And what is said concerning spirituals, *that the kingdom of God comes not with observation*, is also found to have place in every greater work of Divine Providence ; that all passes softly, without din or bustle, and the matter is evidently done before men think or advert that it is doing. Nor is the prophecy of Daniel to be forgotten, touching the last times of the world ; *many shall run to and fro, and knowledge shall be increased* ; manifestly denoting and signifying it a part of fate, that is, of Providence, that the thorough passage of the world, (which by so many distant navigations plainly seems to be fulfilled or to be now happening,) and the augmentation of all science, should fall upon the same age.

XCIV. Follows the greatest reason of all for begetting hope ; namely, from the mistakes of time past and of the ways yet tried. For the reprehension is excellent which, concerning a civil estate not wisely

administered, one has embraced in these words: *
That which having regard to the past is the worst point, looking to the future ought to appear the best. For if you had rightly ordered all things pertaining to your office and duty, and still your affairs were not in a better condition, there had been left no hope of their recovery and amendment. But since the state of your affairs is disordered, not through the real quality of the affairs, but through your misgovernment, there is hope that, these mistakes being left or corrected, the affairs may be greatly altered to the better. In like manner, if, during so long a course of years, men had kept the true roads of inquiry and culture of knowledge, nor yet been able to make a farther advance, bold, doubtless, and rash would be the opinion that the matter could be carried to a greater proficiencie. But if the way itself has been mistaken, and the travail of men been wasted in things where it was least fitting, it follows that the difficulty has grown not out of the things themselves, (for these are not in our command,) but out of the human mind, and its exercise and application, which thing admits help and cure. Therefore, it were best to propose those mistakes themselves; for, as many as the hindrances have been by errors in time past, so many are the arguments of hope for the

* Demosthenes, in his Orations to the Athenians. See, in connection with this aphorism, the author's fragment, entitled, "Colours of Good and Evil," No. 8. "Quod quis culpa sua contraxit, majus malum." &c.

future. And these, though not wholly untouched in what was said before, yet it has seemed good also here to present them shortly again in naked and simple terms.

XCV. They, who have handled the sciences, have been either empirics or dogmatists. The empirics, after the manner of the pismiro, amass merely and consume; the reasoners, after the nature of the spider, spin out their webs from themselves; but the method of the bee is between; who elicits her material from flowers of the garden and field, but yet alters and digests it by her own powers. And not unlike is the true work and process of philosophy; which trusts not singly or principally to the force of the mind, nor yet stores the material afforded from natural history, and mechanical experiments, whole in the memory, but converted and wrought by the intellect. Therefore, from a closer and more inviolate league (than has yet been made) of these faculties (the experimental, namely and rational) are good hopes to be conceived.

XCVI. Natural philosophy is not hitherto found pure, but infected and corrupt: in the school of Aristotle, by logic; in the school of Plato, by natural theology; in the second school of Plato, Proclus, and others, by mathematics; which ought to terminate natural philosophy, not to generate or procreate it.

But from natural philosophy, sincere and unmixed, are better things to be hoped.

XCVII. No one has been yet found of so constant and severe a mind, as to have determined and taxed himself utterly to abolish theories and common notions, and to apply his intellect, altogether smoothed and even, to particulars anew.* Accordingly, that

* To what extent this erasure from the mind's tablet can be accomplished, will always remain a doubt. Of the fallacies described by the author under different classes of idols, those ranked as *Idola Tribus*, and *Idola Fori*, are the most deep-rooted and difficult to remove; for, with regard to the others, namely, the influence of individual taste or predilection, and the admiration of some particular theory, as the causes of error; these, by repeated efforts of the mind, may, with success, be opposed and finally extirpated. With the fallacies which are seated in the human nature itself as common to the race, or those which are connected with language as the medium of interchange in the communication of thought, and which lurk in its generality, or its ambiguities, this end is scarcely to be attained.

1st, Fallacies of the tribe, or race of men generally, are, of course, both extensive and firmly seated; and they qualify most of our judgments, as well as modify our pursuits, and influence our will and affections. As selfishness misleads the individual, this fallacy misleads the human kind. For man is disposed to view all things in the relation which they bear to himself exclusively, and to measure them accordingly; constituting himself the centre towards which, if not from which, all lines are to be drawn. And this tendency operates in numberless ways to warp his judgment. Thus, among many others, when he surveys the world of nature around him, and reflects on the immense and varied productions of all kinds which are every where diffused,

human reasoning which we have, is a kind of medley and unsorted collection, from much trust, and much

and renewed in constant succession, with the multitude of creatures peopling the earth, and the waters, and the air; and how many of all these productions spring up and perish in regions far removed from his habitations, and of which he can neither count the sun, nor, in many cases, divine the use; he is inclined to regard this profuse store, and of which so great a part will ever be "unseen" and "unfathomed" by him, as a waste somehow of creative power, and a prodigality which might have been spared. Thus, too, when he contemplates the other living creatures which walk the earth and come within his observation, he is inclined to measure their characters and dispositions, as well as their uses and importance, with a reference to himself solely, and the degree in which they minister to his wants or pleasures.*

But errors of this class have an influence, more or less, upon all our reasonings and judgments, reaching even to our conception of things divine. Of this, the most remarkable examples are found in the heathen mythology of the most refined nations, equally as in the superstitions of the more barbarous at every period, and in the ascription both of human weakness, and human passions the most depraved, to the objects of their worship. What the Roman philosopher said of Homer, "*humana ad deos transtulit; divina mallem ad nos,*" continued applicable to the whole system upheld in the succeeding ages of polished Greece and Rome. And it is true, that even when light has succeeded darkness, in this great field, and ignorance has been followed by knowledge, the tendency in question is with great difficulty checked; and the influence may still be traced in various ways. For, even now will be found to exist in the minds of persons otherwise well instructed, certain indistinct notions, which must

* Or when he allows to some of the gentler kinds what is akin to his own natural sympathies, and instinctive affections, the concession is qualified by some epithet of wonder:

*Nescio qua mira dulcedine capti
Natorum.*

accident also, and the childish notions which we first imbibed.

be ranked under this class of errors and fallacies. Such is the supposition that some acts or operations are more difficult than others, even to Omnipotence, and require a greater effort or measure of power in the Almighty to accomplish them. And such, in like manner, is the belief, though obscure, that there is a general providence of God, differing, in kind or degree, from that which is particular; a distinction allied to the philosophy of Epicurus, and which even the reasoning of a Roman philosopher could refute: "*Stabit illud quidem—esse deos, et eorum providentia mundum administrari, eosdemque consulere rebus humanis, non solum universis, verum etiam singulis.*"—*Cic. De Divin., L. i.* Such limited and erroneous views have regard to the Divine power; but the same imperfect conceptions are formed of other attributes of the Deity, and which are often squared, or distinguished and divided, and even placed somehow in opposition one to another, according to the measure and imperfect standard of human conception. It is plain, that the judgments referred to are *secundum hominem*, and drawn from a comparison of man's limited powers; and are notions vague also and indeterminate in themselves.

There is, also, in many minds, a lurking notion of Destiny, and of Accident or Chance, as possessing a power or agency, if not independent of, at least unconnected with, the Divine providence and rule in the government of the world. The former errors are from misinterpretation of Scripture: the latter are purely heathen.

It was one of the great objects of Bacon's philosophy to expose the erroneous judgments or *idola* of this class, more especially those arising from a limited survey of the natural world; and to counteract their influence. "*In historia quam requirimus, et animo destinamus, ante omnia videndum est, ut late pateat, et facta sit ad mensuram universi. Neque enim aretandus est mundus ad angustias intellectus, (quod adhuc factum est,) sed expandendus intellectus, et laxandus, ad mundi imaginem recipiendam, qualis invenitur.*"—*Parasceve. Aph. II.*

Whereas if one of ripe age and senses entire, and a mind thoroughly cleared, should apply himself freshly to experiment and particulars, of him were better things to be hoped. And, in this point, we promise to ourselves the fortune of Alexander the Great; nor let any one argue us of vanity before he hears the close of the matter, which tends to the discharge of all vanity. For of Alexander and his exploits, Æschines has spoken thus: *Surely we live not a mortal life, but for this are born, that posterity may narrate and publish prodigies concerning us*; as if he had considered the achievements of Alexander to be something miraculous.

But, in the following ages, Titus Livius better adverted and saw into the case, and of Alexander has said something of this kind: *That his daring was no other than a just contempt of vanities.** And we con-

2d, The difficulty of giving precision to language, so that it shall convey to all those who use it even in the same elements of words, the same notions, and produce exactly the same impressions, may be considered as insurmountable, except within a very limited range. There is also another form, though subordinate and of much less importance, in which written language has an influence in upholding error; namely, in that department of taste and sentiment which is poetical and imaginative. For many fables and untruths are embodied thus, and long preserved, not in vulgar speech and from superstitious notions, but in the style of polite writers, and by authorised usage, which has become familiar. These fables, too, are in many cases pleasing; interwoven with the feelings as well as grateful to the imagination.

* *Eum non aliud quam bene ausum vana contemnere.* Livy, in the passage referred to, (Lib. ix. cap. 17, of his History.) is instituting a comparison between the military character of Alexander

ceive that of us, too, a like judgment is about to be made in future times ; *that we did nothing great, but only made lighter of things that are held great.* However, in the meantime, (as we have already said,) there is no hope but in a *regeneration* of science ; that is to say, that it be raised up by a just method from experiment, and founded again ; which no one (in our opinion) may affirm to have hitherto been done or thought of.

XCVIII. Now the foundations of experience (for to this we are by all means to come down) have, as yet, been either nothing, or exceedingly weak ; nor has a furniture and stock of particulars, competent either by number, or kind, or certainty, for information of the intellect, or sufficient in any way, been hitherto provided and collected. But, on the contrary, learned men (supine truly and careless) have taken up certain rumours of experiment, and, as it were, the reports and airs of it, alike for constituting or strengthening their philosophy ; and have, nevertheless, ascribed to these the weight of lawful testi-

and that of the most distinguished Roman commanders ; and draws the inference, that if his wars had been waged with the armies of Rome instead of the Asiatic, the issue would most probably have been very different. For, among other reasons, he should have found that he had not to do with Darius, over whom, encumbered with a train of women and slaves, amidst purple and gold, and loaded with his furniture of state, Alexander obtained a bloodless victory, and rather captured a booty than conquered a foe ; “*nihil aliud quam bene ausus vana contemere.*”

mony. And as if some kingdom or state should govern its councils and affairs, not from the express letters and relations sent by trust-worthy legates and messengers, but from town-talk and tattle of the streets; altogether such an administration, so far as regards experience, has been introduced into philosophy. We find nothing in natural history sought out by due methods, nothing verified, nothing numbered, nothing weighed, nothing measured. But what is indefinite and vague in the observation, that in the information is traitorous and deceitful. And if to any one these appear strange things to be uttered, and liker an overcharged complaint, seeing that Aristotle himself, such a man, and supported by the means of such a king, completed so accurate a history *of animals*; and some others, with greater industry, (though with less noise and train,) added many things; and others still have written copious histories and narratives touching plants, metals, and fossils; truly, he seems not sufficiently to attend, or clearly to see what is our present scope. For there is one method of the natural history which is prepared on its own account; another of that which is collected for information of the intellect, in order to the building up of philosophy. And these two histories differ, both in other things, and principally in this; that the first of them embraces the variety of natural species, but not the experiments of mechanic arts. For as in matters of civil state, any one's disposition, and

occult sense of mind and affections, are elicited better when he is placed in disturbance than at other times ; in like manner also, the secrets of nature more betray themselves when disquieted through vexations of art, than when they slide on their course. So that good hopes are then, indeed, to be conceived of natural philosophy, after natural history (which is the ground and foundation of it) shall have been better furnished ; but sooner by no means.

XCIX. And again, in that very abundance of mechanical experiments, is discovered the greatest paucity of such as do chiefly advantage and assist towards information of the intellect. For the mechanician, no way solicitous about the inquisition of truth, neither lifts his thought, nor puts forth his hand, to anything but what is subserving to his trade or employment. But then shall there be a good foundation of hope for ulterior advances in knowledge, when a multitude of experiments shall be received and aggregated in natural history, which, by themselves, are not of any profit, but help only for the discovery of causes and axioms ; and which we have been accustomed to call experiments of *light*, as distinct from experiments of *use*. And those have in them a wonderful virtue and quality, which is, that they never deceive or are frustrate. Because being employed for this purpose, not that they should effect some work, but that in something they may reveal its natural cause, in

whatsoever way they fall out they equally satisfy the purpose, seeing that they conclude the question.

C. But not only is a greater store of experiments to be sought and provided, and of another kind too than has yet been done, but also a method altogether different, and an order and process to be introduced for continuance and further advance of experience. For that kind of experiment, without object, and ever incurring into itself, (as before said,) is mere groping, and stupefies rather than informs men. But if experiment should proceed by an assured law, in series and sequence, something better might be hoped for learning.*

CI. But, after a fulness and material of natural history and experiment, such as is needed for the work of the intellect, or philosophical work, should, at length, be in readiness and prepared ; yet the intellect no way suffices to act upon that material of itself, and without a monitor ; no more than one should hope, without books, to retain and master the computation of some journal of accompts. And yet more has been done hitherto, in the matter of discovery, by medita-

* This passage, and others to the same effect, would not justify an inference, that in the opinion of the author, important discoveries may not yet be made by those *aliud agentes* ; but that the latter are precarious, and at long intervals, perhaps, and not under control.

tion than by writing ; nor has experience yet become lettered ; but except by writing no discovery is to be evinced ; and, that coming into use, better things are to be hoped of experience, grown at length to be literate.

CII. Moreover, when such is the number, and, as it were, host of particulars, and that so dispersed and diffuse, as to scatter and confound the intellect, we are not to hope well of skirmishings and light movements, and transcurions of the intellect ; unless by fit and well-disposed, and, as it were, living registers of invention, there be made an array and marshalling of those things which pertain to the particular subject of inquiry, and the mind be applied to the prepared and digested helps of these registers.

CIII. And yet, after a store of particulars rightly and orderly placed, as it were, before the eyes, we are not to pass immediately to the search and discovery of new particulars or works ; or, at least, if we do, we are not therein to stop and rest. For, though we deny not, but, after all the experiments of all arts shall have been gathered and digested, and have come under the knowledge and understanding of any one man,* that even by traduction or transference of the

* The sanguine temperament, as well as elevated views of the author, are conspicuously shown in this and similar sentiments scattered through his writings. For it must be acknowledged,

experiments of one art to others, many new discoveries may be made, profitable towards the human life and condition, through this experience which we call *literate*; yet from this, after all, are less things to be hoped; but more from new light of axioms, drawn by a sure method and rule out of those particulars, and which may again indicate and designate new particulars. For the way lies not in a plain, but is by ascent and descent; ascent first to axioms, descent to works.*

that his love of science has led him, while dictating such passages, to imagine attainments nearly unlimited in knowledge, and power over nature; and to have figured to himself, from the *instruction* of the mind, results much beyond what the analogy even of the greatest discoveries, made since his time, appears to have justified.

* This part of the *Instauratio* was intended by the author for illustration, under the head of *Scala Intellectus*, but of which a small fragment only was prepared, or is preserved. It comes under the fourth part in the distribution of the *Instauratio*.

It is evident that the limited faculties of man forbid the attainment, by any individual, of this universal knowledge of nature, and acquaintance with particular things as here contemplated; and consequently forbid the constitution of axioms and conclusions, which should be the *most general* in any perfect and *absolute* sense. For, however extensive man's acquaintance with nature may become, and however large the stock of his experience may at last be, his knowledge must still be imperfect as long as any thing remains undiscovered, but is within the limit of possible existence, and therefore within the possible range of future discovery. "Longum est iter ad omnia: quæ talia sunt, ut optata magis quam inventa videantur."—*Cic.* And this knowledge must continue not only defective, as admitting of new increase, but

CIV. Nor is it to be suffered that the intellect should bound and fly from particulars to axioms re-

imperfect also and uncertain, as ever subject to rectification. "Here we know in part," is a declaration which, in regard more peculiarly to his knowledge of the physical part of creation, and its laws and agency, will be truly predicated of man through the whole extent of his present state of existence.

It is, therefore, the wise and just doctrine of the author himself, that all useful knowledge of nature is to be sought in those intermediate discoveries and conclusions which lie between the first and single experiences and the highest axioms. And no real limitation or restraint is hereby imposed upon the human intellect, or the progress of its researches; for there may be a continual advance made, without ever reaching those general conclusions, which would be final because universal.

Another limitation which has place within this range of inquiry and the advances in it, otherwise without limit, is from the insufficiency of individual minds to grasp by apprehension, and retain in memory, the ever-growing multitude of facts established by experiment, and the progressive steps of reasoning, by which those intermediate, but more general axioms have been attained, so as to keep up and maintain a permanent conviction of their truth as supported by evidence. For, in so far as this is not, or cannot be done, these axioms or conclusions must, if received, be received on the testimony of others, that is to say, upon authority; an evidence liable to error, and, in matters of science, a faulty and imperfect ground of belief; and as such, rejected by the author himself.

This limit in physical science is of the same nature, though not in the same degree, as the limit to advance of intellectual and moral culture in man, considered individually. For the expectation of a continued and progressive advance assumes, in either case, that the knowledge or experience acquired by one individual, or one generation, may be conveyed over to the next or following, and thus successively handed down; so that to each

mote, and, as it were, most general, (such as are the principles so called of arts and things ;) and according

new increase of the stock new additions may in succession be made. But it is not so in reality, and cannot possibly be so. In neither case does the successor inherit this knowledge, or this experience, as an estate transmitted. Neither does knowledge, in itself, and however extensive, constitute wisdom; which latter is a more valuable part of man's estate than learning. Whatever advantage he may have from the acquisitions of those who have preceded, and in the pursuit of physical science the advantage is great, still he must make the conquest for himself. In the study of nature, and the discovery of its constituents and agencies, and the command over it thus obtained, much of what may be called hereditary knowledge is derived from the records of inventions already found; and this instruction, or rather these discoveries, are more willingly adopted, because they are matters of science simply, without mixture of the affections and inclination, or opposition from that quarter. Yet even here the knowledge so adopted is imperfect; for it is not verified by repetition, or at least in their full extent, of the actual processes from which the conclusions and axioms were drawn.

The table of nature is not like that of the chess-player, or similar board, where the unfinished game may be taken up by one person at the point where another has left it. For not only is nature much more complicated and subtle, but the pieces do not remain fixed and visible at every move. The tradition or continuance of the lamp of knowledge, therefore, resembles more the tradition or continuance of the lamp of life, passing onward through successive but separate generations of men; but with this difference, that the latter is never interrupted, whereas many and large breaks have intervened in the descent of learning.

“*Sic rerum summa novatur*

Semper; et inter se mortales mutua vivunt—

Et, quasi cursores, vitæ lampada tradunt.”

to the unshaken truth of these prove and despatch middle axioms; which hitherto has been done, through a native force of the mind thereto prone, and even already long taught and accustomed to this very thing, through the demonstrations which are made by syllogism. But then at length are we to hope well of learning, when by a true scale or ladder, and by connected steps, not intermitting and with gaps, we shall ascend from particulars to lesser axioms, and thence to middle, one higher than other; and, lastly, in the

In the department of morals, indeed, this limit is more remarkable, and more definite. For the experience of an individual, or of any number of individuals successively, and the advances made by them in wisdom and virtue, although embodied in aphorisms and maxims for the instruction of others, are transmitted to them, however just and true in themselves, not as knowledge, but as advice only and warning; and each individual of the human race begins in his own person, and with all the obstacles of an opposing, or, at all events, a doubting interest, a new course of experience personal to himself; and leaves it, in turn, as a broken thread for him that follows.

In its theory, moral science was always supposed, and is now complete. For there is a perfect rule of life, and standard of morals delivered in the divine law, and therefore conclusive. And even the experience of mankind, in successive ages, has accumulated and transmitted an ample stock of materials, and of axioms, in this department.

“Many are the sayings of the wise,
In ancient and in modern books enrolled.”

The precepts of morality and virtue are abundant; nor in them is there any deficiency. It is the application of them only that is wanting. But this is personal to each individual.

end to the most general. For, indeed, the lowest axioms differ not much from naked experiment. The highest again and most general (so held) are notional and abstract, and have nothing of solidity. But those middle axioms are the true, and solid, and living, in which human affairs and fortunes lie ; and over these again, finally, those most general themselves ; such, I mean, as are not abstract, but by those middle truly limited.

Therefore, to the human intellect are to be furnished not wings, (or feathers,) but lead rather and weights, to restrain all bound and flight. And this has not hitherto been done ; but when it shall be done, it will be allowed to hope better things for learning.

CV. Again, in constitution of axioms, a form of *induction* is to be devised other than has been in use hitherto ; and this not for proof and discovery of principles only, (as they are called,) but even for the lower axioms, and the middle, and in fine for all. For the induction which proceeds by simple enumeration is a childish thing, and concludes uncertainly ; and is exposed to danger from a contradictory instance ; and pronounces, for the most part, after fewer things than is fit, and of these only what are at hand. But the *induction*, which will be serviceable for discovery and demonstration of science and art, ought

to separate nature by due rejections and exclusions ; and thence, after a sufficiency of negatives, to conclude upon affirmatives ; which has not before this been done, nor for certain even attempted, unless only by Plato, who, doubtless in some measure, uses this form of induction for examination of definitions and ideas. But for the profitable and just ordering of this induction or demonstration, very many things are to be employed, which to this day have not entered into the thought of any mortal ; so that a greater labour is to be expended in it than heretofore has been expended in the syllogism. And of this induction we are to use the help, not only for discovery of axioms, but also for limiting of notions. And in this *induction*, beyond question, is placed our greatest hope.*

* In the common affairs of life, connected with personal interest or a favourite pursuit, the philosophical or proper induction is, to a certain extent, carried on by all men : but, in the simple pursuit of truth, the intellectual faculty is naturally supine, or tardy, and may easily be interrupted, or lulled. It is not an unnecessary observation, therefore, which is made by Locke ; “ He that would seriously set upon the search of truth ought, in the first place, to prepare his mind with a love of it.” Although there is no direct reference to Bacon's philosophy in the writings of Locke, with exception, it is believed, of one quotation from the *Novum Organum*, it is evident that he was well acquainted with that philosophy ; of which his *Treatise of Education*, as well as many passages in the *Essay*, affords a sufficient proof.

The Aphorisms CIV. and CV. are, perhaps, the most import-

CVI. But, in the constitution of axioms by this induction, an examination and trial is likewise to be made, whether that which is constituted an axiom be fitted only and made to the measure of the particulars from which it is extracted; or if it be truly ampler and broader. And, if it be ampler or broader, we are to look whether it fortifies this its amplitude and breadth, by designation of new particulars; thus giving a sort of warrant, or surety; lest we either close and stop in things already known; or perhaps, with too slack embrace, we should grasp shadows only and abstract forms, not what is solid and determinate in substance. Now, if these methods should come in use, then, assuredly, would hope break with a steadfast light.

CVII. And here also is to be resumed what was said before, concerning natural philosophy carried out, and of the particular sciences brought back to it; that there be not a cutting and maiming of science; for otherwise, there should still be small hope of a proficience.

CVIII. And now we have spoken about relief of despair, and the production of hope, from discharge, or rectification, of the errors of time past. Let
ant in this book; not only as containing the true direction as to the method of inquiry, but pointing also to the real extent in discovery which that method may be expected to attain.

us next see if there be yet anything else which begets hope. And it occurs, that if by men who were not in search of them, but otherwise employed, many useful discoveries have been made, as it were by a sort of accident or chance occurrence, nobody can doubt but that were the same men seeking and minding the matter, and that in a method and order, not by starts and bouts, many more disclosures must of necessity be made. For though it may possibly fall out, once or again, that some person should fortuitously happen on that which escaped him before, while he was prying with great effort and designedly ; yet in the main of things there is no question but the contrary takes place. Accordingly, far more and better things, and in quicker successions, are to be hoped from method, and careful endeavour, and the well-directed aim and purpose of men, than from accident, and the instinct of animals, and such like, which hitherto have led the way to discoveries.*

CIX. Even that, likewise, may be drawn to hope, that of the very things which have already been dis-

* Is it not, however, a doubtful question, whether, in the most important improvements yet made, the hints and suggestions have been given in the way of studious inquiry, and by method, so often as through casual observation, and unpremeditated? Have not the improvements in the arts, which are founded in natural philosophy, been discoveries rather than inventions; not found so often by the researches of the philosopher, as by Pan, in the chase?

covered, some are of such a kind, that before they were discovered it would not easily have come into the mind of any one to suspect aught concerning them ; but one should at once have contemned them as plainly impossible. For men are used to prognosticate of new things after the pattern of the old, and according to an imagination prejudiced and tinctured by them ; which kind of anticipation is most deceitful, since much of what is derived from the fountains of things flows not in the accustomed rills.

As if, before the discovery of cannon, one should have described the thing by its effects, and talked of it after this manner ; that a certain invention had been disclosed, by which walls and the strongest fortresses might, from a long reach, be shaken and cast down ; undoubtedly men should have set themselves to meditate much and variously about the powers of engines and mechanic contrivances, to be multiplied by weights, and wheels, and such like arietations, and impulses ; but of inflamed air, so suddenly and violently expanding itself, and blowing forth, scarcely any thing would ever have occurred to the imagination or conceit of any one ; being a thing he saw no example of at hand, save, perhaps, in earthquakes or thunder, which, as *magnalia* (or greater works) of nature, and not imitable by man, men would straightway have rejected.

In the same way if, before discovery of the silk yarn, some one should have thrown out language of

this sort ; that a certain kind of thread was discovered, for use of garments and furniture, which far exceeded linen or woollen thread in fineness, and, nevertheless, in tenacity, and in beauty too, and softness ; men should have straight imagined something about a species of vegetable cotton, or about the more delicate piles of some animal, or about feathers and down of birds ; but of the spinnings of a puny worm, and these so copious, and self-renewed, and annual, assuredly they would have conjectured nothing. Nay, if one had even dropped a word concerning a worm, doubtless he had been mocked as a dreamer, who dreamed new labours of the spider.

In like manner, if, before discovery of the mariner's needle, some one should have broached a discourse of this nature ; that a certain instrument was invented, by which the poles and points of the heavens might be accurately taken and discerned ; men should immediately, through the workings of fancy, have pursued many and diverse cogitations regarding the more exquisite construction of astronomical instruments ; but that anything could have been found whose motion should so well sort with the celestials, and yet itself should not be of the celestials, but a stony or metallic substance merely, would have appeared utterly incredible. And yet these, and like things, did escape the notice of men through so many ages of the world, and have been discovered, not by philosophy or art and skill of reasoning, but through some fortuitous

and favouring occurrence ; and are, as we said before, of such a kind as are plainly heterogeneous, and the most remote from things antecedently known, so that no preconceit could at all, or in any way, have led to them.*

There is all reason, therefore, to hope, that in the lap of nature are many things of excellent use still hidden, which have no kindred or parallelism with those hitherto discovered, but are altogether placed without the roads of the fancy ; which, in any case, are yet undiscovered ; which, beyond doubt, in many turns and circuits of ages, will sometime also themselves come forth, as those former did come ; but, by the way which we now treat, may speedily, and suddenly, and together, be presented to the view, and anticipated.†

* “ Many things are true in divinity, which are neither inducible by reason, nor confirmable by sense ; and many things confirmable by sense, yet not inducible by reason. Thus, it is impossible, by any solid or demonstrative reasons, to persuade a man to believe the conversion of the needle to the north ; though this be possible and true, and easily credible upon a single experiment unto the sense.”—*Brown's Rel. Med.*

† How fully these anticipations have been verified in succeeding times, and more remarkably in the present age, by many discoveries in science and art, as distinguished from discoveries of fortune, is sufficiently plain : and equally so, that the field of invention is not narrowed by such discoveries, but enlarged ; the amount of the known adding still to the sum of the unknown. The *direction* which has been given through science to certain agencies of nature, which were already known, although imper-

CX. But, in truth, other discoveries likewise are seen, of such sort as to convince us that mankind may pass by, and tread upon noble inventions even placed at their feet. For, however the inventions of gun-powder, or silk-thread, or the mariner's needle, or of sugar, or paper, or the like, may seem to depend on certain properties of things and of nature, yet certainly the art and skill of printing has nothing but what is open and nearly obvious. Nevertheless men, not adverting that types of letters are, no doubt, collocated with more labour than letters are written by action of the hand ; but there is this difference, that the types of letters, once collocated, suffice for numberless impressions, but letters, traced by the hand, for one writing only ; or, again, perhaps not advert- ing that ink may be inspissated, so as to tinge, not flow ; especially the letters being turned upward, and

feetly, and the extensive *application* of them to many arts and important purposes of life, are justly to be accounted discoveries, not less than those of which there was no previous suggestion, and nothing to direct the inquiry.

Yet it is true that, even in advanced stages of science, there is a natural unwillingness to give ear to the reports of new discovery, when that discovery is out of the usual track ; or to give credit to experiments altogether different from those already known : a reluctance which has not unfrequently retarded the progress of learning, and the application of inventions which have ultimately been received, and proved of the greatest advantage for the uses of human life. Such, besides many others, are the discoveries, comparatively recent, of the first, and now second inoculation, for cure of small-pox.

the impression made from above ; wanted, for so many ages, this most beautiful invention, (which avails so much to the propagation of learning.)

Besides, in this race of invention, the human mind is wont oftentimes to be so giddy and inconstant, as first to distrust, and a little after despise itself ; and, first, to think it incredible as to some particulars, that any such thing can be discovered ; but after it is discovered, to think it incredible again, that men could so long have missed it. And this very thing is rightly drawn to hope ; that is to say, that a crowd of discoveries yet remain which not only from operations yet unknown, to be sought out and laboured, but also from transferences, and compounds, and applications of those already known, may, through that literate experience which we spoke of, be deduced.

CXI. Nor is that to be omitted, for a ground of hope ; namely, if men will consider the infinite expense of wit, and time, and fortune, which they bestow in matters and studies of far less usefulness and value ; whereof were even some part turned to things sound and substantial, there is no difficulty that might not be overcome. Which, for this reason, it has seemed good to add ; because (we plainly confess it) a collection of natural and experimental history, such as we measure it in our mind, and such as it ought to be, is a great, and, as it were, a kingly work, and of much labour and cost.

CXII. Meantime, let no one much dread the multitude of particulars ; yea, rather let this very thing reassuro his hopes. For the particular phenomena of arts and of nature are but as a handful, compared with the conceits of the mind, after they have been separated and abstracted from the evidence of things. And this road has its issue in the champaign, and almost at hand ; the other has no issue, but an implication without end. For hitherto men have made little stay in experiment, and have but lightly dipped on it ; while, in meditations and musings of the mind, they have wasted an infinity of time. But with us, if any one were at hand who could answer upon interrogatories to the facts of nature, the discovery of causes, and of all knowledge, might be the work of a few years.*

CXIII. Even something of hope, as we conceive,

* Some of the statements in this work, and in other writings of the author, may appear not to be sufficiently qualified. But it is to be remembered that his great object was to encourage inquiry, rather than to mark its limits ; to excite hope, rather than suggest doubts ; to show how much remained to be done in science, upon a comparison of what had been done hitherto ; and how great proficiencie might reasonably be expected, if a better method of discovery was adopted. Much had been explored of the material globe which, in preceeding ages, had not been reached, or was thought inaccessible ; and his desire and hope was, in like manner, to enlarge the intellectual map, by opening new fields of invention ; not to anticipate their farthest bound.

may be furnished to men from our own example ; nor do we say this out of vain-glory, but because it is profitable to be said. If any of them be distrusting, let them look to me, a man, among the men of my age, the most occupied in civil affairs, and of health something infirm, (wherein is great waste of time,) and in this matter plainly a leader, or pioneer, and following in the steps of no other, neither even communicating in these with any mortal ; but yet, having entered perseveringly upon the right road, and submitting my apprehension to realities, have somewhat (as we think) promoted those very things we design ; and let them look next to what, after these our hints, is to be expected from men abounding in leisure, and from con-sociated labours, and the succession of times ; in a road, especially, which is not pervious to individuals alone, (as happens in that logical way,) but where the labours and tasks of many (especially as to collecting of experience) may excellently be distributed, and thereafter combined and confronted. For then shall men begin to know their strength, when all shall not work upon the same, but diverse men on diverse things.

CXIV. Lastly, though the gale from this *new Con-tinent* of hope did blow much weaker and more doubt-fully, yet have we resolved, (unless we would be of a plainly abject mind,) that trial is, by all means, to be made. For the thing is not, with like danger, untried,

and unsuccessful ; since by that is staked the loss of a great good, by this of an inconsiderable human labour. But, from what has been said, and from what has not been said likewise, seems to us that abundant hope accrues, not only for a strenuous man to try, but for a prudent and sober man to trust.

CXV. And now we have spoken concerning the ridding of despair, which has been among the most powerful reasons of let and hindrance to the progress of knowledge ; and with this our discourse of the signs and causes of errors, and of the sloth and ignorance which have prevailed, is completed ; especially as the more subtile causes, and which fall not within the popular judgment or observation, may fitly be referred back to what has been said respecting the *idols* of the human mind.

And here should equally be closed the destroying part of our *Instauration*, which is perfected in three confutations ; confutation, namely, of *human reasoning natural*, and left to itself ; confutation of *demonstrations* ; and confutation of *theories*, or the philosophies and learnings that are received. And the confutation of these has been such as it could be ; that is, by signs, and notoriety of causes ; for by us, (who dissent from others both concerning principles and demonstrations,) no other confutation might be offered.

Therefore is it time that we come to the art itself, and rule of *interpreting nature* : and yet somewhat re-

mains which is first to be obviated. For, as it is our purpose, in this first book of *aphorisms*, that the minds of men should be prepared, not for admitting only, but for understanding what things are to follow ; the area (or platform) of the mind being now cleared out, and smoothed, and made even, it follows that the mind be put in a good posture, and with benevolent aspect, as it were, towards those things which we shall propose. For, in a new matter, not only the strong preoccupation of an old opinion, but likewise a false preconception or profiguration of the thing which is adduced, has power to prejudice. We shall endeavour, therefore, to win good and just opinions of what we advance, though it be for a time only, and as it were lent, till the thing itself be fully known.

CXVI. First, then, it seems fit to be asked that men do not consider us, after the custom of the ancient Greeks, or of some later men, as Telesius, Patricius, Severinus, desirous of building up any sect in philosophy. For neither is this our business, nor do we think it much importing to the interests of men, what kind of abstract opinions any one should hold about Nature and the principles of things. Nor is it to be doubted but that many old things of this sort might be recalled, and new be introduced ; in the same way that many theories of the heaven may be supposed, agreeing well enough with the *phenomena*, yet differing among themselves.

Now, concerning such supposeable things, and no less unprofitable, we labour not. But, on the contrary, what we purpose and endeavour is, if we can, to lay more solid foundations of human power, and to enlarge and extend its boundaries. And although dispersedly, and in certain special subjects, we are not without some things truer far and more certain, (as we judge,) and of more fruit too than such as men hitherto use, (which we have collected for the fifth part of our Instauration) still we propose not any universal or entire theory. Nor, in truth, does the time for this seem to have yet come. Neither have we the hope that our remaining life should serve for accomplishment of the sixth part of the *Instauration*, (which is allotted to philosophy discovered by rightful interpretation of Nature ;) but we are content if, in the intermediate part, we bear ourselves soberly and usefully, and scatter meantime the seeds of purer truth for posterity ; and are not wanting to the beginnings of so great matters.*

* As Socrates desired to replace the abstruse disquisitions of the older philosophies by the study of what concerned human life and its interests, it was the object of Bacon to exchange the logic of Aristotle for the facts of nature.

The character of Bacon, as a philosopher, is well expressed by Walton, when he calls him "that great Secretary of Nature, and all learning;" and it is agreeable to the author's own view, as thus expressed in the *Sapientia Veterum*: "But it is excellently devised. that of all discourse or speech, Echo alone is given in marriage to the Universe;" in distinction, that is, from Syrinx, or written speech, which is exact and methodical ; "for that, in fine, is true

CXVII. And as we are not founders of a sect, so neither prodigal or large promisers of particular works. But some one may possibly object on that score, that we, who make so oft mention of works, and draw all things thither, ought ourselves to exhibit some pledges of works. But our way and method (as we have often distinctly said, yet is useful again to repeat) is this; that we extract, not works from works, nor experiments from experiments, (as the empirics do,) but from works and experiments, causes and axioms, and

philosophy, which most faithfully returns the accents of the world itself, and is, in a manner, written down while the world is dictating, and is nothing else but its image and reflection; neither adds any thing of its own, but iterates merely and repeats."—*Pan; sive Natura.*

Discovery of the *facts* of nature is the object of his philosophy; and a true induction not only begins, but, in reality, ends with this discovery. For if it be supposed that the ultimate purpose can be reached, of ascertaining the whole course and connections of nature, or the *laws* as otherwise expressed, the result will be still, not the establishment of any theory, but a knowledge of the facts as they exist.

It would be well, if those who admire the philosophy of Bacon would also follow his example, and act upon the directions given in this and the following aphorism. For the propensity to form premature systems, at least in certain portions, whether of physical science, or of human learning in other departments, can scarcely be said to be less in the period of time which has followed, than in that which preceded the writings of Bacon. In which respect, his prediction, as uttered in Aphorism LXIV., seems to have been literally fulfilled. The lesson in question is apparently that which is attended to the least, and learned the last.

from causes and axioms again new works and experiments ; (as rightful interpreters of Nature.)

And, though in our tables of invention (of which the fourth part of the Instauration consists,) and even in the examples of particulars, (which we have adduced in the second part,) and, moreover, in our observations upon history, (described in the third part of the work,) any one, even of moderate perspicacity and quickness, shall every where note indications and designations of very many noble works ; yet we candidly confess, that the natural history which we yet have, either from books or from our own searches, is not so copious and verified as may satisfy or minister to a just interpretation.

Therefore, if any be more apt for mechanicals, and fitted, and acute of scent to trace out works from a sole converse with experiments, we leave it to him, and yield the task of plucking by the way, as it were, many things out of our history and tables, and applying them to works ; and so taking interest in a manner for the time, till the principal can be gotten. But we, (who reach forward to greater things,) condemn all over-hasty and premature stop in things of this kind, as Atalanta's balls,* (as we are accustomed so

* The frequent repetitions, both of doctrine and illustration, which occur in the philosophical works of Bacon, and the renewed inculcation of truths, many of which appear to be so unquestionable, were necessary at the time when he wrote ; for he spoke to the age, and it was his object to remove preju-

often to say.) For we do not childishly desire the golden apples ; but, for victory in the race of Art, we

desires which had taken deep root, and to correct errors which were prevalent, or rather universal. It is often important in such cases to let in the light from different points upon the chambers of the mind.

“Some, perchance, will conceive,” says Hakewill, “I might have delivered my mind with less expense of words and time ; and, truly, I must acknowledge that, *in multiloquio non deerit peccatum*. Yet, withal, it must be remembered, that being to grapple with such a gyant-like monster, I could not think him dead till I had his head off ; and that which to some may seeme superfluous or impertinent, will happily by others be thought not unprofitable or unpleasant ; the pains is mine, and if it be overdone, done I am sure it is ; if I have said more than enough, enough is said to serve the turn.”—*Apologie. Preface.*

With respect to that warning so frequently given by the author, under the simile of Atalanta in the fable, it must be allowed, at the same time, that there is no real opposition between the pursuit of knowledge and the study of inventions in art ; no discrepancy between experiments of light and experiments of fruit. On the contrary, they mutually assist each other, and give reciprocal instruction and help. The science or discovery of physical laws, and the application of those rules to works of art, or rather the illustration of them in such works, ought to proceed together, and necessarily do so ; and science is not less indebted to inventions of art, than discoveries in art are indebted to science. The error which Bacon combats, is that of stopping at the productions of art, in some special discoveries, as a sufficient attainment, and giving up the more general and higher aim, or relaxing in the pursuit of it. For, in their own nature, scientific knowledge and inventive art are in their progress parallel, if not synchronous ; nor can any considerable advance be made in one without reflecting light upon the other.

rely wholly upon Nature ; neither hasten to reap the herbage, or the fog ; but wait for the seasonable harvest.

CXVIII. To one who shall have read our history itself, and tables of invention, something will doubtless occur also in the experiments themselves as being questionable, or altogether untrue ; and on this account, perhaps, he shall inwardly conclude, that our discoveries rest upon foundations and principles false and uncertain. But this is nothing, for it must needs so happen in the beginning. For it is like as if, in writing or printing, one or other letter should chance to be wrong placed or collocated ; yet that uses not much to interrupt the reader, since the mistakes are easily corrected by the sense itself ; just so, let men consider that many experiments in natural history may be falsely taken up and assented to, which yet, a little after, by causes and axioms discovered, are easily blotted out and rejected. And yet it is true, that if, in natural history and experiment, there should be great, and frequent, and continued mistakes, these could by no felicity of mind or art be corrected or amended. Accordingly, if in our natural history, which has been verified and collected so diligently, and severely, and almost religiously, something of untruth and error should at times lurk in particulars, what then shall be said of the natural history that is common, which, in comparison with

ours, is so negligent and loose? or of the philosophy and science built upon such sands? (or rather quick-sands.) Let not any one be moved, therefore, by this which we have mentioned.

CXIX. Again, very many things will occur in our history and experiments, some trivial and ordinary, others mean and illiberal, others, in fine, exceedingly subtle and merely speculative, and seemingly of no use; which kind may avert and alienate the affections of men.

Now, of those things which appear to be ordinary and well known, let it be considered that truly men are accustomed, as yet, to nothing else than to refer and accommodate the causes of things which are unusual to those which are of frequent occurrence; but of these last, namely, things frequently occurring, they ask no causes, but take them to be granted and admitted. Accordingly, of *weight*, of the *rotation of the celestials*, of *heat or cold*, of *light*, of *hard or soft*, of *thin or thick*, of *liquid or consistent*, of *animate or inanimate*, of *similar or dissimilar*, in fine, of *organic*, they do not seek any cause; but, holding these to be clear and manifest, they dispute and resolve concerning those other, being things which occur not so frequently and familiarly.

But we who are satisfied that no judgment can be formed of things rare or memorable, much less new things be brought to light, unless the causes of com-

mon things, and the causes of their causes be rightly inquired and settled, are of necessity compelled to receive into our history things the most common and vulgar. Nay, we have found nothing hurt philosophy more, than that things familiar, and often occurring, do not stay and detain the contemplations of men, but are taken up in passage only, nor the causes of them wont to be sought: so that information of things unknown is not oftener wanted than attention in such as are known.*

* This disregard of common things in the pursuit of truth, arising from pride of intellect, or from a supposed knowledge of them, or from indolence and supineness of mind, which would escape as much as possible from all inquiry, is fertile both of ignorance and error. "Not to doubt," says Hales, "in things in which we are conversant, is either by reason of excellency and serenity of mind, thoroughly apprehending [imagining that it thoroughly apprehends] the main principles on which all things are grounded, together with the deserying of the several passages from them unto particular conclusions, and the diverticles and blind by-paths which sophistry and deceit are wont to tread; and such a man can nature never yield: or else it is through a senseless stupidity, like unto that in the common sort of men, who, conversing among the creatures, and beholding the course of heaven and the heavenly host, yet never attend them, neither ever sinks it into their heads to marvel or question these things, so full of doubt and difficulty."—*Abuses of hard places of Scripture*. To the same effect he observes, in regard to historical learning and teaching in the academies and colleges in his time, (middle of the seventeenth century:)—"It is a common scholical error, to fill our *papers* and *note-books* with observations of great and famous events, either of great battles, or civil broils and conten-

CXX. Next, for what regards the baseness of things, or even foulness, which things (as Plinius

tions: The expedition of Heracles his offspring for the recovery of Pelopponese, and the like. Meanwhile, things of ordinary course and common life gain no room in our *paper-books*. Petronius wittily and sharply complained against schoolmasters in his times, who, training up of youth in the practice of rhetoric, never suffered them to practise their wits in things of use, but in certain strange supralunary arguments which never fell within the sphere of common action. "*Adolescentulos in scholis stultissimos fieri, quia nihil ex iis quæ in usu habemus aut audient aut vident, sed responsa in pestilentia data, ut virgines tres aut plures immolentur,*" &c.—*Miscellanies. Method of Reading Profane History.*

It is thus in every department, natural or moral, that what is near in place, or common and familiar, comes to be disregarded.

"As we see th' eclipsed sun,
By mortals is more gazed upon
Than when, adorned with all his light,
He shines in serene sky most bright."—*Butler.*

"It is place which lessens and sets off."—*Shaks.*

"Assiduitate quotidiana et consuetudine oculorum assuescunt animi; neque admirantur, neque requirunt rationes earum rerum quas semper vident; perinde quasi novitas nos, magis quam magnitudo rerum, debeat ad exquirendas causas excitare."—*Cic. De Nat. Deor., L. ii.*

"*Causarum ignorantia in re nova mirationem facit: eadem ignorantia si in rebus usitatis est non miratur; quod crebro videt non miratur, etiamsi cur fiat nescit; quod ante non videt, id si evenerit ostentum esse censet.*"

"Ce n'est pas dans les choses extraordinaires et bizarres que se trouve l'excellence, de quelque genre que ee soit. On s'élève pour y arriver, et on s'en éloigne. Il faut le plus souvent s'abaisser."—*Pascal.*

The word "common" is itself a fallacy, or *idolum fori*; for it

says) ought to be prefaced with a *salvo honore*, (or excuse,) these are to be received into natural history

signifies both that which is usual and frequently observed, and that which, from its frequency, is disregarded or despised.

In considering the value of ordinary things in human life and conduct, it has often been remarked, that the character and disposition of an individual may be better seen and more distinctly marked by his daily actions, which are without study, than by others more rare, and where preparation may be made, and a mask assumed. Nature is betrayed with greater freedom in the sock than the buskin.

The errors which arise from oversight in things common have place not less in opinions and judgments; of which those passing current most easily, and the least suspected, require often to be examined as if they were new and untried. For by this process not a few fallacies will be detected which their frequency covered. So it is also in current words and terms in daily use, of which the real meaning is often lost because not calling for attention, but which become much more forcible, as well as more distinct, by recurrence to their primary signification.

This inquiry into the elements of knowledge, and the grounds of opinion in things of ordinary as well as of more unusual occurrence, is, indeed, essential in all reasoning on moral and political subjects, for the correction of error, and inconclusive judgments. It is for the same reason an important point in every branch of education; where, even at an early stage of mental exercise, the advantage cannot be overrated of changing implicit assent in things the most common, equally with things that are more abstruse, to an assent founded in the understanding, and the result of reflection.

With respect to the value of earthly things the commonest, and for that reason unattended to and often despised, the proof is abundant throughout all nature, where are so many things "most abject in regard, and dear in use."

not less than the most beautiful and costly. Nor is natural history thereby polluted ; for the sun enters

“ The trodden weed sends out a rich perfume.”—*Addison.*

“ O mickle is the powerful grace that lies
In herbs, plants, stones, and their true qualities ;
For nought so *vile* that on the earth doth live
But to the *earth* some special *good* doth give ;
Nor aught so good, but strained from that fair use,
Revolts from *true birth*, stumbling on abuse.”

Romeo and Juliet.

Nay more ;

“ There is some *soul of goodness* in things *evil*,
Would men observingly *distil* it out.”—*K. Henry V.*

But it is when things thus common, and apparently mean, come in particular circumstances to the help of man, that he corrects his estimate and values them at their worth :

“ The art of our necessities is strange,
That can make vile things precious.”

“ Unmuffle, ye faint stars, and thou, fair moon,
That woultst to love the traveller’s benison,
Stoop thy pale visage through an amber clond,
And disinherit chaos that reigns here,
In sable night of darkness and of shades.
Or if your influence be quite dammed up
With black usurping mists, some gentle *taper*,
Though a rush candle from the wicker hole
Of some clay habitation, visit us
With thy long levelled rule of streaming light ;
And thou shalt be our star of Arcady,
Or Tyrian Cynosure.”—*Comus.*

“ Care and utmost shifts,
How to secure the lady from surprisal,
Brought to my mind a certain shepherd lad,

alike into palaces and jakes, yet is in nowise polluted.
And we dedicate not or build any lofty tower or

Of small regard to see to, yet well skilled
In every virtuous plant and healing herb
That spreads her verdant leaf to the morning ray—
Amongst the rest *a small unsightly root,*
But of Divine effect, he called me out ;
The leaf was darkish, and had prickles on it,
But in *another country,* as he said,
Bore a bright golden flower, but not in this soil ;
Unknown, and *like esteemed,* and *the dull swain*
Treads on it daily with his clouted shoon ;
And yet more medic'nal is it than that Moly
That Hermes once to wise Ulysses gave.”—*Comus.*

“ In the book of Nature, God has veiled, in an obscure and homely stone, an attractiveness, (unvouchsafed to diamonds and rubies,) which the stubbornness of metals does obsequiously acknowledge.”—*Boyle.*

And it is conceivable that others also among the common things in nature, and seemingly the most remote from each other among the yet “ unpublished virtues of the earth,” may hereafter, when brought into contact, or placed in circumstances to show their connection, lead to discoveries not less unexpected or important, though differing in kind from those which have been already disclosed. It is not less true in the physical condition of man, that the meanest and the most feeble things may profit him, as the feeblest and the meanest may hurt and destroy.

“ He that of greatest works is finisher,
Oft does them by the weakest minister.”

And as it is in physical, so it will be found in moral doctrine, between which there is a true consent, though sometimes secret, and oftener overlooked. For humility, though denoting lowness in place and in self-esteem, is yet among the highest virtues, and a result also of the highest knowledge ; a scientific attainment, as

pyramid to the pride of man, but found a sacred temple in the human mind, after the pattern of the world.

well as a Christian grace. "I never yet," says an acute and original thinker, "found pride in a noble nature, nor humility in an unworthy mind. It may seem strange to an inconsiderate eye, that such a poor *violet* as virtue should ever dwell with honour; and that such an aspiring fume as pride should ever sojourn with baseness. It is certain, we seldom find the latter but in those who, being conscious of their own deficiency, think there is no way to get honour but by boldly assuming it. It is he that has nothing else to commend him who would invade men's good opinions by an unbecoming haughtiness. If you search for high and strained carriages, you shall, for the most part, meet with them in low men."—*Feltham*. Neither is this state of feeling, which is thus allied to lowliness, inconsistent with the highest moral courage in natural character, but rather coincident and homogeneous.

"O thou goddess,
Thou divine nature, how thyself thou blazon'st
In these two princely boys! For they are *gentle*
As Zephyrus blowing *beneath the violet*,
Not wagging his sweet head; and yet as rough,
Their royal blood enchafed, as the rud'st wind
That by the top doth take the mountain pine,
And makes him stoop to the vale."—*Cymbeline*.

Such estimates, indeed, are not according to the current of the world's opinions.

"If proud Pygmalion quit his cumbrous frame,
Funereal pomp the scanty tear supplies;
Whilst heralds loud with venal voice proclaim,
Lo, here the brave and the puissant lies.
When humbler Alcon leaves his drooping friends,
Pageant nor plume distinguish Alcon's bier;

Our pattern then we follow. For whatever is deserving of essence, the same is deserving of science also,

The faithful muse with votive song attends,
 And blots the mournful numbers with a tear.
 " I saw him faint ! I saw him sink to rest !
 Like one ordained to swell the vulgar throng ;
 As though the virtues had not warmed his breast,
 As though the muses not inspired his tongue."

Shenstone.

To those who are fond of tracing the filiation of thought, it might be a matter of curiosity to compare this last stanza with the lines of Spencer, beginning,

" I saw him die, I saw him die as one
 Of the mean people, and brought forth on bier," &c.

Ruines of Time.

Much of what is beautiful in the figurative language of poetry, whether in prose or verse, is drawn from these associations between physical and moral nature, real or supposed ; as in two of the passages above quoted, where the lowliest and most hidden flower of the garden, but the deepest in tint and the richest in odour, is taken for the emblem of the highest virtues. And it is singular, although, perhaps, too curious, to remark, that in the separation of the rays of light by the prism, the ratio of the violet colour, as to intensity, should be found the highest of the seven.

As, in the material world, the tree is not more beautiful or serviceable than the herb, so it is certain that the moral virtues, and even the more delicate mental graces, as well as the natural affections, will be found not less frequently in the humble than in the most exalted outward stations ; or rather that the former has, in respect to some of these qualities, an advantage and a preference, not for security alone, as

" We often find
 The sharded beetle in a safer hold
 Than is the full-winged eagle ;"

which is the echo (or reflexion) of essence.* But the vile subsist equally with the noble. Nay more, as

but for excellence also. When the philosophy of Greece descended from speculative to practical wisdom, it was to "the low-roofed house of Soerates."

"*Belarius*.—Stoop, boys ; this gate
Instructs you how to adore the heavens, and bows you
To a morning's holy office : the gates of monarchs
Are arch'd so high that giants may jet through,
And keep their impious turbands on, without
Good morrow to the sun—
We house i' the rock, yet use thee not so hardly
As prouder livers do."—*Cymbeline*.

And not in fiction merely may the trait be found, which is added in that exquisite picture :

"I' the cave wherein they bow, their *thoughts* do hit
The roofs of palaces."

Somewhat akin to this estimate of things common, and their real value both in physical inquiry and in human character, is the effect which a skilful artist produces by their exhibition in works of genius and taste ; where that which would otherwise be

* There are no real *discords* in nature ; nor any thing which is *deformed* in itself. They are only so esteemed ; for we judge of all things as they impress us agreeably or disagreeably : the sympathies or antipathies in regard to every thing else of nature are *idola tribus*.

"In nature there's no blemish, but the mind."—*Twelfth Night*.
i. e., out of the mind, except in our estimate.

And that estimate itself depends most frequently upon *associate* circumstances of season or predisposition.

"The crow doth sing as sweetly as the lark
When neither is attended."—*Merch. of Venice*.

out of certain putrid substances, such are musk and civet, most excellent odours are sometimes generated

familiar only, becomes, through its simplicity, a beauty and an excellence. Of this kind is the effect occasionally produced in the compositions of that artist who has copied nature with the finest pencil; and who has, at times, even amid scenes the most pathetic or sublime, ventured to introduce an incident or an expression the most simple and familiar, not only without injury to the prevailing tone, or disturbance of the sentiment, but so as to heighten the effect, by giving an immediate *reality* to the scene.

Lor.—"How sweet the moonlight sleeps upon this bank!
Here will we sit, and let the sounds of music
Creep in our ears; soft stillness and the night
Become the touches of sweet harmony:
Sit, Jessica: Look how the floor of heaven
Is thick inlaid with patines of bright gold," &c.—*Merch. of Ven.*

Thus, again, in the midnight scene of Banquo's murder, while the assassins are waiting to assault him, and the feeling of the spectators is wrought up to painful expectation, his remark to Fleance in the gathering darkness, "It will be rain to-night," so far from interrupting that feeling, is in harmony with it, by the contrast between the impending blow of the murderers, and the unpreparedness of the victim.

And thus, under very opposite circumstances, in Henry V., when the king, visiting his soldiers in the camp, on the eve of Agincourt, selects old Sir Thomas Erpingham for his debt of kindness,—

"Lend me thy cloak, Sir Thomas,"—

who does not acknowledge this familiar appeal to be an enhancement of the scene?—

"A little touch of Harry in the night."

Many other instances are to be found in the same rich treasury. See, among others, the latter scenes of that deepest of all dramatic

and contrived, so likewise, from mean and sordid instances emanates at times a glorious light and information. But of this too much, seeing that antipathy and niceness of that sort is plainly puerile and effeminate.

CXXI. But the next is, on all accounts, to be looked into more closely : that many things in our history will, to the vulgar apprehension, or indeed to any intellect accustomed to present things, appear of a somewhat curious and unprofitable subtlety. Of this, therefore, first and chiefly, we both have spoken, and are to speak, in this manner : that as yet, in the beginning, and for a long time, we are seeking experiments of *light* only, not experiments of fruit ; after the example, as we have frequently remarked, of the divine

histories, the tragedy of Lear ; as there are also traits of sublime thought interspersed in his comedy : being, in both cases, the truth of nature, and the delicacy of art.

But it cannot be questioned, that in other compositions too, as well as dramatic, the studied exclusion of all that is natural and obvious in thought, or simple in expression, is an important error, and even disappoints its own purpose. It is this continual strain at uncommon thoughts by which the effect of Young's poetry is so much hurt, however sublime the conceptions severally are. Let any page of his Night Thoughts be compared with any page of Milton's Paradises, and this contrast of style is immediately felt. So it is in many other cases : for this attempt at uninterrupted elevation of style has frequently spoiled the compositions of later writers, both in verse and prose.

creation, which, on the first day, produced the light only, and alletted one entire day to that alone, nor on that day mixed aught of materiate work.

Therefore, if any should censer such things to be of no use, let him think it to be the same as if he judged also that there is net any use of the light, because, indeed, it is net a solid or materiate substance. And we hesitate net to say, that knowledge of simple natures, if it be well examined and defined, is truly as the light, giving entranee to the universal recesses of works, and, with a sert of power and efficacy, embracing and drawing after it whele bands and troops of works, and opening the fountains of the noblest axioms ; yet in itself is that knowledge of no considerable use. Nay, even the elements of letters, by themselves and separately, signify nothing, and have net any use ; yet are they like the *materia prima*, (er rudiment,) for composition and garniture of all discourse. Yea, the seeds of natural things, powerful in their possible virtue, as to use (except by their process) are nothing ; and the dispersed rays of the light itself, unless they concur, impart net their benefit.

But if any take offence by subtleties of speculation, what shall we have to say of the seholmen who have indulged in subtleties without measure ? Which subtleties, too, were wasted en words, or, at least, en vulgar notions, (which is the same,) net en things or nature ;

and without profit not only in their beginnings, but even in their consequences; not being such as have for the present perhaps no utility, but consequentially an infinite, like those we speak of. But of this let men be assured, that all subtlety of disputations and reasonings, if it be employed only after invention of axioms, is late and out of place; and that the true and proper, or at least chief time for subtlety, is in the balancing of experiment, and the constitution of axioms therefrom.* For that other subtlety desires and catches at nature, but never apprehends or takes hold of her. And that is undoubtedly most true, if transferred to nature, which they use to say of occasion or fortune, "that she offers a lock in front, but behind she is bald."

Finally, as touching this contempt in natural history of things either vulgar and base, or over-subtle, and in their beginnings unprofitable, let that speech of the poor woman to a swoln prince, who would have thrown aside her petition as something unworthy and beneath his majesty, be taken for an oracle, "Do you then give over to be a king." For it is most certain that the command over nature may neither be acquired nor maintained, if one will not be at leisure

* It has been justly observed, in conformity with this maxim, and nearly upon the same principle, that facts which are adduced in proof of a theory ought to be received with greater caution, and examined with a more scrupulous care than facts which have suggested a theory.

for things of this kind, as seeming too small and trifling.

CXXII. Farther, it occurs also to be something strange, and hard, that we should, in a manner, at one blow, and with violence, drive out and displace all learning and all authorities together; and this without having taken any one of the ancients to our succour and protection, but, as it were, in our own strength.

Now, we are not ignorant that, if we had inclined to act with a less sincere faith, it had not been difficult for us to refer the things which are adduced either to the early ages before the times of the Greeks, (when the knowledge of nature flourished perhaps more, though indeed with a greater silence, nor had happened yet upon the trumpets and pipes of the Greeks,) or even (in parts assuredly) to certain of the Greeks themselves; and to seek thence a warrant and reputation, after the manner of upstarts, who build and connect a nobility to themselves out of some ancient pedigree, through favour of genealogies. But we, relying on the evidence of things, reject all seasoning of fable and imposture; nor do we think it more imports the present purpose, whether the things that shall be invented now may have been long ago known to the ancients, and are merely settings and risings in the changes and revolutions of things, than it should be a concern to men whether the now world

was that island Atlantis, and known to the old, or be now for the first time discovered. For the discovery of things is to be sought from the light of nature, not recovered from the darkness of antiquity.*

Then, as to the censure being thus universal, any one who justly considers the matter will most certainly account it both more allowable, and more modest, than if it had been made in part. For if the errors had not been rooted in the first notions, it needs must have happened that some things rightly invented had corrected others ill invented. But since the mistakes have been in the ground-work, and of such a kind as that men rather neglected things, and passed them over, than made a wrong or false judgment concerning them, it is nothing strange that men should not have obtained what they were not bent upon, nor have reached a goal which they placed not, or settled; nor have completed a course which they entered not, or held.

And in regard to the insolency of the thing; certainly if one should pretend that, by stedfastness of hand, and exactness of eye, he is able to describe a straighter line or a more perfect circle than some other, then, indeed, a comparison of faculty is introduced. But if one asserts that, by a ruler applied, or compass circumfered, he is able to describe a straighter line or

* The character "time-honoured" may often be just in cases of moral influence and feeling; but not so in subjects of reasoning, or the search of truth.

a more perfect circle, than any other can by the sole power of the eye and carriage of the hand, he shall not surely be a great boaster. Nay more, what we now say has place, not only in this our first and inceptive endeavour, but has a regard also to those who shall busy themselves afterward in this matter. For our way in discovery of knowledge almost levels minds, nor leaves much to their excellency; since it performs all by most certain rules and demonstrations. So that (as we have said often) these of ours hold of a certain felicity rather than ability, and are a birth of time rather than of wit. For, assuredly, there is something of fortune in human cogitation, no less than in works and deeds.

CXXIII. Of ourselves, therefore, is that to be said which he spoke jesting,* especially as it cuts the matter so well: "It cannot be that they who drink water and they who drink wine should think alike." For the rest of men, ancient as well as modern, have in science imbibed a crude liquor, such as water, whether naturally flowing from the mind, or drawn by logic, as by wheels, out of a well. Whereas we drink and quaff a liquor concocted from numberless grapes, and these mature and ripened, and gathered, and plucked in clusters; and thereafter squeezed in the press; and, lastly, refined in the cask, and clarified. According-

* Philocrates, speaking of himself in contrast with Demosthenes.

ly, it is nothing to be wondered, if we agree not with those others.

CXXIV. Farther, it will doubtless occur, that not even by ourselves has the true scope and highest mark of learning been fixed beforehand, (which thing we censure in others,) seeing that the contemplation of truth is worthier and more noble than all usefulness and magnitude of works ; whereas this long and anxious stay in experiment, and matter, and multitude of particulars, fastens the mind, as it were, to the ground, or rather thrusts it down into some Tartarus of confusion and perturbation, and forbids and removes it from the sereneness and tranquillity of abstract wisdom, (as from a much diviner state.) Now, to this reasoning we freely assent ; and this very thing which they are pointing at, and most desire, is what chiefly, and before all others, we are endeavouring. For we are founding in the human intellect a true copy of the world, such as it is found, not such as any one's private judgment would dictate to him. But this cannot be effected thoroughly, unless by a dissection and anatomy made of the world with the greatest care. Therefore, we openly advertise that those inept models, and little apes of worlds, so to speak, which the fancies of men have set up in philosophy, are to be utterly driven out. And let men be taught then, (as we said before,) what difference there is between the *idols* of the human mind, and the ideas of the divine mind. For those

are no other than abstractions at will ; but these are the true signatures of the Creator upon the creatures, as they are by real and exquisite lines impressed and defined in matter. Therefore are truth and utility in this case the very same ; and works themselves are to be esteemed more as they are the pledges of truth, than because of the commodities of life.

CXXV. Perhaps it will farther occur, that this of ours is in some degree *actum agere*, (to repeat what has been done already ;) and that the ancients themselves equally followed the road that we do. Hence, by some it shall be thought likely that we, also, after so great stir and pains, will at last close in some or other of those philosophies which prevailed among the ancients. For that they also, in the beginnings of their meditations, had prepared a great stock and force of instances and particulars ; and had digested them into commentaries by heads and titles, and thence concocted their philosophies and arts ; and, after sure intelligence of the matter, pronounced, and had subjoined sundry examples, for authority and light of instruction ; but as to the notes of particulars, and their tablets, and commentaries, had thought it superfluous and troublesome to bring these into the light ; and, therefore, had done what in building is customarily done, namely, after structure of the edifice, had removed the scaffolding and ladders out of view. Nor, indeed, is it necessary to suppose that the thing hap-

pened otherwise. But any one, unless he shall have altogether forgotten what we have said above, will easily make an answer to this objection, (or rather scruple.) For the form of inquisition and invention among the ancients not only do we profess to show, but their own writings also plainly testify. And it was no other than this, that from a few instances and particulars, (the common notions being added, and perhaps some portion of the received opinions which were best liked,) they flew to the most general conclusions and principles of knowledge; resting on the unshaken and fixed truth of which they should mediately draw forth and evince the subordinate conclusions, out of which they constituted their art. Then, again, if new particulars and examples were moved and adduced, which resisted and crossed their placets (or conclusions,) those, either by distinctions, or by explanations of their rules, they artfully reconciled and made conformable; or, in fine, by exceptions, removed in gross; and, again, the causes of particular things not thwarting they sorted to those their principles, with travail and pertinacity. But neither was this their natural history and experiment what it ought to have been, (certainly far wide of it;) and this sudden flight to the most general ruined all.

CXXVI. But it may occur still farther, that by a sort of inhibition against pronouncing and fixing determinate principles, till, through the middle degrees,

we have arrived at the most general, we are favouring an entire suspension of judgment, and leading to pure scepticism. Now we meditate and propose not an indefinite and endless incomprehension, but a right comprehension, (not *acatalepsia*, but *eucatalepsia*.) For we do not derogate from sense, but minister to it; and despise not the intellect, but direct it. And it is better to know what is needful, and yet think that we know not throughly; than to think that we know throughly, and yet know nothing of those we need to know.*

CXXVII. Again, some one shall doubt, perhaps, rather than object, whether we speak of natural phi-

* "C'est une ignorance savante qui se connoit."

The Delphic priestess spoke truly of Socrates, † though the response is not always truly interpreted. For he was pronounced the wisest of men, not because, in a positive sense, he knew nothing, or even because he so professed to know nothing; but, *comparatively*, because he knew nothing *perfectly*, or as he ought to know it; nor pretended to know that which he did not know; in which respect, he so far surpassed the other philosophers and teachers who affected to know every thing: "Ob eamque rem se arbitrari ab Apolline omnium sapientissimum esse dictum, quod hæc esset una omnis sapientia, *non arbitrari sese scire quod nesciat*." It is not opposed, but conformable, in this sense, to the response of a better oracle, and which requires a similar qualification: "If any man think that he *knoweth any thing, he knoweth nothing yet as he ought to know.*"

† "Whom well inspired the oracle declared
Wisest of men."

losophy only, or likewise of perfecting, according to our method, the rest of learning, logical, ethical, and political. And certainly we understand those things which have been said to concern the whole; and as the common logic, which governs things by syllogism, pertains not only to the natural, but all science; so ours, which proceeds by *induction*, likewise embraces all. For we construct a history and tables of invention, as well concerning *anger, fear, shame*, and the like; and even concerning examples of civil businesses; and as much concerning motions of the mind, as *memory, composition, and division, judgment*, and the rest; as of *warm and cold, or light, or vegetation*, or other such.* But, however, since our method of in-

* “*Quicquid agunt homines,*” not less than *quicquid cogitant*. And yet it is undoubtedly true, that the kind of induction enjoined by Bacon is more peculiarly applicable to physical science, and in that department more than others productive of fruit. The human mind itself is a subject for observation, but not for induction, in any proper sense of the word. No one expects, by any repetition of experiment, to discover a new faculty of mind hitherto unknown. Mind is itself the agent of discovery, but not the subject of any, except what is obtained by *attention* to its operations, and by its own immediate testimony or consciousness. For the evidence of whatever is predicated concerning its acts, therefore, reference must be made, not to any chain of reasoning, but to the direct observation of each individual inquirer.

In regard to civil affairs, as distinguished from natural or physical, whether these concern men individually, or as members of a political society, the case is different. In moral obligation, strictly so called, there is no room for discovery or invention of what is new; for there is an immediate consciousness of moral

terpretation, after history prepared and ordinate, contemplates not only the motions and discourses of the

right or wrong, irrespective of reasoning ; and, farther, a perfect rule has been delivered, which is to be applied, but cannot be improved. The induction, therefore, is confined to questions, not of the law, but of its application ; unless, with Archdeacon Paley, expediency or utility shall be received as the ground of moral obligation ; for this would be a proper subject of induction and experiment. In physical inquiry, a dependence upon that regular and constant order which prevails in the natural world is an important ingredient in all reasoning and induction employed upon its phenomena. But in human affairs and human conduct, there is no such dependence, or stedfast and uniform expectation. Besides, though moral culture is of much greater importance than physical learning, the pursuit is encountered by corresponding obstacles of much greater power ; and the advancement is less attainable. Truth, the object of physical science and discovery, is unopposed ; but, in moral science, truth is oftener disliked or unwelcome.

Inquiry into the material world has thus a prerogative of great value, that it is exempt from selfish interests. For the *Idola Tribus* of Bacon are fallacies of the intellect, not of the passions or affections, as influencing questions of a mixed nature : and the proficiency which he contemplated was that of learning in the usual sense of the term, by a better direction of the mind in pursuit of knowledge ; not great attainment or new methods of discovery in moral science, as distinguished from intellectual.

Of the difficulties experienced in that general learning which falls under moral as distinguished from physical inquiry, the attempted, but hitherto imperfect, science of political economy affords an instructive example. For, although the materials of experiment are fluctuating, as well as much diversified, the subject is not in itself unfit for induction ; but here, in a peculiar manner, the practical conclusions are not reached, nor the axioms admitted, because the reasoning is resisted and overcome

mind, (as the common logic,) but also the nature of things; we so direct the mind, that it may apply

by private interests, individual and corporate, or at least by what is supposed to conduce to such interests. The obstruction is from the *Idola Speeus*, the most difficult of all to be eradicated. And hence no science has made advances so inconsiderable, in respect to any general recognition of its right principles.

Another moral science, as distinguished from physical, to which the inductive process may, to a certain extent at least, be applied with advantage, is that of law and jurisprudence. The principles of justice, of the *bonum et æquum*, are not proper subjects of induction as tending to discovery; for they are founded in the moral law, and that which is of moral obligation to individuals ought to guide the legislator no less in the enactment of general laws. But, in so far as regards the modes of administering the law, the proper constitution of courts, the rules of evidence, and the order and forms of judicial proceedings as instruments, these are certainly fit subjects for experiment, and to be approved upon trial; for the inquiry is not what is right in itself abstractly, but what conduces best to the attainment of a particular end. For the same reason, many other parts of civil government, and the administration of public affairs, fall within the scope of induction, reasoning, and experience, by which alone their adaptation to use can be fully ascertained.

With regard to that branch of human learning which is peculiar to the fine arts, a similar distinction is necessary. For the qualities which please in a poem or a picture, or other production in this class of arts, act by immediate impressions upon the mind. But the means by which the artist shall best produce those qualities, by what connections of thoughts and similitudes, and what adaptation of words, or by what shades and colours, or what use of the chisel, these are proper subjects of experiment to him, as much as the discovery of the chemical properties of bodies, or their mechanical forces are to the physical inquirer. In regard to the

itself to that nature by apt modes in all. And, on this account, in the doctrine of *interpretation*, we give many and divers precepts, applying to the quality and condition of the subject about which we inquire, and in some part to the method of discovery.

CXXVIII. But this be it not allowed even to ques-

impression which is made upon others by these productions; those of painting and statuary are at once recognized, those of the poet not so soon; with exception of what is addressed to common sympathies, and clothed in natural language. For the two first appeal to the spectator through the external sense, the latter does so through the additional medium of language, and requires a greater effort of mind.

Whether philosophers in criticism will ever succeed in discovering a standard of taste, by which any one shall be enabled to measure what is grand or beautiful, and fix the extent of these qualities as he measures a column, or defines a boundary, is a very different question. If it is a subject for discovery, as distinguished from immediate consciousness or feeling, that discovery must evidently be reached through induction, not by anticipation, or any previous hypothesis. It must be a sum or result of the properties discovered in objects which give pleasure through the medium of sense to minds cultivated and exercised; and which conclusions, being reduced into rules or axioms, should be made a help whereby to measure new objects and new productions. But in this, as in other *logical* discussions, it would be well to begin with definition of the terms; the endeavour to do which, with accuracy, would probably shorten the inquiry, if not supersede it altogether. Definition will often reconcile opinions; or in the attempt to define, if unsuccessful, the question may vanish:

“ When wits, like fools, at war about a name,
Have full as oft no meaning, or the same.”

tion in regard to us; whether it is our desire to destroy and demolish the philosophy and arts and learning which we have: for, on the contrary, we embrace willingly both their use, and also culture and honours. Accordingly, we offer no kind of obstruction, neither deny but that those which have prevailed may both nourish disputations and adorn discourses, and be employed also and found serviceable to men for the business of their calling and advantages of civil life; in fine, like a sort of money, (or coin) may be received and pass with men by consent. And farther, we plainly intimate that the things which we advance will not well sort with those other; since they cannot be at all brought down to the understanding of the vulgar, unless by effects and works only. But this, itself, which we say of our affection and good-will toward the received learning, how truly we profess, let our writings set forth in public testify, (our books concerning the *advancement of learning*, particularly;) therefore, we shall not labour to convince it farther in words. But of this we constantly and explicitly give warning, that by the methods which are in use, neither great advances can be made in the doctrines and study of the sciences, nor they themselves be carried out to any amplitude of works.

CXXIX. It remains that we say a few things concerning the excellency of the end. These, if they had been mentioned before, might have seemed no better

than wishes; but hope being now raised, and unjust prejudices rid, may chauce to have greater weight. And if we had perfected and fully discharged our task, and were not proceeding to call others to a part and concert of labours, we should still have abstained from speech of this kind, lest it should be taken for a publishing of our deserts. But since the industry of others is to be sharpened, and their minds provoked and kindled, some things it is convenient to recall to men's recollection.

First, then, the introduction of noble inventions appears to hold by far the foremost place among human actions; and so the early ages determined. For to the inventors of things they ascribed divine honours; but to those who merited in civil matters, (such as founders of cities and empires, lawgivers, deliverers of their countries from long calamities, subverters of tyrannies, and others like to these,) they adjudged the honours of heroes only.* And cer-

* "The worship of heroes, so well distinguished from that of the gods in the earlier ages of Greece, clearly demonstrates to us that the gods were not heroes. The ancients believed that great men were admitted after death to the feasts of the gods, and enjoyed their felicity but not their power. It is true, that that devotion became imperceptibly transformed into a religious worship, but this was not until a much later period, when these heroes were identified with those ancient divinities whose name they bore, or whose character they imitated. In Homer's time they were still preserved distinct."—*Gibbon's Ess. on the Study of Literature*. "Quem virum, aut heroa,—celebrare? quem deum?"—*Hor.*

But as the author has observed in a preceding passage, the

tainly, if one compares them rightly, he will find this judgment of the old age to be just. For the benefits of inventions may belong to the whole human race, the civil exclusively to certain seats of men; these, again, endure not beyond a few generations; those, as it were, through perpetual times. And the amendments of civil estate proceed, for the most part, not without force and disturbance; but inventions bless and convey their advantages without the hurt or sadness of any one.

Besides, inventions are in a manner new creations, and somehow imitative of the Divine works; as he well sung:

*Primum frugiferos factus mortalibus œgris
Dididerant quondam præstanti nomine Athene;
Et reereaverunt vitam, leges que rogarunt.*

(Athens, that name renowned, the first gave birth
To fruitful arts, for labouring man's relief;
And life created new, and founded laws.)

And it seems worthy of note in Solomon, that flourishing in sovereignty, in treasure, in magnificence of works, in attendance and service, in shipping, moreover, and in renown of name, and in the height of men's admiration, he yet chose not any of these for the matter of his glory, but pronounced thus: "The glory of God is to conceal a thing; the glory of the king is to find out a thing."

Egyptians acknowledged a still different class, when placing in their temples many images of those animals to which they were indebted for discoveries useful to life, and improvements in art.

Then (if ho will) let any one reflect what difference is between the life of man in any the most cultivated province of Europe, and in some the wildest and most barbarous region of the new Indies; he shall esteem the difference so wide, as it may be deservedly said, that "man is to man a god," not on account of help only and advantage, but also on a comparison of estate. And this is procured neither by soil, nor climate, nor bodily power, but by arts.

Again, it is availing to remark the force and virtue, and consequences, of things invented; which in none others more manifestly appear than in those three unknown to the ancients, and whose beginnings, though recent, are dark and without celebrity; namely, the *art of printing*, *gunpowder*, and the *mariner's needle*. For these three have altered the face and condition of the whole world; the first in letters, the second in war, the third in navigation; whence innumerable changes of things have ensued; so that not any government, not any sect, not any planet, seems to have exercised a greater command and influx, as it were, upon human affairs, than these mechanicals have exercised.

Moreover, it will not be foreign to distinguish three kinds and degrees, as it were, of human ambition. The first is of those who desire to enlarge their own power in their own country; which sort is common and unworthy. The second, of those who struggle to extend the power and dominion of their country among human kind; and that has more of dignity doubtless,

not less of cupidity. But if one endeavours to renew and enlarge the power of the human kind itself, and its empire over the universe, beyond question this ambition (if it is to be so called indeed) is both more wholesome than the others, and more majestic. But man's sovereignty over things is placed in art and science alone. For nature is not commanded except by obeying.

Besides, if the usefulness of any one invention separately should move men so, as they should account him who, by some particular benefit, could bind the whole human race, to be more than man ; how much higher shall it not be thought to invent something so excellent, that by it all things else may readily be invented ? And yet, (that we may every way speak the truth,) in the same manner that we are much beholden to the light, for that by it we are able to journey, to exercise arts, to read, to discern each other ; and, nevertheless, the view itself of the light is a more excellent and a more beautiful thing than its manifold uses ; so, for certain, the very contemplation of things as they are, without superstition or imposture, error or confusion, is of greater worth in itself than the whole fruit of inventions.

Lastly, if any should object the depravation of knowledge and arts to uses of malice, and luxury, and the like, let it move no one. For it may be said of all earthly goods ; of wit, courage, strength, beauty, riches, light itself, and every thing else. Let mankind only recover their right over nature, which be-

longs to them by the Divine endowment, and room be given for its exercise, just reason and sound religion will direct the use.

CXXX. But it is time at length that we propose the art itself of *interpreting* nature ; in which, though we consider ourselves to have given the most useful and the truest precepts, yet we ascribe not to it an absolute necessity, (as if without it nothing might be done ;) nor even a perfection. For we are of this opinion, that if men had in readiness a just history of nature and experience, and occupied themselves sedulously in it, and had the mastery over themselves in two things ; the one, to lay aside received opinions ; the other, to restrain their minds, for a season, from the most general things, and the nearest to these ; it might be that, even by the proper and native force of the mind, and without other art, they should happen upon our form of *interpretation*. For *interpretation* is a true and natural work of the mind, when the lets which oppose it are removed. Yet, certainly, by the rules which we give, all things will be more in prospect, and much better assured.

Nor yet do we affirm, that to these nothing may be added ; but, on the contrary, we, who look at the mind, not in its proper faculty (or power) alone, but so far as it is coupled with things, ought to conclude, that the art of inventing may itself grow, and mature with inventions. *

* "Ita res accendent lumina rebus."—*Lucretius*.

REMARKS.

THE objects proposed by Lord Bacon in this work were: First, to show the erroneous course which the learning of preceding times had followed in the pursuit of knowledge; and this, which may be called the destroying part of his system, is not the least important benefit conferred by his philosophy: Secondly, to point out and illustrate the true way by which that pursuit can be conducted with any hope of success. Both these subjects are systematically treated in the Books of the *Novum Organum*, which are the only parts of his great design for the renovation of human learning which he professes to have perfected, or, at least, to have accomplished, what he had proposed concerning them. For, although he has, also, in the Second Book of this Treatise, and in his other writings, engaged, to a certain extent, in the pursuit itself, that is to say, the interpretation of nature, the achievement of the entire plan neither was, nor, as he has frequently stated, could be, within the reach or expectation of any one man, but must be a work of time and united labour.

How far he had himself conceived that a knowledge of nature, in that great extent of which he formed the conception,

is attainable, or that the sacred temple of physical truth which he contemplated can ever be completely reared by man, does not distinctly appear. His aim was not to check or circumscribe, but to encourage and enlarge philosophical inquiry; not to mark the boundary of human knowledge, but to widen its field. That there are such barriers, admits of no question; but to define them, is equally beyond our reach with other parts of knowledge; for these pillars always recede as they are approached. Inquiry into the will of God is limited by the announcement "thus far;" but not inquiry into his works, either in our own frame, or in the external world; that great manuscript, as it has been designated, and without irreverence, which the Almighty Creator has opened out to be read by his intelligent creatures. Yet there are observable elements of limitation in the attainment of the latter knowledge; the observation of which is no discouragement to the pursuit of what is truly valuable, but only to the chase of what is unsubstantial. And a just consideration of these elements is itself a useful part of knowledge. *Per multa sunt, de quibus salubrius est ambigere quam statuere.—Erasm.* There are many cases where it is unwise to pursue the receding abstractions of the intellect, and no more profitable than to throw an angle on the rock. There are many truths, also, to be received by a being constituted as man, of which the evidence does not rest exclusively upon the exercise of intellect; although it is the tendency, and a frequent error of philosophical minds, to act upon the contrary supposition.

Every thing in nature around him, and above and below the place of his habitation, reminds him equally of the limit to his intellectual as well as physical powers. The interior

of the earth upon which he dwells is accessible within a very narrow range only; and its profundities past his sounding line. So it is also with the regions above that earth, though probably having direct relations to it; and their profundities not less inaccessible. And so it is with the knowledge which he possesses even of himself; and, above all, in what forms the noblest part of his being, his intellectual and spiritual frame; for of these, as well as of what is without, his knowledge remains partial and imperfect.

1. There is an obvious limit to the extent of human knowledge, in proportion to the limit of the human faculties, both bodily and mental, compared with the extent and complexity of things that exist: and a barrier is thus formed, which, though undefined as to its exact place, is not the less real, and is felt to be so. For, like other parts of creation, the present powers of man, and his capacities of attainment, are suited to the uses and purposes of his present condition. The senses which give information of outward things fail beyond certain limits to give that information; and the material instruments which can enlarge their sphere of operation, however delicate or powerful, still leave their discoveries far within the range of external nature, whether it be in disclosing its amplitude or its minuteness. Neither is it imaginable that the human mind, as an instrument, can be so improved, either in its modes of exercise, or through the increase of acquired knowledge, as to reach even the whole of those relations in the natural world which have an influence upon this globe of earth and its inhabitants. For, although advances in knowledge tend to connect and simplify many things which, at first, appeared to be in disorder and inextricable, the mind attempts in vain

to grasp more than a part of those connections at once, or successively; and every new discovery, although it may reconcile things formerly adverse, or clear things formerly doubtful, instead of tending to exhaust the store, only adds to the number and variety of that which remains to be discovered; and it is thus even in things which are subjected to the sense, much more in the relations of things which are not so. Many things, also, which are obvious to sense, cannot be made the subject of experiment, not admitting either to be detained for examination, or repeated by effort; such as the phenomena of the atmosphere.

In some respects, the mental power is even less susceptible of uniform improvement than the mechanical and physical. The mind is a more complicated machine; it is also more subtle and evasive; its operations cannot be suspended, or its momentary fabrics arrested and examined. We cannot, by watchfulness or effort, reach the fine links of thought so as to examine the order of their succession. To a certain extent we can recal them, though not precisely in the former train; but effectually to guard against what are called fortuitous and arbitrary associations of thought (for in reality there are none such) is impossible; for even while attempting it, the train is going on. It is by reflection only, and repeated attention, that we discover and correct those false conclusions which the mind had already drawn from associated conceptions, not by a previous control, or direction given to their current. Farther, in that limited power of managing the mind which is attainable, the experience of one person does not directly profit another. The faculty must be exercised in each individual severally; and as there is no added stock or accumulation in moral

habits and affections, so it is also in the habits of thinking intellectually ; nor is it a part of learning which practically grows or increases.

Experience, therefore, is both more slow in its effects upon mental improvement, and more transient. A discovery in mechanism can, in most cases, be understood immediately, and is at once acknowledged ; is applied to use without hesitation ; and remains to future time for imitation or improvement. But those discoveries which instruct the mind are of a hidden nature, are indirect in their influence, and slow to be received. Having their operation *within* the mind, they are at once less subject to observation, and more easily perverted, or lost. And although these inventions may be recorded in writing, and are so published and communicated, this has no effect in fixing the opinions of their value, which are liable to change as before ; unlike the discoveries of the balance and the screw, which, once attained, are perpetuated.

It is true, that all the great works and fabrics of mechanical power are equally the contrivances of mind ; but when those works are effected, the results remain, and are unalterable. There is not inherent in them any tendency to vitiate or destroy themselves, as instruments ; they are immutable in their operation and principle, because instruments only. But the mechanism of the mind does alter, and is ever affected by errors, and delusions invading it ; and not only are the motives and principles by which it is actuated involved and complex, but also unstedfast and shifting ; for it is constantly in act, and is itself, also, both the instrument and the subject.

Analogous to the difference of the mechanical and intellectual power are the distinctions in scientific attainment. Thus, in surgery, understood as a peculiar branch of the

healing art, and conversant directly with the outward frame and its diseases, and which can, in most cases, verify its experiments by information of sense; the discoveries, when made, are more permanent, as well as more conclusive in the results, than inventions of remedy in other branches of medical science, where the distemper is inward, and assumes a greater diversity of forms.

2. The varieties of mind in different individuals, even those whose intellects have been most cultivated, tend plainly to obstruct the advancement of learning in all subjects of a moral and didactic nature, and to neutralize the conclusions and axioms which would otherwise be reached by experience. And such is the case even where there is no indisposition to receive the truth, arising from individual prejudice or self-interest. "Truly, the strongest opposition that I can possibly make to your opinions will derogate no more from your unquestionable excellency of judgment, than it would conclude either of us ill-sighted, should you affirm such a garment to be red, and I that it were green, the object being a changeable taffety, and we seated in contrary lights, or looking through mediums diversely tinted. A like effect upon the soul to these upon the sense hath diversity of education, and discrepance of those principles wherewith men meet first imbued, and whereon all our after reasonings are founded."—*E. of Bristol to Sir K. Digby.* Both the extent and limit of this principle are among the secrecies of the mind, in their origin and their influence, and form one of the less observed barriers to knowledge. For it opens up the whole field of association, fancy, and habits; and, if pursued, would account, in a manner not to be denied, however unprofitable the discovery, for most of the diversities in opinion and judgment

among men, when the pursuit of truth is the common object, in matters within the reach of their common faculties. Even theories framed to account for this and other facts in the province of mind, and which might deny the above solution, are subservient to it in the mind of the person by whom it is embraced, since they arise, as he conceives, from that very difference in the habits of thinking, as a cause and efficient.

Bacon, in one of his Aphorisms, has remarked what he considers as the chief characteristic distinction of minds; namely, that some are more prone to observe the resemblances of things, and others the differences. It is obvious that the axiom referred to, as well as others in his philosophical works, has a more immediate application in subjects of physical inquiry, on which the writer's mind was peculiarly intent. For, though the generic distinction thus noted has place also in most other subjects as well as in physics, there are important differences of mental constitution and habits of thought, which do not fall properly under that class, and which are very discernible in the departments of moral and critical inquiry. One which is at all times observable is, that some persons are prone to speculation, others have regard only to what is practical; to which that difference is nearly allied between minds which take a comprehensive, and those which take a more limited, view of things. The former, or speculative, reflects, and compares, and philosophizes upon subjects, however common in appearance or event, and desires to find some general principle under which to class them. The other does not seek farther than the immediate fact, or takes a limited view of the principle to which it is referred, confining the attention to a few of the many particulars to which it is applicable. Some minds, again, are

active and quick, others slow; some penetrating, others superficial. There is also a general and marked difference of minds, which, though akin to some of the others, may yet be distinguished from them; namely, the poetical or imaginative, and the unimaginative or prosaic. And there is, farther, a poetical and a prosaic period in the mind itself, according to the period of life in the same individual.

The influence of imagination may be, in a great measure, if not entirely, excluded from physical research, and strict experiment in natural history, as it is unquestionably from the conclusions of science usually so called. But in other subjects, whether moral or critical, including even logical reasoning, it is not, and cannot be so, but forms in reality a large part, and in some, as in oratory, the chief ingredient. But, in truth, all passion is poetical, whether it be expressed in works of pure fiction, or in narrative, or drama, or even in the language of ordinary life; as may be witnessed every day. Nor, in reality, can the language of poetry and imagination be altogether banished even from science. Witness the descriptions and nomenclature of scientific inventions, and of those works which are regulated wholly by mechanism and mechanical laws, but of which the different parts, and their action, are often expressed by terms analogous to mind and will, and in a style and language highly figurative. Nor is this altogether from necessity, but, in great measure, also, from admiration of the work, and of that fine adaptation to its purposes which suggests the allegory, and impresses the mind of the artist in a manner not to be resisted.

There is one source which gives rise to diversities of judgment, if not also to erroneous reasoning, which has not

been specially distinguished by Lord Bacon, but has a large practical application. For, besides the *Idola Tribus*, or fallacies common to man in his own world or microcosm, and the *Idola Specus*, which are those peculiar to each individual, considered as a still lesser microcosm or world to himself, there is an intermediate class which admits of being separately noted, and might be designated as *Idola Mercurii*, or *Tabernæ*; fallacies of trade and profession. For the several classes and orders of men, and the various professions, whether liberal or mechanical, whether of law, merchandise, medicine, the civilian, the soldier, the mariner, the trader, all have their several and peculiar *dens*, in the language of Lord Bacon, which circumscribe their view. And as there is a pedantry belonging to every such class, so there are in each certain fallacies which are peculiarly apt to mislead or distort the judgment.

But, independent of such causes of error, the different constitution of minds affects the conclusions of reasoning, and the judgments which are formed, on all subjects of a mixed character. The reasoning may be exact, and ought to convince, yet is turned aside, and becomes pointless. Such is the condition, in like manner, of what is called *wit*, in all its forms, and the reception which it meets with from different persons.

“A jest's prosperity lies in the ear
Of him that hears it, never in the tongue
Of him that makes it.”—*Shaks. L. L. L.*

Or, in the downright and native language of Goldsmith, “A jest, calculated to spread at a gaming table, may be received with perfect indifference should it happen to drop in a macerel boat.”

But not only are there great diversities of mind, by which the opinions of different persons are variously affected, and their judgments disturbed; there is, also, great diversity of mind in the same individual at different periods, and under different circumstances. It is not only various therefore in many, but mutable in all.

To this versatility of the human mind any one who attends to his own thoughts will at once bear witness. Who that has lived some years after the maturity of his intellect is not conscious of the changes which take place in his opinions, not from additional or more correct information merely, but also from many other causes which he can scarcely trace or account for; from changes of temperament, or new associations or events, which give their colour to his intellect through the channel of his affections, presenting the same objects in a different light? Let him attempt to record his opinions upon any question of a general nature, where there is not a standard by which to fix and limit his inquiry; and he will find the tablet to be continually changing; written, and effaced, and written again.

In this respect it is plain how marked the difference is between man and the other creatures inhabitants of the earth. For these last partake of the constancy of nature in the outward and material world; being governed, so to speak, more directly and immediately by their Creator, with less intervention of will on their part, or liberty either of advancing beyond the allotted bound, or of sinking below it. As objects of experiment, therefore, to the natural philosopher, there is no animal, man excepted, whose character and habits may not, by observation, be ascertained nearly with the same precision as inanimate nature. The knowledge

of the lower creation, whether animate or inanimate, organized or inorganic, admits of being perfected by man more easily than the knowledge of himself.

3. There is a limit also in the attainment of knowledge, occasioned not by the penury, but the abundance of its materials; that is, by the accumulation of facts and recorded experiments; and which must be compared by the intellect, and treasured up for use. The *sylva* and *supellex* become, in some measure, a burthen, and the mind is in danger of breaking down under the weight of its conquest and spoil. It was a complaint of Hales, that before his time, the books of common-places had become so numerous in their schools of learning, "that it was a great part of *Clerkship* to know how to use them."—*Remains*. This difficulty is well known by experience in the administration of the law, and its application to practice; for the decisions in law have a similar relation to its rules, though the order of the interpretation be reversed, as physical experiments have to the discovery of natural laws. But the mass of reported cases in the municipal law becomes, by accumulation, so great, and the precedents are so various, and often nicely shaded, that the greatest professional acuteness may be baffled in the search of what the axioms and rules really are. So that, between the adjudged cases and the numerous commentaries, the text itself of the law is nearly overlaid and lost.

"Pars minima est ipsa puella sui."

Thus it is likewise in the science or profession of medicine; for in it also the number of reported experiments accumulates nearly in the same proportion; and if all are to be examined and compared, the student and practitioner in the art may be forced at last either to suspend his judgment of

the actual result, or to proceed from necessity upon conclusions which he did not, and could not, verify to his own satisfaction.

But it must equally be so where the subject of inquiry is the material world, or what is outward and physical; and even more so in that large department of knowledge, because the ingredients are so multiform and complex, and the reported experiments must be numerous in proportion. The memory becomes overloaded, and the effort to reduce the materials to order, and verify the conclusions which are suggested to the mind, exceeds its power, unless this attempt be confined to some portion only of the whole; and, in the latter case, the conclusion must be uncertain to this extent, that it may be disturbed or contradicted by discoveries in another branch, and the axioms which were constituted be thus deprived of their force.

Cicero complained (*Tusc. Quæst.*) of the number of theories in natural philosophy; and drew the conclusion, that instead of attempting to search into the foundations of each separately, it was necessary to adhere to the authority of some one philosopher whose system was the most plausible. And it will naturally happen, that the multiplicity, not of theories, but of experiments and facts, should lead to a similar result.

Let the case be taken of the sensible atmospheric changes in their varieties and vicissitudes, differing so widely in the periods of their returns, and often at intervals so distant, and these varying in the various regions of the earth; and let it be supposed that those numberless changes shall be observed and recorded; the mind is unequal to the effort of conceiving how this accumulating mass of materials may be examined, and separated, and digested; or what length of time or ex-

tent of observation would be sufficient to perfect the science of meteorology, and establish its conclusive axioms. Besides, physical experiments cannot, except to a very limited extent, be verified by any one individual; and, however capacious his mind may be, he must receive the greatest part of the information, from which he reasons, upon the testimony of others; that is to say, upon authority.

The obstructions interposed in the manner now referred to apply to speculative philosophy and all moral and didactic learning, as well as to physical and scientific; since the multitude of recorded opinions, in books and histories of the human mind, is even greater than that of recorded facts; and the record more changeable and uncertain.

For let any one at all accustomed to reflection begin to express his thoughts in writing, upon any subject which has attracted his attention, and give scope to their current; he will find that no period can arrive when that course naturally stops, or when he can arrive at a conclusion of the subject, or termination of his work. New ideas and relations, and associations, arise in succession, and without a close.

It may be observed, that one of the greatest instruments for the advancement of knowledge by the ease with which it is communicated and diffused, namely, the art of printing, does, in reality, increase the difficulty and hinderance in question, by dispersing narratives and opinions so widely and so profusely; and, in that respect, becomes an element of limitation. So that the human intellect, when its exertions are greatest, and attainments highest, or of most promise, is again brought within its bound; being alternately incited and circumscribed, like the horse in his manege, but not always with the horse's docility.

Proposals have been sometimes made in particular departments of learning, to obviate the evil occasioned by this multiplication of their stores; but not with much prospect of a remedy to be effected. In the departments of jurisprudence this may be, and has been, accomplished to a certain extent. For the laws themselves, when they have become numerous and complex, and thereby obscure, may be digested and reduced into order, and abridged of their superfluities, and rendered clear in their enactments. The same advantage, however, cannot be obtained even in that department with regard to the commentaries and the reports; which refuse to be thus dealt with. But in other subjects of science, and philosophy, and literature, there is a want altogether of any legislative authority by which the benefit can be conferred or attempted. The lawgivers may abridge their own laws; but who shall abridge science? It has, indeed, been proposed, or rather imagined and wished, that a purification of this kind should be made in it, by riddance of superfluous books and registers, and consolidation of what is useful. Such was the proposal of D'Alembert, that in the several departments of learning there should, at certain fixed periods, be a collection made of all the reported facts and discoveries; and after selection of such as are found to be important, the rest should be discarded, and the record destroyed.—(*Melanges.*) The proposal was not without precedent, for it is an easy suggestion of the mind. “It is not a melancholy *utinam* of my own, but the desires of better heads, that there were a general synod for the benefit of learning, to reduce it, as it lay at first, in a few and solid authors, and to condemn to the fire those swarms and millions of rhapsodies, begotten only to distract and abuse the weaker judgments of scholars, and to

maintain the trade and mystery of typographers."—*Religio Medici*. But as to facts either of natural or civil history, there are none unimportant, if duly verified. With regard to books and the records of opinions, great part of which, both speculative and didactic, might no doubt be spared, as "worth a sponge," no intimation is given by the proponnders of such plans, under what authority the synod shall be constituted, and by what rule the partition be made of what is profitable from what is useless. As to the evil of so many books being written, Bacon himself has justly remarked, that it can only be cured by writing more books; superseding, namely, the trivial and imperfect, by such as are substantial and comprehensive. But it is not to be doubted, under this head, that even the power which man acquires by extension of his knowledge and its additional stores, may become in turn an element of limit to its farther attainment.

4. There are other impediments to the advance of knowledge, arising from errors which do not fall exactly within Bacon's enumeration; nor did they come, perhaps, within the scope of his inquiry, which had particular regard to interpretation of nature in the external world, or the science of physics. But the errors are nevertheless important, and have a powerful influence.

Under the *Idola* in question may be comprehended those numerous fallacies and delusive doctrines which relate to civil affairs and the concerns of life; where selfish interests mislead in the pursuit of truth, or oppose the communication of it to others when it is discovered; in one case through mistaken views, in the other by design. Of the former description are theories relating to trade and commerce, and other subjects of national or political economy; the princi-

ples and true axioms of which, in consequence of the private or corporate interests which they affect, are reached with so much difficulty, and so tardily acknowledged, even by those who, in other subjects of reasoning, are acute and penetrating. Hence the slow progress made in that branch of learning, and the resistance given to conclusions in it, however clearly deduced, and however justified by experience; and hence the many practical errors committed in this department by legislators and rulers.

Examples of the second kind are not less numerous, where the obstruction to a general advance in knowledge arises not from mistake but design. The *Idola* commented on by Lord Bacon form obstacles in the way of those who are supposed to be in search of truth, and desirous to make it known. But in the cases now referred to it is otherwise; for here the opposing difficulties are the work of learning, and superior knowledge. Many subjects of a simple nature in themselves, and either obvious at once, or admitting of a clear explanation, are, of purpose, rendered complex, or veiled in obscurity of language or of argument. Nor is this evil confined to subjects of abstract science or speculative inquiry, but is extended to those active professions which affect society in its near interests, and the duties as well as the wants of individuals; where the information ought, consequently, to be plainest, and the truth rendered most palpable. Such are the verbal mysteries of law and legislation, of medicine and pharmacy, and the other cherished pedantries of learning.

And it is not only in subjects of science and skill that the evil has taken root; but it is the same in regard to the ordinary affairs of life, and the common transactions of society. Of this the chief example is found in what relates

to money as a medium of commerce, and its artificial regulation; and to exchange, and balance of trade, and whatever falls within the business of the banker and money-dealer. For these subjects are not of necessity intricate, or difficult to understand, if allowed to explain themselves; but they are rendered complex to appearance by the technicalities of art with which they are surrounded. In these, and other cases of a similar kind, extending even to matters of taste and the refined arts, it is the mystery, contrived or upheld, which creates the real obstacle, and knowledge itself which is made the instrument of ignorance.

In respect to works of art, if the *jargon** of the professing critic were dispensed with, it would be found that there is a much more general concurrence than is often supposed in the judgments which are formed of these productions. A good representation of nature commends itself to the common spectator as truly as to the nominal critic, however learned, although the approbation of the former may not be expressed in the same phraseology. What he does not know is, *how* the work has been done, and the effect produced. But whether it *is* produced or not is a judgment which neither the artist nor the professional critic forms with more certainty or clearness, than any other spectator of cultivated mind and delicate perception, although not a student in the school. As to poetry, in the limited acceptance of the word, the case is, in some respects, different. For it is more conversant with mind, and its operations, whereas painting and sculpture derive more from what is outward, and received on the information of sense. Not that a popular sympathy is wanting with a poetical picture,

* A word become low, but for which there is not a good synonyme.

where the narrative or sentiments touch the common feelings, and that even in the humblest and most untaught classes, according to Moliere's test. But to the niceties of thought and composition, the adaptation of metaphors, or the refined beauties of language, the majority of readers are insensible. In music, a distinction may be made between that which consists chiefly in artifice, or difficulty of combination, and that which is natural, or marked by greater simplicity of conception. For, although the former may require much experience to appreciate the skill of the artist, the noblest compositions in the latter, and upon which genius of the highest order has been exercised, are yet understood by all, and produce their effect even when poured into the common ear. In many subjects, accordingly, the refinements of art must be tried by the standard of public opinions, and general consent; and the artist in such works, whether of poetry, romance, oratory, painting, or other invention, must judge his art by its operation upon the popular mind and feeling, contrasted with his critical rules, however nice, and his theoretical method, however unanswerable it may appear.

5. Another obvious limit to the progress of human knowledge, and the amount of its discovery, is occasioned by the vicissitudes of the human race in the successive generations of men, by which the stream becomes an interrupted current, liable to be often broken and dispersed. For besides those revolutions of empires, and devastations of countries, which have, at different periods, buried so many great works and monuments, and even obscured the knowledge of invented arts, the natural period of human life is, in one respect, a bar both to the collection and retention of acquired learning.

For, as already observed, the delivery of learning from one

individual to another is not properly the *traditio scientiæ*, or of knowledge attained, but rather the *traditio lampadis*, or of direction merely. Although it instructs in the methods of discovery, and informs of results obtained, each inquirer must begin *de novo* to understand and treasure that information. And it is the same with successive generations of men. Human learning does not, therefore, advance in a continuous line, but rather in a circular progress, with alternate elevation and depression; and although there are always some individuals on the summit for the time, they are followed by others who must ascend by certain degrees to a similar position; and so in the case of all who succeed.

A remarkable exception, indeed, to this usual course of human history and events is found in the case of China; and it may be, in a greater or lesser degree, in some other histories and eras of the world. But, in the instance of the Chinese, the illustration is remarkable as falling under present observation; namely, that the obstacle to proficiencie in learning has not been presented by the changes of empires or revolutions of society, but by their permanence. So that for a succession of centuries no improvement or alteration appears to have taken place among that people; and that it has been so not in their laws merely, but manners and institutions, and economical customs. A reverence for antiquity, supported by despotism in the government, has probably contributed largely to this result; and another ingredient is found in the separation from other countries, and from knowledge of their arts, and learning; a separation favoured by the local position of that empire on the globe. But the effect has certainly been, that the progress of knowledge among that otherwise cultivated people has been opposed, not by the vicissitudes of

the human race, but by the absence of such revolutions and changes.

It may be observed here, in reference to the communication of knowledge even during the same age, and among contemporaneous nations, that there is much less of actual interchange than might reasonably be expected; a sufficient evidence of the slow progress of imitation where the question is of improvement. For not only in the case of remote regions of the earth, but among the civilized countries of Europe, that family of nations, there are many useful discoveries and applications of science to the purposes of life, which, though sufficiently suited to all, remain peculiar to the people with whom they originated. They may be reported by travellers, and be well known to others; but in most cases are adopted very tardily, and in some not at all, by the foreigner.

6. Some of those Idola, or classes of fallacy, described by Lord Bacon, and against which the intellect is to be warned, may not only be considered as causes of error, but, farther, as forming ultimate barriers to the pursuit of learning. More especially is it so with language, which, though accuracy of conception and conclusiveness of reasoning are independent of it in any one individual, prevents the same accuracy in the communication of those conceptions to others, and, consequently, the community of thought, and the progress of united labours. And it is a hinderance to that co-operation, which we cannot conceive to be altogether overcome at any period of advancement in science. For some of the imperfections are inherent in the instrument itself of verbal communication; some from its limit, as failing to convey the shades and niceties of thought; others from ambiguity of words admitting more than one signification, and thus of

being received by different persons in senses not only different but sometimes opposed ; for, by frequent use, they slide into new and varied significations, either more enlarged or more restricted, or lose their primary signification, and only retain the figurative. On the other hand, figurative words, by long use, often become prosaic ; and the return to the primary and literal sense may, in skilful hands, become poetical again ; an art which Milton has best understood. We find some words by these changes degraded to a lower meaning, others elevated to a higher ; some gradually losing their original sense altogether, and acquiring a sense exactly the reverse. Nouns pass into verbs, and verbs into conjunctions and adverbs. There are very many words which have a variety of meanings, and few, comparatively, which “ bear a single sense.” In subjects of reasoning, figurative language is, of course, disallowed as far as possible ; for the words which are often most acceptable to the poet are unwelcome and altogether troublesome to the logician. But it is only in degree that it can be deprived of that quality. Language is inherently figurative ; for there are few words which may not be transferred from their literal and direct signification to an indirect and collateral. Nor does time contribute to improve and purify a language ; but, on the contrary, corrupts and depraves it, till it ceases to be used as a medium of intercourse ; and then it is only relieved from its fluctuations, but not, of course, from its ambiguities.* As it is thus in the

* The changes of words, and consequent revolution of language, even that of any one nation and country, offer a mine, not soon to be exhausted, of philosophical criticism ; and if collected and brought into a method, more fully than has yet been done, would be an acquisition not to literature only, but to science in its higher sense.

In reference to the fluctuations of living languages, some exception or qualification ought, perhaps, to be made of certain Asiatic or other Eastern tongues,

dialect of each particular country, much more is the difficulty increased by the number and variety of written languages among men ; for redress of which, no attempt at one more general, and perfect as a standard, has been found practicable, or is expected. It seems, therefore, that language, by its necessary imperfections, will always disturb and be a hindrance in building the tower of human science.

7. The real progress of knowledge is impeded by too much effort made for the attainment of it, when made in a wrong direction. The advancement is obstructed by attempts to give additional clearness to things which are not less clear than the evidence adduced to illustrate them ; whether these things be operations of mind, or facts and appearances in nature. And the error may be committed either by the useless attempt at definition, or, which is equally out of place in such subjects, by reasoning. Truths already evident require no such help, and can derive by them no additional light. "Il sol non ha corona che di raggi suoi." It must be confessed, however, that to agree upon what truths are thus self-evident, and to be received and believed as principles without farther proof, is a step in learning towards which, however desirable, and though suggested at various times, there has been little advance by any general consent of philosophers.

But the course of learning has been equally obstructed by the efforts made to solve difficulties and penetrate into depths, partly in moral and partly in physical science, which, if we reason from the entire want of success attending such labours, may justly be considered beyond the compass of the human faculties ; an oak too strong for the arm of Milo. And this

which have been little subject to change or depravation. But of the general tendency in question there are abundant examples.

limit is equally discernible in mind itself, as in the natural world. For of the *essence* of the human mind, and the first springs of action in it, we have no knowledge, but only of its qualities and its operations. It would be of no small advantage to learning, therefore, if it might be accomplished, to have, along with Inventories of Desiderata and of Doubts, an Inventory also of Insolubles; of those inscrutable things which ought to be excluded from the researches of science, and forbidden. But here, too, as in the other case, that question recurs, who shall make up the lists? and how shall the consent be obtained?

What is real in human knowledge, like what is real in human duty, and in human happiness, is not found in abstractions; and what is truth to man does not lie in extremes, but rather in a mean; of which experience and inductive philosophy afford sufficient evidence. Such appears plainly to have been the view of Lord Bacon; and such the just estimate which he formed, both of the proper objects of learning, and what ought to be the expectation of its results. This indication of his own mind is clearly given in the 104th Aphorism of this Book. “Etenim axiomata infima non multum ab experientia nuda discrepant. Suprema vero illa et generalissima (quæ habentur) notionalia sunt, et abstracta, et nil habent solidi. At media sunt axiomata illa vera, et solida, et viva. in quibus humanæ res, et fortunæ, sitæ sunt; et supra hæc quoque, tandem, ipsa illa generalissima; talia scilicet, quæ non abstracta sint, sed per hæc media vere limitantur.”

And although the indication here given, as to the futility of the most general axioms, is qualified by the words “quæ habentur,” it is plain that the ground and reason of the doc-

trine equally supposes, at all times, an abstraction, or generalization, in the pursuit of human learning, which overshoots the mark, and is unattainable, and the effort to attain it unprofitable.

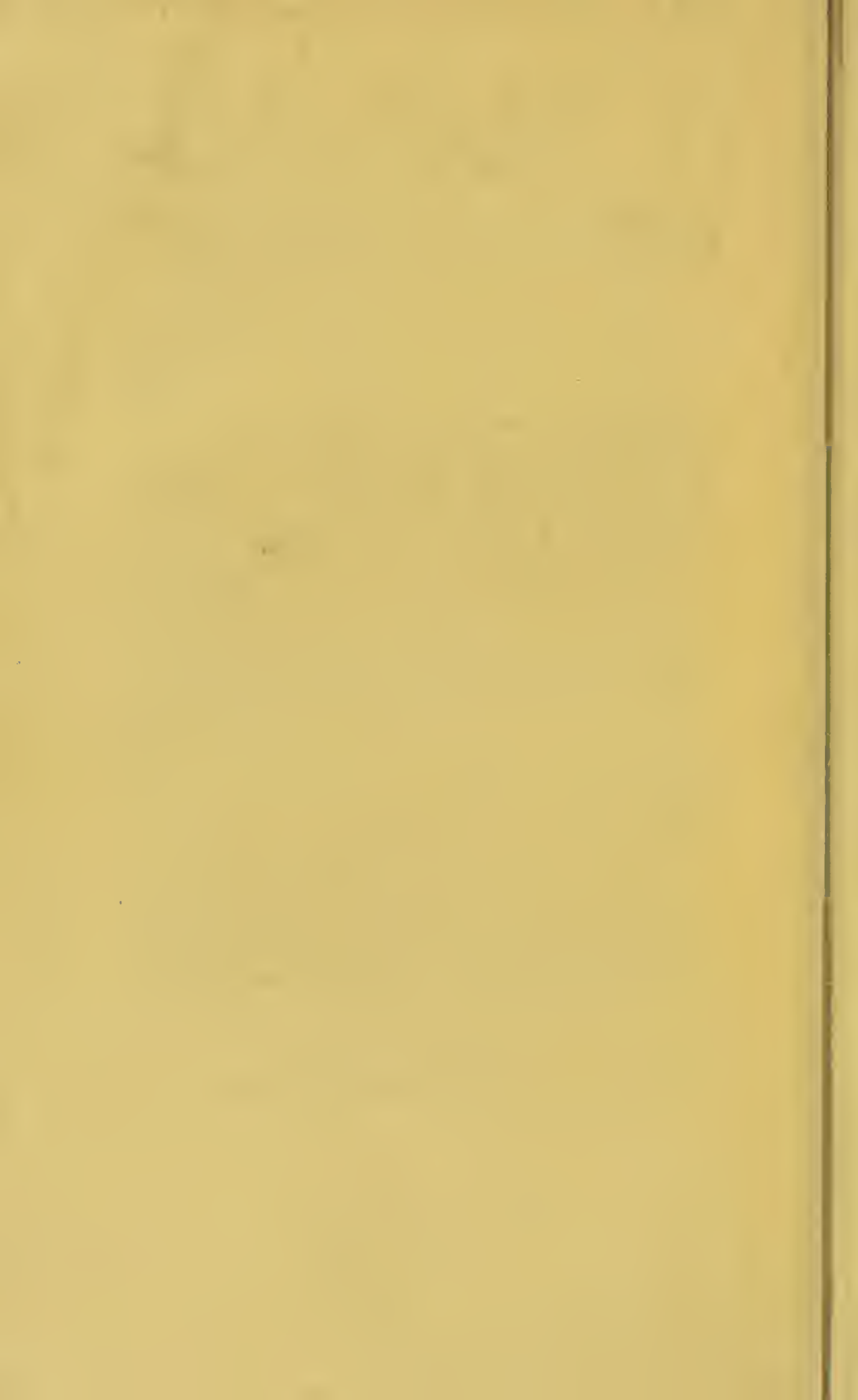
As learning does not in itself constitute happiness, so neither does it wisdom. And if the intellect does not consent to limit its inquiries, as the will must be content to bound its desires, it will be involved in a vortex of doubts, and lost in a labyrinth of opinions, which is adverse to true philosophy, not less than to tranquillity of mind. To know the boundary of science, therefore, is necessary as well as to know its expansiveness. It is even an exaltation of the reasoning power, that it reaches to a knowledge of its own limited nature.

This principle has its application, not only in physical science, but in all departments of human knowledge; for there are metaphysics in all. A logical truth may be so cut by nice distinctions, and divided, as to lose its power of convincing. An extreme criticism defeats its purpose of correcting. A mathematical truth may be demonstrated, and yet not believed. It is proverbial, that the height of justice may become unjust, and a legal right be so enforced as to prove a moral wrong and iniquity.

And, even in the Divine law, it is declared that a commanded duty may be so observed in the letter as to violate the spirit; and the rigid observance of a commanded rite be unaccepted, if in the room, or to the neglect of another and higher command, which postpones sacrifice to mercy.







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