It is an observation which has been often repeated since Bacon's time, and which, it is astonishing, was so long in forcing itself on the notice of philosophers, That, in all our reasonings about the established order of the universe, experience is our sole guide, and knowledge is to be acquired only by ascending from particulars to generals; whereas the syllogism leads us invariably from universals to particulars, the truth of which, instead of being a *consequence* of the universal proposition, is *implied* and *presupposed* in the very terms of its enunciation. The syllogistic art, therefore, it has been justly concluded, can be of no use in extending our knowledge of nature*.

* On this point it would be a mere waste of time to enlarge, as it has been of late explicitly admitted by some of the ablest advocates for the *Organon* of Aristotle. "When "Mr Locke, (I quote the words of a very judicious and acute logician) when Mr "Locke says—'I am apt to think, that he who should employ all the force of his rea-"son only in brandishing of syllogisms, will discover very little of that mass of know-"ledge, which lies yet concealed in the secret recesses of nature;'—he expresses him-"self with needless caution. Such a man will certainly not discover any of it. And if "any imagined, that the mere *brandishing of syllogisms* could increase their knowledge, "(as some of the schoolmen seemed to think) they were indeed very absurd." (*Commentary on the Compendium of Logic* used in the University of Dublin. By the Rev. John Walker. Dublin 1805.)

To the same effect, it is remarked, by a later writer, with respect to Lord Bacon's assertion, "that *discoveries* in Natural Philosophy are not likely to be promoted by "the engine of syllogism;"—"that this is a proposition which no one of the present "day disputes; and which, when alleged by our adversaries, as their chief objection to "the study of logic, only proves, that they are ignorant of the subject about which "they are speaking, and of the manner in which it is *now* taught." (*See an Anonymous Pamphlet printed at Oxford in* 1810, p. 26.) Dr Gillies has expressed himself in terms extremely similar upon various occasions. (See, in particular, Vol. I. pp. 63, 64, 2d edit.)

This very important concession reduces the question about the utility of the Aristotelian logic within a very narrow compass.

To this observation it may be added, That, if there are any parts of science in which the syllogism can be advantageously applied, it must be those where our judgments are formed, in consequence of an application to particular cases of certain maxims which we are not at liberty to dispute. An example of this occurs in the practice of Law. Here, the particular conclusion must be regulated by the general principle, whether right or wrong. The case was similar in every branch of philosophy, as long as the authority of great names prevailed, and the old scholastic maxims were allowed, without examination, to pass as incontrovertible truths *. Since the importance of experiment and observation was fully understood, the syllogistic art has gradually fallen into contempt.

A remark somewhat similar occurs in the preface to the *Novum Organon*. "They who attributed so much to logic "(says Lord Bacon) perceived very well and truly, that it was "not safe to trust the understanding to itself, without the guard "of any rules. But the remedy reached not the evil, but be- "came a part of it: *For the logic which took place, though it "might do well enough in civil affairs, and the arts which con- "sisted in talk and opinion*, yet comes very far short of subtilty, "in the real performances of nature; and, catching at what it

* "Ce sera un sujet éternel d'étonnement pour les personnes qui savent bien ce que c'est "que philosophie, que de voir que l'autorité d'Aristote a été tellement respectée dans les "ecoles pendant quelques siècles, que lors qu'un disputant citoit un passage de ce "philosophe, celui qui soutenoit la these n'osoit point dire *transeat*; il falloit qu'il niât "le passage, ou qu'il l'expliquât à sa manière." Dict. de Bayle. Art. *Aristote*.

" cannot reach, has served to confirm and establish errors, rather " than open a way to truth *."

It is not, however, merely as a useless or inefficient organ for the discovery of truth, that this art is exceptionable. The importance of the very object at which it professedly aims is not a little doubtful. To exercise with correctness the powers of deduction and of argumentation; or, in other words, to make a legitimate inference from the premises before us, would seem to be an intellectual process which requires but little assistance from rule. The strongest evidence of this is, the facility with which men of the most moderate capacity learn, in the course of a few months, to comprehend the longest mathematical de-

---

* As the above translation is by Mr Locke, who has introduced it in the way of apology for the freedom of his own strictures on the school logic, the opinion which it expresses may be considered as also sanctioned by the authority of *his* name. (*See the Introduction to his Treatise on the conduct of the Understanding.*) I cannot forbear remarking, on this occasion, that when Lord Bacon speaks of the school logic as " answering well enough in civil affairs, and the arts which consist in talk and opinion," his words can only apply to *dialectical* syllogisms, and cannot possibly be extended to those which Aristotle calls *demonstrative*. Whatever praise, therefore, it may be supposed to imply, must be confined to the Books of *Topics*. The same observation will be found to hold with respect to the greater part of what has been alleged in defence of the syllogistic art, by Dr Gillies, and by the other authors referred to in the beginning of this section. One of the ablest of these *seems* to assent to an assertion of Bacon, " That logic does not help towards the invention of arts and sciences, but only " of arguments." If it only helps towards the invention of arguments, for what purpose has Aristotle treated so fully of demonstration and of science in the two books of the Last Analytics?

monstrations; a facility which, when contrasted with the difficulty of enlightening their minds on questions of morals or of politics, affords a sufficient proof, that it is not from any inability to conduct a mere logical process, that our speculative errors arise. The fact is, that, in most of the sciences, our reasonings consist of a very few steps; and yet, how liable are the most cautious and the most sagacious, to form erroneous conclusions!

To enumerate and examine the causes of these false judgments is foreign to my purpose in this section. The following (which I mention only by way of specimen) seem to be among the most powerful. 1. The imperfections of language, both as an instrument of thought, and as a medium of philosophical communication. 2. The difficulty, in many of our most important inquiries, of ascertaining the *facts* on which our reasonings are to proceed. 3. The partial and narrow views, which, from want of information, or from some defect in our intellectual comprehension, we are apt to take of subjects, which are peculiarly complicated in their details, or which are connected, by numerous relations, with other questions equally problematical. And lastly, (what is of all, perhaps, the most copious source of speculative error) the prejudices which authority and fashion, fortified by early impressions and associations, create to warp our opinions. To illustrate these and other circumstances by which the judgment is apt to be misled in the search of truth, and to point out the most effectual means of guarding against them, would form a very important article in

a philosophical system of logic; but it is not on such subjects that we are to expect information from the logic of Aristotle *.

The fundamental idea on which this philosopher evidently proceeded, and in which he has been too implicitly followed by many even of those who have rejected his syllogistic theory, takes for granted, that the discovery of truth chiefly depends on the reasoning faculty, and that it is the comparative strength of this faculty, which constitutes the intellectual superiority of one man above another. The similarity between the words *reason* and *reasoning*, of which I formerly took notice, and the confusion which it has occasioned in their appropriate meanings, has contributed powerfully to encourage and to perpetuate this unfortunate mistake. If I do not greatly deceive myself, it will be found, on an accurate examination of the subject, that, of the different elements which enter into the composition of *reason*, in the most enlarged acceptation of that word, the power of carrying on long processes of *reasoning* or *deduction*, is, in point of importance, one of the least †.

---

* In the Logic of *Port-Royal*, there is a chapter, entitled, *Des sophismes d'amour propre, d'interêt, et de passion*, which is well worthy of a careful perusal. Some useful hints may be also collected from Gravesande's *Introductio ad Philosophiam*. See Book ii. Part ii. (*De Causis Errorum.*)

† It was before observed (p. 148.) "That the whole theory of syllogism proceeds "on the supposition, that the same word is always to be employed in the same sense; "and that, consequently, it takes for granted, in every rule which it furnishes for the "guidance of our reasoning powers, that the nicest, and by far the most difficult part "of the logical process, has been previously brought to a successful termination."

In this remark (which, obvious as it may seem, has been very generally overlooked,)

The slightest reflection, indeed, may convince us, how very little connection the mere reasoning faculty has with the general improvement of mankind. The wonders which it has achieved have been confined, in a great measure, to the mathematical sciences,—the only branches of human knowledge which furnish occasion for long concatenated processes of thought; and even there, *method*, together with a dexterous use of the helps to our intellectual faculties which art has discovered, will avail more than the strongest conceivable capacity, exercised solely and exclusively in habits of synthetic deduction. The tendency of these helps, it may be worth while to add, is so far from being always favourable to the power of reasoning, strictly so called, that it may be questioned, whether, among the ancient Greek geometers, this power was not in a higher state of cultivation, in consequence of their ignorance of the

---

I have found, since the foregoing sheets were printed, that I have been anticipated by M. Turgot. "Tout l'artifice de ce calcul ingénieux, dont Aristote nous a donné les "règles, tout l'art du syllogisme est fondé sur l'usage des mots dans le même sens; "l'emploi d'un même mot dans deux sens différens fait de tout raisonnement un sophisme; "et ce genre de sophisme, peut-être le plus commun de tous, est une des sources les "plus ordinaires de nos erreurs." *Oeuvres de M. Turgot*, Tom. III. p. 66.

Lord Bacon had manifestly the same conclusion in view, in the following aphorism: "Syllogism consists of propositions, propositions of words, and words are the signs of "notions; therefore if our notions, the basis of all, are confined, and over hastily taken "from things, nothing that is built on them can be firm; whence our only hope rests "upon *genuine* induction." *Nov. Org.* Part I. Sect. I. Aph. 14. (Shaw's Translation.)

On what grounds Dr Gillies was led to hazard the assertion formerly quoted (p. 251,) that "Aristotle invented the syllogism to prevent imposition arising from the abuse of "words," I am quite unable to form a conjecture.

algebraical symbols, than it exists in at this day, among the profoundest mathematicians of Europe.

In the other sciences, however, the truth of the remark is far more striking. By whom was ever the art of reasoning so sedulously cultivated as by the schoolmen, and where shall we find such monuments of what *mere reasoning* can accomplish, as in their writings? Whether the same end might not have been attained without the use of their technical rules, is a different question; but that they *did* succeed to a great degree, in the acquisition of the accomplishments at which they aimed, cannot be disputed. And yet, I believe, it will be now very generally admitted, that never were labour and ingenuity employed, for so many ages, to so little purpose of real utility. The absurdity of expecting to rear a fabric of science by the art of reasoning alone, was remarked, with singular sagacity, even amidst the darkness of the 12th century, by *John of Salisbury*, himself a distinguished proficient in scholastic learning, which he had studied under the celebrated *Abelard*. "After a "long absence from *Paris* (he tells us in one passage) I went "to visit the companions of my early studies. I found them, "in every respect, precisely as I had left them; not a single "step advanced towards a solution of their old difficulties, nor "enriched by the accession of one new idea:—a strong expe- "rimental proof, that, how much soever logic may contribute "to the progress of other sciences, it must for ever remain bar- "ren and lifeless, while abandoned to itself*."

* Metalog. Lib. ii. cap. 10.

Among the various pursuits now followed by men liberally educated, there is none, certainly, which affords such scope to the reasoning faculty, as the science and profession of law; and accordingly, it has been observed by Mr Burke,* "That "they do more to *quicken and invigorate the understanding*, "than all the other kinds of learning put together." The same author however adds, that "they are not apt, except in per- "sons very happily born, to open and to liberalize the mind, "exactly in the same proportion." Nor is this surprising; for the ultimate standards of right and wrong to which they recognize the competency of an appeal, being conventional rules and human authorities, no field is opened to that spirit of free inquiry which it is the boast of philosophy to cultivate. The habits of thought, besides, which the long exercise of the profession has a tendency to form, on its appropriate topics, seem unfavourable to the qualities connected with what is properly called *judgment*; or, in other words, to the qualities on which the justness or correctness of our *opinions* depends: they accustom the mind to those partial views of things which are suggested by the separate interests of litigants; *not* to a calm, comprehensive, and discriminating survey of details, in all their bearings and relations. Hence the apparent inconsistencies which sometimes astonish us in the intellectual character of the most distinguished practitioners,—a talent for acute and refined distinctions; powers of subtle, ingenious, and close argumentation; inexhaustible resources of invention, of wit, and of eloquence;—combined, not only with an infantine imbecillity in the affairs of life, but with an incapacity of forming a sound decision, even on those problematical questions which are the subjects of

their daily discussion. The great and enlightened *minds*, whose judgments have been transmitted to posterity, as oracles of legal wisdom, were formed (it may be safely presumed) not by the habits of their professional warfare, but by contending with these habits, and shaking off their dominion.

The habits of a controversial writer are, in some respects, analogous to those of a lawyer; and their effects on the intellectual powers, when engaged in the investigation of truth, are extremely similar. They confine the attention to one particular view of the question, and, instead of training the understanding to combine together the various circumstances which seem to favour opposite conclusions, so as to limit each other, and to guard the judgment against either extreme,—they are apt, by presenting the subject sometimes wholly on the one side, and sometimes wholly on the other, to render the disputant the sceptical dupe of his own ingenuity. Such seems to have been nearly the case with the redoubtable Chillingworth; a person to whose native candour the most honourable testimony has been borne by the most eminent of his contemporaries, and whose argumentative powers have almost become matter of proverbial remark. Dr Reid has pronounced him the "best reasoner, "as well as the acutest logician of his age;" and Locke himself has said, "If you would have your son to reason well, let "him read Chillingworth." To what consequences these rare endowments and attainments led, we may learn from Lord Clarendon.

"Mr Chillingworth had spent all his younger time in dispu-

"tations, and had arrived at so great a mastery, that he was "inferior to no man in those skirmishes: but he had, with his "notable perfection in this exercise, contracted such an irreso- "lution and habit of doubting, that by degrees he grew con- "fident of nothing."——"Neither the books of his adversaries, "nor any of their persons, though he was acquainted with the "best of both, had ever made great impression on him; all his "doubts grew out of himself, when he assisted his scruples with "all the strength of his own reason, and was then too hard for "himself: but finding as little quiet and repose in those victo- "ries, he quickly recovered, by a new appeal to his own judg- "ment; so that, in truth, he was in all his sallies and retreats, "his own convert."

The foregoing observations, if well founded, conclude strongly, not merely against the *form* of the school logic, but against the importance of the *end* to which it is directed. Locke and many others have already sufficiently shewn, how inadequate the syllogistic theory is to its avowed purpose; but few seem to be sufficiently aware, how very little this purpose, if it were attained, would advance us in the knowledge of those truths which are the most interesting to human happiness.

"There is one species of madman" (says Father Buffier) "that makes an excellent logician*."—The remark has the appearance of being somewhat paradoxical; but it is not without a solid foundation, both in fact, and in the theory of the

* Traité des Prem. Vérités. Part I. chap. xi.

human understanding. Nor does it apply merely (as Buffier seems to have meant it) to the scholastic defenders of metaphysical paradoxes: it extends to all whose ruling passion is a display of argumentative dexterity, without much solicitude about the justness of their premises, or the truth of their conclusions. It is observed by Lord Erskine, in one of his admirable pleadings lately published, that "in all the cases which have filled West-"minster-Hall with the most complicated considerations—the "lunatics, and other insane persons who have been the subjects "of them, have not only had the most perfect knowledge and "recollection of all the relations they stood in towards others, "and of the acts and circumstances of their lives, but *have, in* "*general, been remarkable for subtlety and acuteness.*"—"These," (he adds) "are the cases which frequently mock the wisdom of "the wisest in judicial trials; because *such persons often reason* "*with a subtlety which puts in the shade the ordinary concep-*"*tions of mankind*: their conclusions are just, and frequent-"ly profound; but the premises from which they reason, *when* "*within the range of the malady*, are uniformly false:—not "false from any defect of knowledge or judgment; but because "a delusive image, the inseparable companion of real insanity, "is thrust upon the subjugated understanding, incapable of re-"sistance, because unconscious of attack."

In the instances here alluded to, something, it is probable, ought to be attributed to the physical influence of the disorder in occasioning, together with an increased propensity to controversy, a preternatural and morbid excitation of the power of

attention, and of some other intellectual faculties; but much more, in my opinion, to its effects in removing the check of those collateral circumstances by which, in more sober understandings, the reasoning powers are perpetually retarded and controlled in their operation. Among these circumstances, it is sufficient to specify, for the sake of illustration, 1. That distrust, which experience gradually teaches, of the accuracy and precision of the phraseology in which our reasonings are expressed;—accompanied with a corresponding apprehension of involuntary mistakes from the ambiguity and vagueness of language; 2. A latent suspicion, that we may not be fully in possession of all the elements on which the solution of the problem depends; and 3. The habitual influence of those first principles of propriety, of morality, and of common sense, which, as long as reason maintains her ascendant, exercise a paramount authority over all those speculative conclusions which have any connection with the business of life. Of these checks or restraints on our reasoning processes, none are cultivated and strengthened, either by the rules of the logician, or by the habits of *viva voce* disputation. On the contrary, in proportion as their regulating power is confirmed, that hesitation and suspense of judgment are encouraged, which are so congenial to the spirit of true philosophy, but such fatal incumbrances in contending with an antagonist whose object is not truth but victory. In madness, where their control is entirely thrown off, the merely logical process (which never stops to analyse the meaning of words) is likely to go on more rapidly and fearlessly than before;—producing a volubility of speech, and an ap-

parent quickness of conception, which present to common observers all the characteristics of intellectual superiority. It is scarcely necessary to add, that the same appearances, which, in this extreme case of mental aberration, are displayed on so great a scale, may be expected to shew themselves, more or less, wherever there is any deficiency in those qualities which constitute depth and sagacity of judgment.

For my own part, so little value does my individual experience lead me to place on argumentative address, when compared with some other endowments subservient to our intellectual improvement, that I have long been accustomed to consider that promptness of reply and dogmatism of decision which mark the eager and practised disputant, as almost infallible symptoms of a limited capacity; a capacity deficient in what Locke has called (in very significant, though somewhat homely terms) *large, sound, roundabout sense**. In all the higher endowments of the understanding, this intellectual quality (to which nature as well as education must liberally contribute,) may be justly regarded as an essential ingredient. It is this which, when cultivated by study, and directed to great objects or pursuits, produces an unprejudiced, comprehensive, and efficient mind; and, where it is wanting, though we may occasionally find a more than ordinary share of quickness and of information; a plausibility and brilliancy of discourse; and that passive susceptibility of polish from the commerce of the world, which is so often united with imposing but secondary talents,—we

* Conduct of the Understanding. § 3.

may rest assured, that there exists a total incompetency for enlarged views and sagacious combinations, either in the researches of science or in the conduct of affairs *.

If these observations hold with respect to the art of reasoning or argumentation, as it is cultivated by men undisciplined in the contentions of the schools, they will be found to apply with infinitely greater force to those disputants (if any such are still to be found) who, in the present advanced state of human knowledge, have been at pains to fortify themselves, by a course of persevering study, with the arms of the Aristotelian logic. Persons of the former description often reason conscientiously

---

* The outlines of an intellectual character, approaching nearly to this description, is exhibited by Marmontel in his highly finished (and I have been assured, very faithful) portrait of M. de Brienne. Among the other defects of that unfortunate statesman, he mentions particularly *un esprit à facettes*; by which expression he seems, from the context, to mean a quality of mind precisely opposite to that described by Locke in the words quoted above:—"*quelques lumières, mais éparses; des apperçus* "*plutôt que des vues; et dans les grands objets, de la facilité à saisir les petits détails,* "*nulle capacité pour embrasser l'ensemble.*" A consciousness of some similar deficiency has suggested to Gibbon the following criticism on his own juvenile performance, entitled *Essai sur l'Etude.* It is executed by an impartial and a masterly hand; and may perhaps, without much injustice, be extended, not only to his Roman history, but to the distinguishing features of that peculiar *cast* of genius, which so strongly marks all his writings.

"The most serious defect of my essay is a kind of obscurity and abruptness which "always fatigues, and may often elude the attention of the reader. The obscurity of "many passages is often affected; proceeding from the desire of expressing perhaps a "common idea with sententious brevity: *brevis esse laboro, obscurus fio.* Alas! how fatal "has been the imitation of Montesquieu! *But this obscurity sometimes proceeds from a* "*mixture of light and darkness in the author's mind; from a partial ray which strikes* "*upon an angle, instead of spreading itself over the surface of an object.*"

with warmth, from false premises which they are led by passion, or by want of information, to mistake for truth. Those of the latter description proceed systematically on the radical error of conceiving the *reasoning process* to be the most powerful instrument by which truth is to be attained; combined with the secondary error of supposing that the power of reasoning may be strengthened and improved by the syllogistic art.

In one of Lord Kames's sketches, there is an amusing and instructive collection of facts to illustrate the *progress of reason*; a phrase, by which he seems to mean chiefly the progress of *good sense*, or of that quality of the intellect which is very significantly expressed by the epithet *enlightened*. To what is this progress (which has been going on with such unexampled rapidity during the two last centuries) to be ascribed? Not surely to any improvement in the art of reasoning; for many of the most melancholy weaknesses which he has recorded, were exhibited by men, distinguished by powers of discussion, and a reach of thought, which have never been surpassed; while, on the other hand, the same weaknesses would now be treated with contempt by the lowest of the vulgar. The principal cause, I apprehend, has been, the general diffusion of knowledge (and more especially of experimental knowledge) by the art of printing; in consequence of which, those prejudices which had so long withstood the assaults both of argument and of ridicule, have been gradually destroyed by their mutual collision, or lost in the infinite multiplicity of elementary truths which are identified with the operations of the infant understanding. To examine the process by which truth has been slowly and insensi-

bly cleared from that admixture of error with which, during the long night of Gothic ignorance, it was contaminated and disfigured, would form a very interesting subject of philosophical speculation. At present, it is sufficient to remark, how little we are indebted for our emancipation from this intellectual bondage, to those qualities which it was the professed object of the school-logic to cultivate; and that, in the same proportion in which liberality and light have spread over Europe, this branch of study has sunk in the general estimation.

Of the inefficacy of *mere reasoning* in bringing men to an agreement on those questions which, in all ages, have furnished to the learned the chief matter of controversy, a very just idea seems to have been formed by the ingenious author of the following lines; who has, at the same time, hinted at a remedy against a numerous and important class of speculative errors, more likely to succeed than any which is to be derived from the most skilful application of Aristotle's rules; or indeed, from any direct argumentative refutation, how conclusive and satisfactory soever it may appear to an unbiassed judgment. It must, at the same time, be owned, that this remedy is not without danger; and that the same habits which are so useful in correcting the prejudices of the monastic bigot, and so instructive to all whose principles are sufficiently fortified by reflection, can scarcely fail to produce pernicious effects, where they operate upon a character not previously formed and confirmed by a judicious education.

En parcourant au loin la planète ou nous sommes,
Que verrons nous? les torts et les travers des hommes!
Ici c'est un synode, et là c'est un divan,
Nous verrons le Mufti, le Derviche, l'Iman,
Le Bonze, le Lama, le Talapoin, le Pope,
Les antiques Rabbins et les Abbés d'Europe,
Nos moines, nos prélats, nos docteurs agregés;
Etes vous disputeurs, mes amis? voyagez *.

To these verses it may not be altogether useless to subjoin a short quotation from Mr Locke; in whose opinion the aid of *foreign travel* seems to be less necessary for enlightening *some* of the classes of controversialists included in the foregoing enumeration, than was suspected by the poet. The moral of the passage, (if due allowances be made for the satirical spirit which it breathes) is pleasing on the whole, as it suggests the probability, that our common estimates of the intellectual darkness of our own times are not a little exaggerated.

" Notwithstanding the great noise that is made in the world " about errors and opinions, I must do mankind that right as " to say, *There are not so many men in errors and wrong opinions,* " *as is commonly supposed.* Not that I think they embrace the " truth; but indeed, because concerning those doctrines they " keep such a stir about, they have no thought, no opinion at " all. For if any one should a little catechize the greatest part " of the partizans of most of the sects in the world, he would " not find, concerning those matters they are so zealous for,

* Discours sur les Disputes, par M. de Rulhiere.

"that they have any opinion of their own: much less would he "have reason to think that they took them upon the examina- "tion of arguments and appearance of probability. They are "resolved to stick to a party that education or interest has "engaged them in; and there, like the common soldiers of an "army, show their courage and warmth as their leaders direct, "without ever examining, or so much as knowing the cause they "contend for. If a man's life shews that he has no serious "regard for religion, for what reason should we think that "he beats his head about the opinions of his church, and "troubles himself to examine the grounds of this or that doc- "trine? 'Tis enough for him to obey his leaders, to have his "hand and his tongue ready for the support of the common "cause, and thereby approve himself to those who can give "him credit, preferment, and protection in that society. Thus "men become combatants for those opinions they were never "convinced of; no, nor ever had so much as floating in their "heads; and THOUGH ONE CANNOT SAY THERE ARE FEWER "IMPROBABLE OR ERRONEOUS OPINIONS IN THE WORLD "THAN THERE ARE, YET THIS IS CERTAIN, THERE ARE "FEWER THAT ACTUALLY ASSENT TO THEM, AND MISTAKE "THEM FOR TRUTHS, THAN IS IMAGINED *."

If these remarks of Locke were duly weighed, they would have a tendency to abridge the number of controversial writers; and to encourage philosophers to attempt the improvement of

* Essay on Human Understanding, Book iv. c. 20.

mankind, rather by adding to the stock of useful knowledge; than by waging a direct war with prejudices, which have less root in the understandings, than in the interests and passions of their abettors.

Section III.

In what respects the study of the Aristotelian Logic may be useful to Disputants.—A general acquaintance with it justly regarded as an essential accomplishment to those who are liberally educated.—Doubts suggested by some late Writers, concerning Aristotle's claims to the invention of the Syllogistic Theory.

The general result of the foregoing reflections is, That neither the means employed by the school logic for the assistance of the *discursive faculty*, nor the accomplishment of that end, were it really attained, are of much consequence in promoting the enlargement of the mind, or in guarding it against the influence of erroneous opinions. It is, however, a very different question, how far this art may be of use to such as are led by profession or inclination to try their strength in polemical warfare. My own opinion is, that, in the present age, it would not give to the disputant, in the judgment of men whose suffrage is of any value, the slightest advantage over his antagonist. In earlier times, indeed, the case must have been different. While the scholastic forms continued to be kept up, and while schoolmen were the sole judges of the contest, an expert logician could not fail to obtain an easy victory over an inferior proficient.

Now, however, when the supreme tribunal to which all parties must appeal, is to be found, not *within* but *without* the walls of universities; and when the most learned dialectician must, for his own credit, avoid all allusion to the technical terms and technical forms of his art, can it be imagined that the mere possession of its rules furnishes him with invisible aid for annoying his adversary, or renders him invulnerable by some secret spell against the weapons of his assailant?* Were this really the case, one might have expected that the advocates who have undertaken its defence, (considering how much their

---

* An argument of this sort in favour of the Aristotelian logic, has, in fact, been lately alleged, in a treatise to which I have already had occasion to refer.

"Mr Locke seems throughout to imagine that no use can be made of the doctrine "of syllogisms, unless by men who deliver their reasonings in syllogistic form. That "would indeed justly expose a man to the imputation of disgusting pedantry and "tediousness. But, in fact, he who never uses an expression borrowed from the Aris- "totelic logic, may yet, unobserved, be availing himself, in the most important manner "of its use, by bringing definitions, divisions, and arguments, to the test of its rules.

"In the mere application of it to the examining of an argument which we desire to "refute,—the logician will be able to bring the argument in his own mind to syllogistic "form.—He will then have before his view every constituent part of the argument; "some of which may have been wholly suppressed by his antagonist, and others dis- "guised by ambiguity and declamation.—He knows every point in which it is subject to "examination.—He perceives immediately, by the rules of his art, whether the premises "may be acknowledged, and the conclusion denied, for want of a *vis consequentiæ*.— "If not, he knows where to look for a weakness.—He turns to each of the premises, "and considers whether they are false, dubious, or equivocal: and is thus prepared and "directed to expose every weak point in the argument with clearness, precision and "method; and this to those who perhaps are wholly ignorant of the aids by which the "speaker is thus enabled to carry conviction with his discourse." *Commentary on the Compendium of Logic, used in the University of Dublin.* Dublin 1805.

pride was interested in the controversy) would have given us some better specimens of its practical utility, in defending it against the unscientific attacks of Bacon and of Locke. It is, however, not a little remarkable, that, in every argument which they have attempted in its favour, they have not only been worsted by those very antagonists whom they accuse of ignorance, but fairly driven from the field of battle*.

---

* In most of the defences of the school logic which I have seen, the chief weapon employed has been that kind of argument which, in scholastic phraseology, is called the *Argumentum ad Hominem*; an argument in the use of which much regard to consistency is seldom to be expected.—In one sentence, accordingly, Bacon and Locke are accused of having never read Aristotle; and, in the next, of having borrowed from Aristotle the most valuable part of their writings.

With respect to Locke, it has been triumphantly observed, that his acquaintance with Aristotle's logic must have been superficial, as he has, in one of his objections, manifestly confounded *particular* with *singular* propositions. (Commentary on the Dublin Compendium.) The criticism, I have no doubt, is just; but does it, therefore, follow, that a greater familiarity with the technical niceties of an art which he despised, would have rendered this profound thinker more capable of forming a just estimate of its scope and spirit, or of its efficacy in aiding the human understanding?—Somewhat of the same description are the attempts which have been repeatedly made to discredit the strictures of Dr Reid, by appealing to his own acknowledgment, that there might *possibly* be some parts of the Analytics and Topics, which he had never read. The passage in which this acknowledgment is made, is so characteristical of the modesty and candour of the writer, that I am tempted to annex it to this note;—more especially, as I am persuaded, that, with many readers, it will have the effect of confirming, rather than of shaking their confidence in the general correctness and fidelity of his researches.

"In attempting to give some account of the Analytics and of the Topics of Aristotle, "ingenuity requires me to confess, that, though I have often purposed to read the "whole with care, and to understand what is intelligible, yet my courage and patience "always failed before I had done. Why should I throw away so much time and pain-"ful attention upon a thing of so little real use? If I had lived in those ages when the "knowledge of Aristotle's Organon entitled a man to the highest rank in philosophy,

It has, indeed, been asserted by an ingenious and learned writer, that "he has never met with a person unacquainted "with logic, who could state and maintain his argument with "facility, clearness and precision;—that he has seen a man of "the acutest mind puzzled by the argument of his antagonist; "sensible, perhaps, that it was inconclusive, but wholly unable "to expose the fallacy which rendered it so: while a logician, "of perhaps very inferior talents, would be able at once to "*discern* and to *mark* it*."

I do not deny that there may be some foundation for this statement. The part of Aristotle's Organon which seems, in the design, to be the most practically useful (although it is certainly very imperfect in the execution) is the book of sophisms; a book which still supplies a very convenient phraseology for *marking* concisely some of the principal fallacies which are apt to impose on the understanding in the heat of a *vivâ voce* dispute†. Whether it affords any aid in detecting or *dis-*

"ambition might have induced me to employ upon it some years of painful study; and "less, I conceive, would not be sufficient. Such reflections as these always got the bet-"ter of my resolution, when the first ardour began to cool. All I can say is, that I "have read some parts of the books with care, some slightly, *and some perhaps* not at "all. I have glanced over the whole often, and when any thing attracted my atten-"tion, have dipped into it till my appetite was satisfied. Of all reading, it is the most "dry and the most painful, employing an infinite labour of demonstration, about things "of the most abstract nature, delivered in a laconic style, and often, I think, with af-"fected obscurity; and all to prove general propositions, which, when applied to parti-"cular instances, appear self-evident." Chap. III. sect. 1.

* Mr Walker, author of the Commentary on the Dublin Compendium of Logic.

† Such phrases, for example, as 1. *Fallacia Accidentis.* 2. *A dicto secundum quid, ad*

cerning these fallacies may perhaps be doubted. But it is certainly an acquisition, and an acquisition of no contemptible value, to have always at hand a set of technical terms, by which we can point out to our hearers, without circumlocution or discussion, the vulnerable parts of our antagonist's reasoning. That nothing useful is to be learned from Aristotle's logic I am far from thinking; but I believe that all which is useful in it might be reduced into a very narrow compass; and I am decidedly of opinion, that wherever it becomes a serious and favourite object of study, it is infinitely more likely to do harm than good. Indeed, I cannot help considering it as strongly symptomatic of some unsoundness in a man's judgment, when I find him disposed (after all that has been said by Bacon and Locke) to magnify its importance either as an inventive or as an argumentative Organ. Nor does this opinion rest upon theory alone. It is confirmed by all that I have observed, (if after the example of the author last quoted I may presume to mention the results of my own observations,) with respect to the intellectual characters of the most expert dialecticians whom I have happened to know. Among these, I can with great truth say, that although I recollect several possessed of much learning, subtlety and ingenuity, I can name none who have extended by their discoveries the boundaries of

---

dictum simpliciter. 3. *Ab ignorantia Elenchi.* 4. *A non causa pro causa.* 5. *Fallacia consequentis.* 6 *Petitio principii.* 7. *Fallacia plurium interrogationum, &c.*

I have mentioned those fallacies alone which are called by logicians *Fallaciæ extra Dictionem;* for as to those which are called *Fallaciæ in Dictione* (such as the *Fallacia Æquivocationis, Fallacia Amphiboliæ, Fallacia Accentus vel Pronunciationis, Fallacia a Figura dictionis, &c.*) they are too contemptible to be deserving of any notice.—For some remarks on this last class of fallacies, See Note (M.)

science; or on whose good sense I should conceive that much reliance was to be placed in the conduct of important affairs.

Some very high authorities, I must, at the same time, confess, may be quoted on the opposite side of the question; among others, that of Leibnitz, unquestionably one of the first names in modern philosophy. But, on this point, the mind of Leibnitz was not altogether unwarped; for he appears to have early contracted a partiality, not only for scholastic learning, but for the projects of some of the schoolmen to reduce, by means of technical aids, the exercise of the discursive faculty to a sort of mechanical operation;—a partiality which could not fail to be cherished by that strong bias towards synthetical reasoning from abstract maxims, which characterizes all his philosophical speculations. It must be remembered, too, that he lived at a period, when logical address was still regarded in Germany as an indispensable accomplishment to all whose taste led them to the cultivation of letters or of science. Nor was this an accomplishment of easy acquisition; requiring, as it must have done, for its attainment, a long course of laborious study, and, for its successful display, a more than ordinary share of acuteness, promptitude, and invention. To all which it may be added, that while it remained in vogue, it must have been peculiarly flattering to the vanity and self-love of the possessor; securing to him, in every contest with the comparatively unskilful, an infallible triumph. These considerations, (combined with that attachment to the study of jurisprudence which he retained through life) may, I think, go far to account for the disposition which Leibnitz sometimes shews to magnify a little too much the value of this art. It is, besides, extremely worthy of

remark, with respect to this eminent man, within what narrow limits he circumscribes the province of the school logic, notwithstanding the favourable terms in which he occasionally speaks of it. The following passage in one of his letters is particularly deserving of attention, as it confines the utility of syllogism to those controversies alone which are carried on in writing, and contains an explicit acknowledgement, that, in extemporaneous discussions, the use of it is equally nugatory and impracticable.

"I have myself experienced the great utility of the forms of "logic in bringing controversies to an end; and wonder how "it has happened, that they should have been so often applied "to disputes where no issue was to be expected, while their real "use has been altogether overlooked. In an argument which "is carried on *viva voce*, it is scarcely possible that the *forms* "should continue to be rigorously observed; not only on ac- "count of the tediousness of the process, but chiefly from the "difficulty of retaining distinctly in the memory all the differ- "ent links of a long chain. Accordingly, it commonly hap- "pens, that after one *prosyllogism*, the disputants betake "themselves to a freer mode of conference. But if, in a con- "troversy carried on in writing, the legitimate forms were "strictly observed, it would neither be difficult nor disagree- "able, by a mutual exchange of syllogisms and answers, to "keep up the contest*, till either the point to be proved was

* The words in the original are—"non ingratum nec difficile foret, mittendo remit- "tendoque syllogismos et responsiones, *tamdiu reciprocare serram*, donec vel confectum "sit quod probandum erat, vel nihil ultra habeat quod afferat argumentator."

"completely established, or the disputant had nothing farther "to allege in support of it. For the introduction, however, of "this into practice, many rules remain to be prescribed; the "greater part of which are to be collected from the practice of "lawyers *."

This concession, from so consummate a judge, I consider as of great consequence in the present argument. For my own part, if I were called on to plead the cause of the school logic, I should certainly choose to defend, as the more tenable of the two posts, that which Leibnitz has voluntarily abandoned. Much, might I think on *this* ground be plausibly alleged in its favour, in consequence of its obvious tendency to cultivate that invaluable talent to a disputant, which Aristotle has so significantly expressed by the word αγχινοια †;—a talent of which the utility cannot be so forcibly pictured, as in the lively and graphical description given by Johnson, of the inconveniences with which the want of it is attended.

"There are men whose powers operate only at leisure and in

---

* Leibnitz. Op. Tom. VI. p. 72. Edit. Dutens.

† Aristotle's definition of αγχινοια turns upon *one* only of the many advantages which *presence of mind* bestows, in the management of a *vivâ voce* dispute. Ἡ δ' αγχινοια ἐστιν εὐστοχια τις ἐν ἀσκεπτῳ χρονῳ τοῦ μέσου. (Sagacitas est bona quædam medii conjectatio brevissimo tempore.) Analyt. Post. Lib. i. cap. 34. I use the word, upon this occasion, in that extensive and obvious sense which its etymology suggests, and in which the corresponding Latin phrase is employed by Quinctilian. "In "Altercatione opus est imprimis ingenio veloci ac mobili, *animo præsenti et acri*. Non "enim cogitandum, sed dicendum statim est." Quinct. Lib. vi. cap. 4.

"retirement, and whose intellectual vigour deserts them in con-
"versation; whom merriment confuses, and objection discon-
"certs; whose bashfulness restrains their exertion, and suffers
"them not to speak till the time of speaking is past; or whose
"attention to their own character makes them unwilling to
"utter at hazard what has not been considered and cannot be
"recalled *."

The tendency however of scholastic disputations to cure these defects, it must not be forgotten, belongs to them only in common with all other habits of extemporaneous debate; and the question still recurs, Whether it would not be wiser to look for the remedy, in exercises more analogous to the real business of life?

After having said so much in disparagement of the art of syllogizing, I feel it incumbent on me to add, that I would not be understood to represent a general acquaintance with it as an attainment of no value, even in these times. The technical language connected with it is now so incorporated with all the higher departments of learning, that, independently of any consideration of its practical applications, some knowledge of its peculiar phraseology may be regarded as an indispensable preparation both for scientific and for literary pursuits †. To the

* Life of Dryden.

† It was with great pleasure I read the concluding paragraph of the introduction prefixed to a Compend of Logic, sanctioned by so learned a body as the University of Dublin.

"Utrum hæcce ars per se revera aliquem præstet usum, quidam dubitavere. Quo-

philosopher, it must ever remain a subject of speculation peculiarly interesting, as one of the most singular facts in the history of the Human Understanding. The ingenuity and subtlety of the invention, and the comprehensive reach of thought displayed in the systematical execution of so vast a design, form a proud and imperishable monument to the powers of Aristotle's mind, and leave us only to regret, that they were wasted upon objects of so little utility. In no point of view, however, does this extraordinary man appear to rise so far above the ordinary level of the species, as when we consider the dominion which he exercised, during so long a succession of ages, over the opinions of the most civilized nations. Of this dominion the basis was chiefly laid in the syllogistic theory, and in the preparatory books on the Categories and on Interpretation; a part of his works to which he was more indebted for his authority in the schools than to all the rest put together. Is it extravagant to conjecture, that Aristotle himself foresaw this; and that, knowing how prone the learned are to admire what they do not fully comprehend, and to pride themselves on the possession of a mystical jargon, unintelligible to the multitude, he resolved to adapt himself to their taste in those treatises which were destined to serve, *in the first instance*, as the foundation of his fame. If such was really his idea, the

---

"niam vero in Authorum insigniorum scriptis, sæpe occurant termini Logici, hos ter-
"minos explicatos habere, ideoque et ipsius artis partes præcipuas, omnino necessarium
"videtur. Hæc itaque in sequenti compendio efficere est propositum."

(Artis Logicæ Compendium. In usum Juventutis Collegii Dubliniensis.)

The arrangement of this department of academical study, proposed by M. Prevost of Geneva, seems to be very judiciously and happily imagined.

event has shown how soundly he judged of human nature, in this grand experiment upon its weakness and ductility*.

" *Dialecticam*, quæ linguæ philosophicæ usum tradit, seorsim docere: et *logicam*, quæ " rationis analysin instituit, ab omni de verbis disputatione sejungere visum est.

" *Logicam* autem in tres partes dividimus: de *veritate*, de *errore*, de *methodo*: ut " hæc mentis medicina, ad instar medicinæ corporis, exhibeat ordine statum naturalem, " morbos, curationem."

See the preface to a short but masterly tract *De Probabilitate*, printed at Geneva in 1794.

* The following historical sketch from *Ludovicus Vives* may serve to show that the foregoing supposition is not altogether gratuitous. " A temporibus Platonis et " Aristotelis usque ad Alexandrum Aphrodiseum, qui vixit Severo et ejus filiis " Principibus, Aristoteles nominabatur magis, quam vel legebatur a doctis vel intelligeba- " tur. Primus ille aggressus eum enarrare, et adjuvit studia multorum et ad alia in eo " Philosopho quærenda excitavit. Mansit tamen crebrior in manibus hominum et no- " tior Plato, usque ad scholas in Gallia et Italia publice constitutas, id est, quamdiu " Græca et Latina lingua viguerunt. Postea vero quam theatricæ cœperunt esse dis- " ciplinæ, omnisque earum fructus existimatus est, posse disputando fucum facere, et " os obturare, et pulverem ob oculos jacere, idque imperitissima peritia, et nominibus ad " lubitum confictis, accomodatiores ad rem visi sunt libri logici Aristotelis et Physici, " *relictis permultis præclaris ejus operibus*: Platone vero, et quod ab eis non intellege- " retur, quamvis multo minus Aristoteles, et quod artificium videretur docere, ne no- " minato quidem; non quod minorem aut ineruditiorem putem Platone Aristotelem, sed " quod ferendum non est, Platonem sanctissimum philosophum præteriri, et Aristote- " lem ita legi, ut *meliore rejecta parte, quæ retinetur id cogatur loqui, quod ipsi jubent*." Ludovic. Vives de Civ. Dei, L. viii. c. 10.

A remark similar to this is made by Bayle. " Ce qui doit étonner le plus les hom- " mes sages, c'est que les professeurs se soient si furieusement entêtez des hypotheses " philosophiques d'Aristote. Si l'on avoit eu cette prévention pour sa poëtique, et " pour sa rhetorique, il y auroit moins de sujet de s'étonner; mais, on s'est entêté du " plus foible de ses ouvrages, je veux dire, de sa logique et de sa physique."—(Bayle, Art. *Aristote*.)

That Aristotle's works have of late fallen into general neglect, is a common subject of complaint among his idolaters. It would be nearer the truth to say, that the number of Aristotle's rational and enlightened admirers was never so great as at the present moment. In the same proportion in which his logic has lost its credit, his ethics, his politics, his poetics, his rhetoric, and his natural history have risen in the public estimation. No similar triumph of genius is recorded in the Annals of Philosophy:—To subjugate, for so many centuries, the minds of men, by furnishing employment (unproductive as it was) to their intellectual faculties, at a time when the low state of experimental knowledge did not supply more substantial materials for their reasonings;—and afterwards, when, at the distance of two thousand years, the light of true science began to dawn, to contribute so large a share to its growing splendour.

In the course of the foregoing animadversions on the syllogistic theory, I have proceeded on the supposition, that the whole glory of the invention belongs to Aristotle. It is proper, however, before dismissing the subject, to take some notice of the doubts which have been suggested upon this head, in consequence of the lights recently thrown on the remains of ancient science still existing in the East. Father Pons, a Jesuit missionary, was (I believe) the first person who communicated to the learned of Europe, the very interesting fact, that the use of the syllogism is, at this day, familiarly known to the Bramins of India*; but this information does not

* Lettres Edifiantes et Curieuses, Tome XXVI. (old edition.)—Tome XIV. edit. of 1781. The letter is dated 1740.

seem to have attracted much attention in England, till it was corroborated by the indisputable testimony of Sir William Jones, in his third discourse to the Asiatic Society*. "It will be sufficient (he observes) in this dissertation to assume, what might "be proved beyond controversy, that we now live among the "adorers of those very deities who were worshipped under different names in old Greece and Italy, and among the professors of those philosophical tenets, which the Ionic and Attic writers illustrated with all the beauties of their melodious "language. On one hand we see the trident of Neptune, the "eagle of Jupiter, the satyrs of Bacchus, the bow of Cupid, "and the chariot of the sun; on another, we hear the cymbals "of Rhea, the songs of the Muses, and the pastoral tales of "Apollo Nomius. In more retired scenes, in groves, and in "seminaries of learning, we may perceive the *Brahmans* and "the *Sermanes* mentioned by Clemens, *disputing in the forms of "logic*, or discoursing on the vanity of human enjoyments, on "the immortality of the soul, her emanation from the eternal "mind, her debasement, wanderings, and final union with her "source. The six philosophical schools, whose principles are "explained in the *Dersana Sastra*, comprise all the metaphysics of the old academy, the Stoa and the Lyceum; nor is it "possible to read the *Vedanta*, or the many fine compositions "in illustration of it, without believing that Pythagoras and "Plato derived their sublime theories from the same source "with the sages of India†."

---

* Delivered in 1786.

† Works of Sir William Jones, Vol. I. p. 28.

In a subsequent discourse, the same author mentions "a tradition, which prevailed, according to the well-informed author "of the *Dabistán*, in the *Panjáb*, and in several Persian provinces, that, among other Indian curiosities, which Callisthenes "transmitted to his uncle, was *a technical system of logic*, which "the Brahmans had communicated to the inquisitive Greek, "and which the Mohammedan writer supposes to have been "the ground-work of the famous Aristotelian method. If this "be true, (continues Sir W. Jones,—and none will dispute the "justness of his remark) it is one of the most interesting facts "that I have met with in Asia*."

Of the soundness of the opinion concerning the origin of the Greek philosophy, to which these quotations give the sanction of an authority so truly respectable, our stock of facts is as yet too scanty to enable us to form a competent judgment. Some may perhaps think, that the knowledge of the Aristotelian logic which exists in India, may be sufficiently accounted for by the Mohammedan conquests; and by the veneration in which Aristotle was held, from a very early period, by the followers of the prophet†.

In the same discourse, we are informed, that "the Hindoos have numerous works "on grammar, *logic*, rhetoric, music, which are extant and accessible." An examination of these is certainly an object of literary curiosity, highly deserving of farther attention.

* Eleventh discourse, delivered in 1794.

† "La philosophie Péripatétique s'est tellement établie par tout, qu'on n'en lit plus "d'autre par toutes les universitez Chrétiennes. Celles mêmes, qui sont contraintes de "reçevoir les impostures de Mahomet, n'enseignent les sciences que conformément aux "principes du Lycée, auxquels ils s'attachent si fort, qu' Averroes, Alfarabius, Albumas-

On the other hand, it must be acknowledged, that this part of Aristotle's works contains some intrinsic evidence of aid borrowed from a more ancient school. Besides that imposing appearance which it exhibits of systematical completeness in its innumerable details; and which we can scarcely suppose that it could have received from the original inventor of the art, there is a want of harmony or unity in some of its fundamental principles, which seems to betray a combination of different and of discordant theories. I allude more particularly to the view which it gives of the nature of science and of demonstration, compared with Aristotle's well-known opinions

---

" sar, et assez d'autres philosophes Arabes se sont souvent éloignés des sentiments de " leur prophète, pour ne pas contredire ceux d'Aristote, que les Turcs ont en leur " idiome Turquesque et en Arabe, comme Belon le rapporte." (*La Motte le Vayer*; quoted by Bayle, Art. *Aristote*.)

" L'Auteur, dont j'emprunte ces paroles, dit dans un autre volume, que, selon la rela- " tion d'Olearius, les Perses ont toutes les oeuvres d'Aristote, expliquées par beaucoup de " commentaires Arabes. ' Bergeron (dit il) remarque, dans son Traité des Tartares, " qu'ils possedent les livres d'Aristote, traduits en leur langue, enseignant, avec autant " de soumission qu'on peut faire ici, sa doctrine à Samarcand, université du Grand Mo- " gol, et à présent ville capitale du Royaume d'Usbec.' "

In the 8th volume of the Asiatic Researches, there is a paper by Dr Balfour, containing some curious extracts (accompanied with an English version) from a Persian translation of an Arabic Treatise, entitled the " Essence of Logic." In the introduction to these extracts, Dr Balfour mentions it as an indisputable fact, that " *the system* " *of logic, generally ascribed to Aristotle, constitutes, at this time, the logic of all the na-* " *tions of Asia who profess the Mahometan faith;*" and it seems to have been with a view of rendering this fact still more palpable to common readers, that the author has taken the trouble to translate, through the medium of the Persian, the Arabic original; from which language the knowledge of Aristotle's logic, possessed by the orientals, is supposed to have been derived.

concerning the natural progress of the mind in the acquisition of knowledge. That the author of the Organon was fully aware of an incongruity so obvious, there can be little doubt; and it was not improbably with a view to disguise or to conceal it, that he was induced to avoid, as much as possible, every reference to examples; and to adopt that abstract and symbolical language, which might divert the attention from the inanity of his demonstrations, by occupying it in a perpetual effort to unriddle the terms in which they are expressed.

Nor does there seem to be any thing in these suggestions (which I hazard with much diffidence) inconsistent with Aristotle's own statement, in the concluding chapter of the book of sophisms. This chapter has indeed (as far as I know) been universally understood as advancing a claim to the whole art of syllogism*; but I must acknowledge, that it appears to me to admit of a very fair construction, without supposing the claim to comprehend *all* the doctrines delivered in the books of Analytics. In support of this idea, it may be remarked, that while Aristotle strongly contrasts the dialectical art, as taught in the preceding treatise, with the art

---

* "The conclusion of this treatise (the book of Sophisms) ought not to be overlooked: it manifestly relates, not to the present treatise only, but also to the whole "Analytics and Topics of the author." Reid's Analysis, &c. Chap. v. Sect. iii.

If I were satisfied that this observation is just, I should think that nothing short of the most irresistible evidence could be reasonably opposed to the direct assertion of Aristotle. It is quite inconceivable, that he should have wilfully concealed or misrepresented the truth, at a period when there could not fail to be many philosophers in Greece, both able and willing to expose the deception.

of *disputation* as previously practised in Greece, he does not make the slightest reference to the distinction between demonstrative and dialectical syllogisms, or to those doctrines with respect to demonstration and science, which accord so ill with the general spirit of his philosophy. It does not seem, therefore, to be a very unreasonable supposition, that to these doctrines, (with which for many reasons he might judge it expedient to incorporate his own inventions and innovations,) he only gave that systematical and technical form, which, by its peculiar phraseology and other imposing appendages, was calculated at once to veil their imperfections, and to gratify the vanity of those who should make them objects of study. It is surely not impossible, that the syllogistic theory may have existed as a subject of abstract speculation, long before any attempt was made to introduce the syllogism into the schools as a weapon of controversy, or to prescribe rules for the skilful and scientific management of a *vivâ voce* dispute.

It is true that Aristotle's language, upon this occasion, is somewhat loose and equivocal; but it must be remembered, that it was addressed to his contemporaries, who were perfectly acquainted with the real extent of his merits as an inventor; and to whom, accordingly, it was not necessary to state his pretensions in terms more definite and explicit.

I shall only add, that this conjecture (supposing it for a moment to be sanctioned by the judgment of the learned) would still leave Aristotle in complete possession of by far the

most ingenious and practical part of the scholastic logic*; while, at the same time,—should future researches verify the suspicions of Sir William Jones and others, that the first rudiments of the art were imported into Greece from the East,—it would contribute to vindicate his character against that charge of plagiarism, and of unfairness towards his predecessors, which has been admitted even by some who speak with the most unbounded reverence of his intellectual endowments.

From the logic of Aristotle, I now proceed to that of Lord Bacon; a logic which professes to guide us systematically in investigating the laws of nature, and in applying the knowledge thus acquired, to the enlargement of human power, and the augmentation of human happiness.

---

* This was plainly the opinion of Cicero: "In hac arte (he observes, speaking of the "dialectical art, as it was cultivated by the Stoics,)—in hac arte, *si modo est hæc ars*, "nullum est præceptum quomodo verum inveniatur, sed tantum est quomodo judice-"tur."—And a few sentences after; "Quare istam artem totam dimittamus, quæ in ex-"cogitandis argumentis muta nimium est, in judicandis nimium loquax." (De Orat. Lib. ii. 86, 87.) The first sentence is literally applicable to the doctrine of syllogism considered theoretically: the second contrasts the inutility of this doctrine with the importance of such subjects as are treated of in Aristotle's Topics.

Whether Cicero and Quinctilian did not overrate the advantages to be derived from the study of the *Loci* as an organ of invention, is a question altogether foreign to our present inquiries. That it was admirably adapted for those argumentative and rhetorical *displays* which were so highly valued in ancient times, there can be no doubt, after what these great masters of oratory have written on the subject; but it does not follow, that, in the present state of society, it would reward the labours of those who wish to cultivate either the eloquence of the bar, or that which leads to distinction in our popular assemblies.

Of some of the fundamental rules by which this mode of philosophizing is more peculiarly distinguished, I intend to treat at considerable length;—directing my attention chiefly to such questions as are connected with the theory of our intellectual faculties. In this point of view, the author has left much to be supplied by his successors; the bent of his own genius having fortunately determined him rather to seize, by a sort of intuitive penetration, great practical results, than to indulge a comparatively sterile curiosity, by remounting to the first sources of experimental knowledge in the principles and laws of the human frame. It is to this humbler task that I propose to confine myself in the sequel. To follow him through the details of his Method, would be inconsistent with the nature of my present undertaking.

CHAPTER FOURTH.

OF THE METHOD OF INQUIRY POINTED OUT IN THE EXPERIMENTAL OR INDUCTIVE LOGIC.

SECTION I.

Mistakes of the Ancients concerning the proper object of Philosophy.—Ideas of Bacon on the same subject.—Inductive Reasoning.—Analysis and Synthesis.—Essential difference between Legitimate and Hypothetical Theories.

I HAVE had occasion to observe more than once, in the course of the foregoing speculations, that the object of physical science is *not* to trace necessary connections, but to ascertain constant conjunctions; *not* to investigate the nature of those efficient causes on which the phenomena of the universe ultimately depend, but to examine with accuracy what the phenomena are, and what the general laws by which they are regulated.

In order to save repetitions, I here beg leave to refer to some

observations on this subject in the first volume. I request more particularly the reader's attention to what I have said, in the second section of the first chapter, on the distinction between *physical* and *efficient* causes; and on the origin of that bias of the imagination which leads us to confound them under one common name. That, when we see two events constantly conjoined as antecedent and consequent, our natural apprehensions dispose us to associate the idea of causation or efficiency with the former, and to ascribe to it that power or energy by which the change was produced, is a fact obvious and unquestionable; and hence it is, that in all languages, the series of physical causes and effects is metaphorically likened to a chain, the links of which are supposed to be indissolubly and necessarily connected. The slightest reflection, at the same time, must satisfy us that these apprehensions are inconsistent, and even absurd; our knowledge of physical events reaching no farther than to the laws which regulate their succession; and the words *power* and *energy* expressing attributes not of matter but of mind. It is by a natural bias or association somewhat similar (as I have remarked in the section above-mentioned) that we connect our sensations of colour, with the primary qualities of body*.

* Were it not for this bias of the imagination to identify efficient with physical causes, the attention would be continually diverted from the necessary business of life, and the useful exercise of our faculties suspended, in a fruitless astonishment at that hidden machinery, over which nature has drawn an impenetrable veil. To prevent this inconvenient distraction of thought, a farther provision is made in that gradual and imperceptible process by which the changes in the state of the Universe are, in general, accom-

This idea of the *object* of physical science (which may be justly regarded as the ground-work of Bacon's *Novum Organon*) differs essentially from that which was entertained by the ancients; according to whom "Philosophy is the science of "*causes*." If, indeed by *causes* they had meant merely the constant forerunners or antecedents of events, the definition would have coincided nearly with the statement which I have given. But it is evident, that by *causes* they meant such antecedents as were *necessarily* connected with the effects, and from a knowledge of which the effects might be foreseen and demonstrated: And it was owing to this confusion between the proper objects of physics and of metaphysics, that, neglecting the observation of facts exposed to the examination of their senses, they vainly attempted, by synthetical reasoning, to deduce, as necessary consequences from their supposed causes, the phenomena and laws of nature.—"Causa ea est," says Cicero, "quæ id efficit cujus "est causa. Non sic causa intelligi debet, ut quod cuique an-"tecedat, id ei causa sit; sed quod cuique efficienter antece-"dat.—Itaque dicebat Carneades ne Apollinem quidem posse "dicere futura, nisi ea, quorum causas natura ita contineret,

---

plished. If an animal or a vegetable were brought into being before our eyes, in an instant of time,—the event would not be in itself more wonderful than their slow growth to maturity from an embryo, or from a seed. But, on the former supposition, there is no man who would not perceive and acknowledge the immediate agency of an intelligent cause; whereas, according to the actual order of things, the effect steals so insensibly on the observation, that it excites little or no curiosity, excepting in those who possess a sufficient degree of reflection to contrast the present state of the objects around them, with their first origin, and with the progressive stages of their existence.

" ut ea fieri necesse esset. Causis enim efficientibus quamque " rem cognitis, posse denique sciri quid futurum esset*."

From this disposition to confound efficient with physical causes, may be traced the greater part of the theories recorded in the history of philosophy. It is this which has given rise to the attempts, both in ancient and modern times, to account for all the phenomena of moving bodies by means of *impulse*†;

---

* De Fato, 48, 49. The language of Aristotle is equally explicit. Επισταθαι δε οιομεθα εκαστον ἁπλως, αλλα μη τον σοφιστικον τροπον, τον κατα συμβεβηκος, ὁταν την αιτιαν οιωμεθα γινωσκειν, δι' ἣν το πραγμα εστιν, ὁτι εκεινυ αιτια εστι, και μη ενδεχεται τυτ' αλλως εχειν. Sciri autem putamus unamquamque rem simpliciter, non sophistico modo, id est ex accidenti, cum putamus causam cognoscere propter quam res est, ejus rei causam esse, nec posse eam aliter se habere.—Analyt. Poster. Lib. i. cap. 2.

Nothing, however, can place in so strong a light Aristotle's idea of the connection between physical causes and effects, as the analogy which he conceived it to bear to the connection between the links of a mathematical chain of reasoning. Nor is this mode of speaking abandoned by his modern followers. " To deny a first cause (says Dr " Gillies) is to deny all causation: to deny axioms is, *for the same reason*, to deny all " demonstration." (Vol. I. p. 108.) And in another passage; " We know a mathe- " matical proposition, when we know the causes that make it true. In demonstration, " the premises are the causes of the conclusion, and therefore prior to it. We can- " not, therefore, demonstrate things in a circle, supporting the premises by the con- " clusion; because this would be to suppose, that the one proposition could be both " prior and posterior to the other." (Ibid. p. 96.) (Can one mathematical theorem be said to be prior to another in any other sense, than in respect of the order in which they are first presented to our knowledge?)

† See Philosophy of the Human Mind, Vol. I. Chap. i. sect. 2.

With respect to the connection between impulse and motion, I have the misfortune to differ from my very learned and highly respected friend M. Prévost of Geneva; whose opinions on this point may be collected from the two following sentences. " La " cause diffère du simple signe précurseur, par sa force, ou son energie productive.—

and it is this also which has suggested the simpler expedient of explaining them by the agency of *minds* united with the particles of matter *. As the communication of motion by apparent impulse, and our own power to produce motion by a volition of the mind, are two facts, of which, from our earliest infancy, we have every moment had experience; we are apt to fancy that we understand perfectly the *nexus* by which cause and effect are here necessarily conjoined; and it requires a good deal of reflection to satisfy us that, in both cases, we are as completely in the dark, as in our guesses concerning the ultimate causes of magnetism or of gravitation. The dreams of the Pythagorean school with respect to analogies or harmonies between the constitution of the universe, and the mathematical properties of figures and of numbers, were suggested by the

---

" L'impulsion est un phénomène si commun, soumis à des lois si bien discutées, et si " universelles, que toute cause qui s'y réduit semble former une classe éminente, et mé- " riter seule le nom d' *Agent*." (*Essais de Philosophie*, Tome II. pp. 174, 175.)

I have read with great attention all that M. Prévost has so ingeniously urged in vindication of the theory of his illustrious countryman Le Sage; but without experiencing that conviction which I have in general received from his reasonings. The arguments of Locke and Hume on the other side of the question appear to my judgment, the longer I reflect on them, the more irresistible; not to mention the powerful support which they derive from the subsequent speculations of Boscovich. (See *Locke's Essay*, B. II. chap. 23. § 28. 29. and *Hume's Essay on Necessary Connexion*, Part I.)

In employing the word *misfortune*, on this occasion, I have no wish to pay an unmeaning compliment; but merely to express the painful diffidence which I always feel in my own conclusions, when they happen to be at variance with those of a writer equally distinguished by the depth and by the candour of his philosophical researches.

* To this last class of theories may also be referred the explanations of physical phenomena by such causes as sympathies, antipathies, Nature's horror of a void, &c. and other phrases borrowed by analogy from the attributes of animated beings.

same idea of *necessary* connections existing among physical phenomena, analogous to those which link together the theorems of geometry or of arithmetic; and by the same fruitless hope of penetrating, by abstract and synthetical reasoning, into the mysterious processes of nature.

Beside this universal and irresistible bias of the imagination, there were some peculiarities in the genius and scientific taste of Aristotle, which gave birth to various errors calculated to mislead his followers in their physical inquiries. Among these errors may be mentioned, as one of the most important, the distinction of causes (introduced by him) into the efficient, the material, the formal and the final;—a distinction which, as Dr Reid justly observes, amounts only (like many other of Aristotle's) to an explanation of the different meanings of an ambiguous word; and which, therefore, was fitter for a dictionary of the Greek language, than for a philosophical treatise*. Of the effect of this enumeration of causes in distracting the attention, some idea may be formed, when it is recollected, that, according to Aristotle, it is the business of the philosopher to reason demonstratively from all the four†.

The same predilection of Aristotle for logical or rather verbal subtilties, encouraged, for many ages, that passion for fanciful and frivolous distinctions, which is so adverse to the useful exercise of the intellectual powers. Of its tendency to check the progress of physical knowledge, the reader will be enabled

* Analysis of Aristotle's Logic. Chap. ii. sect. 3.

† Nat. Auscult. Lib. ii. cap. 7.

to judge for himself, by perusing the 16th and 17th chapters of Mr Harris's Philosophical Arrangements; which chapters contain a very elaborate and not inelegant view of what the author is pleased to call the ancient *Theory of Motion*. A later writer of the same school has even gone so far as to assert, that it is such researches alone which merit the title of the Philosophy of Motion; and that the conclusions of Galileo and of Newton,—amounting (as they unquestionably do) to nothing more than a classification and generalization of facts,—deserve no higher an appellation than that of *Natural History**.

In contrasting, as I have now done, the spirit of Bacon's mode of philosophising with that of the ancients, I do not mean to extol his own notions concerning the relation of cause and effect in physics, as peculiarly correct and consistent. On the contrary, it seems to me evident, that he was led to his logical conclusions, not by any metaphysical analysis of his ideas, but by a conviction, founded on a review of the labours of his predecessors, that the plan of inquiry by which they had been guided must have been erroneous. If he had perceived as clearly as Barrow, Berkeley, Hume, and many others have done since his time†, that there is not a single

---

* Ancient Metaphysics, *passim*.

† In alluding to the relation between cause and effect, Bacon sometimes indulges "his fancy in adopting metaphorical and popular expressions. "Namque in limine "Philosophiæ, cum secundæ causæ, tanquam sensibus proximæ, ingerant se menti hu-"manæ, mensque ipsa in illis hæreat, atque commoretur, oblivio primæ causæ obrepere "possit. Sin quis ulterius pergat, *causarumque dependentiam, seriem, et concatenationem*, "atque opera providentiæ intueatur, tunc secundum poetarum mythologiam, facile

instance in which we are able to trace a necessary connection between two successive events, or to explain in what manner the one follows from the other as an infallible consequence, he would have been naturally led to state his principles in a form far more concise and methodical, and to lay aside much of that scholastic jargon by which his meaning is occasionally obscured. Notwithstanding, however, this vagueness and indistinctness in his language, his comprehensive and penetrating understanding, enlightened by a discriminating survey of the fruitless inquiries of former ages, enabled him to describe, in the strongest and happiest terms, the nature, the object, and the limits of philosophical investigation. The most valuable part of his works, at the same time, consists, perhaps, in his reflections on the errors of his predecessors; and on the various causes which have retarded the progress of the sciences and the improvement of the human mind. That he should have executed, with complete success, a system of logical precepts for the prosecution of experimental inquiries, at a period when these were, for the first time, beginning to engage the attention of the curious, was altogether impossible; and yet in his *attempt* towards this undertaking, he has displayed a reach of thought

---

" credet, *summum naturalis catenæ annulum* pedi solii Jovis affigi." (De Aug. Scient. Lib. i.) This is very nearly the language of Seneca. " Cum fatum nihil aliud sit " quam *series implexa causarum*, ille est prima omnium causa ex quâ ceteræ pendent."

In other instances, he speaks (and, in my opinion, much more philosophically) of the " opus quod operatur Deus a primordio usque ad finem;" a branch of knowledge which he expressly describes as placed beyond the examination of the human faculties. But this speculation, although the most interesting that can employ our thoughts, has no immediate connection with the logic of physical science.—See Note (N.)

and a justness of anticipation, which, when compared with the discoveries of the two succeeding centuries, seem frequently to partake of the nature of prophecy. "Prout Physica majora "indies incrementa capiet, et nova axiomata educet, eo "mathematicæ novâ operâ in multis indigebit, et plures demum "fient mathematicæ mixtæ*." Had he foreseen all the researches of the Newtonian school, his language could not have been more precise or more decided.

"Bacon (it has been observed by Mr Hume) was ignorant "of geometry; and only pointed out at a distance the road to "true philosophy."—"As an author and philosopher," therefore, this historian pronounces him, "*though very estimable*, yet "inferior to his contemporary Galileo, perhaps even to Kep-"ler†."—The parallel is, by no means, happily imagined; inasmuch as the individuals whom it brings into contrast, directed their attention to pursuits essentially different, and were characterized by mental powers unsusceptible of comparison. As a geometer or astronomer, Bacon has certainly no claim whatever to distinction; nor can it even be said, that, as an

---

* De Aug. Scient. Lib. iii. Cap. vi.

By the word *Axiom*, Bacon means a general principle obtained by induction, from which we may safely proceed to reason synthetically. It is to be regretted, that he did not make choice of a less equivocal term, as Newton has plainly been misled by his example, in the very illogical application of this name to the laws of motion, and to those general *facts* which serve as the basis of our reasonings in catoptrics and dioptrics. (See pp. 42, 43, of this volume.)

I shall take this opportunity to remark, that Newton had evidently studied Bacon's writings with care; and has followed them (sometimes too implicitly) in his logical phraseology. Of this remark various other proofs will occur afterwards.

† History of England. Appendix to the reign of James I.

experimentalist, he has enriched science by one important discovery: but, in just and enlarged conceptions of the proper aim of philosophical researches, and of the means of conducting them, how far does he rise above the level of his age! Nothing, indeed, can place this in so strong a light, as the history of Kepler himself; unquestionably one of the most extraordinary persons who adorned that memorable period, but deeply infected, as his writings shew, with prejudices borrowed from the most remote antiquity. The mysterious theories of the Pythagoreans which I formerly mentioned, and which professed to find in the mathematical properties of figures and numbers, an explanation of the system of the universe, seem, from one of his earlier publications, to have made a strong impression on his imagination*; while, at an after period of

* *Mysterium Cosmographicum*, de admirabili proportione orbium cœlestium deque causis cœlorum numeri, magnitudinis, motuumque periodicorum genuinis et propriis, *demonstratum per quinque regularia corpora Geometrica*, 1598. Kepler informs us, that he sent a copy of this book to Tycho Brahe; the subject of whose answer he has had the candour to record. "Argumentum literarum Brahei hoc erat, ut suspensis specula-"tionibus à priori descendentibus, animum potius ad observationes quas simul offerebat, "considerandas adjicerem, inque iis primo gradu facto, posteà demum ad causas ascen-"derem."—To this excellent advice the subsequent discoveries, which have immortalized the name of Kepler, may, (in the opinion of Mr Maclaurin) be ascribed. *Account of Newton's Discoveries*, Book I. Chap. iii.

An aphorism of Lord Bacon, concerning the relation which Mathematics bears to Natural Philosophy, exhibits a singular contrast to the aim and spirit of the *Mysterium Cosmographicum*. "In secunda schola Platonis, Procli et aliorum, Naturalis Philo-"sophia infecta et corrupta fuit, per Mathematicam; *quæ Philosophiam Naturalem* "*terminare, non generare aut procreare debet.*" (Nov. Org. Lib. I. Aphor. xcvi.)—The very slender knowledge of this science which Bacon probably possessed, renders it only

life, he indulged himself in a train of thinking about the *causes* of the planetary motions, approaching to the speculations of the late learned author of *Ancient Metaphysics*.

"Nego (says he, in his Commentaries on the planet MARS) "ullum motum perennem *non rectum* a Deo conditum esse præ- "sidio mentali destitutum.—Hujus *motoris* manifestum est duo "fore munia; alterum ut facultate polleat transvectandi corporis; "alterum ut scientiâ præditus sit inveniendi circularem limitem "per illam puram auram ætheriam nullis hujusmodi regionibus "distinctam."—In another part of his work, he seriously gives

---

the more wonderful, that he should have been so fortunate in seizing, or rather in divining its genuine use and application, in physical researches.

The ignorance of geometry with which Mr Hume reproaches Bacon, will not appear surprising, when it is considered, that, sixty years after the time when he left Cambridge, mathematical studies were scarcely known in that University. For this fact we have the direct testimony of Dr Wallis (afterwards Astronomical Professor at Oxford), who was admitted at Emanuel College, Cambridge, in 1632; and who informs us, that at that time, "Mathematics were scarce looked upon as *Academical* Studies, but rather *Me-* "*chanical*; as the business of traders, merchants, seamen, carpenters, surveyors of land, "and almanack-makers in London."—"Among more than two hundred students in "our College, I do not know of any two who had more than I (if so much) which "was then but little; and but very few in that whole University. For the study of "Mathematics was then more cultivated in London than in the Universities."

(See *an Account of some passages in the Life of Dr Wallis*, written by himself when he was upwards of eighty, and published by Hearne, in his edition of Langtoft's Chronicle.)

The same writer, from whom this information is derived, lived to see, not only the institution of the Royal Society of London, but the illustration which the University of Cambridge derived from the names of Barrow and of Newton; and even survived, for seventeen years, the publication of Newton's *Principia*.—That Lord Bacon's writings contributed, more than any other single cause, to give this sudden impulse to science in England, it is impossible to doubt.

it as his opinion, that the minds of the planets must have a power of making constant observations on the sun's apparent diameter, that they may thereby be enabled so to regulate their motions, as to describe areas proportional to the times. "Credi-" bile est itaque, si quâ facultate præditi sint *motores* illi obser-" vandæ hujus diametri, eam tanto esse argutiorem quam sunt " oculi nostri, quanto opus ejus et perennis motio nostris tur-" bulentis et confusis negotiis est constantior.

" An ergo binos singulis planetis tribues oculos Keplere! " Nequaquam. Neque est necesse. Neque enim ut moveri " possint, pedes ipsis atque alæ sunt tribuendæ."

From such extravagancies as these, how wide the transition to the first sentence of the Novum Organon! " HOMO NATURÆ " MINISTER ET INTERPRES TANTUM FACIT ET INTELLIGIT " QUANTUM DE NATURÆ ORDINE RE VEL MENTE OBSERVA-" VERIT, NEC AMPLIUS SCIT AUT POTEST."

In calling man the *interpreter* of Nature, Bacon had plainly the same idea of the object of physics, which I attempted to convey, when I said, that what are commonly called the *causes* of phenomena, are only their established antecedents or *signs*; and the same analogy which this expression suggests to the fancy, has been enlarged upon at considerable length, by the inventive and philosophical Bishop of Cloyne, as the best illustration which he could give of the doctrine in question. It would be difficult, indeed, to select another equally apposite and lu-

minous; and not less difficult to find an author equally qualified to avail himself of its aid. I shall make no apology, therefore, for borrowing his words.

"There is a certain analogy, constancy, and uniformity in "the phenomena or appearances of nature, which are a foun- "dation for general rules; and these are a grammar for the un- "derstanding of nature, or that series of effects in the visible "world, whereby we are enabled to foresee what will come to "pass in the natural course of things. Plotinus observes, in "his third Ennead, that the art of presaging is, in some sort, "the reading of natural letters denoting order; and that so far "forth as analogy obtains in the universe, there may be vati- "cination. And in reality, he that foretells the motions of the "planets, or the effects of medicines, or the results of chemical "or mechanical experiments, may be said to do it by natural "vaticination.

"We know a thing when we understand it, and we understand "it when we can interpret or tell what it signifies. Strictly the "sense knows nothing We perceive indeed sounds by hearing, "and characters by sight; but we are not therefore said to under- "stand them. After the same manner, the phenomena of nature "are alike visible to all; but all have not alike learned the con- "nection of natural signs, or understand what they signify, or "know how to vaticinate by them. There is no question, says "Socrates in *Theateto*, concerning that which is agreeable to "each person, but concerning what will in time to come be "agreeable, of which all men are not equally judges. He that "foreknoweth what will be, in every kind, is the wisest. Ac-

"cording to Socrates, you and the cook may judge of a dish "on the table equally well; but while the dish is making, the "cook can better foretell what will ensue from this or that "manner of composing it. Nor is this manner of reasoning "confined only to morals or politics, but extends also to natu- "ral science.

"As the natural connection of signs with the things signified "is regular and constant, it forms a sort of rational discourse, "and is therefore the immediate effect of an intelligent cause*."

The same language with respect to the office and use of philosophy has been adopted by Reid, and at a much earlier period by Hobbes; and it was evidently by a similar train of thinking (as I already hinted) that Bacon was led to call philosophy *the interpretation of nature*.

According to the doctrine now stated, the highest, or rather the only proper object of Physics, is to ascertain those established conjunctions of successive events, which constitute the order of the Universe; to record the phenomena which it exhibits to our observations, or which it discloses to our experiments; and to refer these phenomena to their general laws. While we are apt to fancy, therefore, (agreeably to popular conceptions and language) that we are investigating efficient causes, we are, in reality, only generalizing effects; and

* *Siris:* or a Chain of Philosophical Reflections and Inquiries concerning the virtues of Tar-Water, §§ 252, 253, 254.

when we advance from discovery to discovery, we do nothing more than resolve our former conclusions into others still more comprehensive. It was thus that Galileo and Torricelli proceeded in proving that all terrestrial bodies gravitate towards the earth; and that the apparent levity of some of them is merely owing to the greater gravity of the atmosphere. In establishing this important conclusion, they only generalized the law of gravity, by reconciling with it a variety of seeming exceptions; but they threw no light whatever on that mysterious power, in consequence of which all these phenomena take place. In like manner, when Newton shewed that the same law of gravity extends to the celestial spaces; and that the power by which the moon and planets are retained in their orbits is precisely similar in its effects to that which is manifested in the fall of a stone,—he left the efficient cause of gravity as much in the dark as ever, and only generalized still farther the conclusions of his predecessors. It was, indeed, the most astonishing and sublime discovery which occurs in the history of science;—a discovery not of less consequence in Natural Religion than in Natural Philosophy,—and which at once demonstrated (in direct contradiction to all the ancient systems) that the phenomena exhibited by the heavenly bodies, are regulated by the same laws which fall under our observation on the surface of this globe. Still, however, it was not the discovery of an efficient cause, but only the generalization of a fact *.

* "The laws of attraction and repulsion are to be regarded as laws of motion, and "these only as rules or methods observed in the production of natural effects, the effi- "cient and final causes whereof are not of mechanical consideration. Certainly if the

From what has been said, it is sufficiently evident, that the *ultimate* object which the philosopher aims at in his researches, is precisely the same with that which every man of plain understanding, however uneducated, has in view, when he remarks the events which fall under his observation, in order to obtain rules for the future regulation of his conduct. The more knowledge of this kind we acquire, the better can we accommodate our conduct to the established course of things; and the more are we enabled to avail ourselves of natural agents as instruments for accomplishing our purposes. It is with truth, therefore, that Bacon so often repeats, that "every accession which "Man gains to his knowledge is also an accession to his power; "and extends the limits of his empire over the world which "he inhabits."

The knowledge of the philosopher differs from that informa-

"explaining a phenomenon be to assign its proper efficient and final cause, it should "seem the mechanical philosophers never explained any thing; their province being "only to discover the laws of nature; that is, the general rules and methods of mo- "tion; and to account for particular phenomena, by reducing them under, or shewing "their conformity to such general rules."—Berkeley's *Siris*.

"The words *attraction* and *repulsion* may, in compliance with custom, be used where, "accurately speaking, motion alone is meant."—"Attraction cannot produce, and in "that sense account for, the phenomena; being itself one of the phenomena produced "and to be accounted for." Ibid.

For some very important as well as refined observations on the respective provinces of physics and of metaphysics in the theory of motion, see a Tract by Dr Berkeley, first published at London in 1721. The title is, *De Motu; sive de Motus principio et natura, et de causa communicationis Motuum*.

tion which is the fruit of common experience, not in kind, but in degree. The latter is, in general, confined to such facts as present themselves spontaneously to the eye: and so beautifully is the order of nature adapted to our wants and necessities, that while those laws in which we are most deeply interested are obtruded on our notice from our earliest infancy, others are more or less removed from the immediate examination of our senses, to stimulate curiosity, and to present a reward to industry. That a heavy body when unsupported, will fall downwards; that a painful sensation would be felt, if the skin were punctured or lacerated; that life might be destroyed by plunging into a river, or by throwing one's self headlong from a precipice, are facts as well known to the savage as to the philosopher, and of which the ignorance would be equally fatal to both. For acquiring this, and other information of the same sort, little else is requisite than the use of our perceptive organs: And accordingly, it is familiar to every man, long before the period that, in his maturer years, falls under the retrospect of memory.

For acquiring a knowledge of facts more recondite, *observation* and *experiment* must be employed*; and, accordingly, the

* To these, Condorcet adds *calculation*. "Bacon (he observes) has revealed the "true method of studying nature, by employing the three instruments with which she "has furnished us for the discovery of her secrets,—observation, experiment, and calcula-"tion." (*Tableau Historique des progrès de l'Esprit Humain.*) In this enumeration, it appears to me that there is a great defect, in point of logical distinctness. Calculation is certainly not an instrument of discovery at all analogous to experiment and observation: it can accomplish nothing in the study of nature, till they have supplied

use of these *media* forms one of the characteristical circumstances by which the studies of the philosopher are distinguished from the experience of the multitude. How much the stock of his information must thereby be enlarged is sufficiently manifest. By habits of scientific attention, his accuracy as an observer is improved; and a precision is given to his judgment, essentially different from the vagueness of ordinary perception: by a combination of his own observations with those made by others, he arrives at many conclusions unknown to those who are prevented, by the necessary avocations of human life, from indulging the impulse of a speculative curiosity; while the experiments which his ingenuity devises, enable him to place nature in situations in which she never presents herself spontaneously to view, and to extort from her secrets over which she draws a veil to the eyes of others *.

---

the materials; and is indeed only one of the many arts by which we are enabled to give a greater degree of accuracy to their results. The use of optical glasses; of the thermometer and barometer; of time-pieces; and of all the various instruments of practical geometry might, with equal propriety, have been added to the list.

The advantages, at the same time, which Natural Philosophy has derived, in modern times, from the arithmetical precision thus given to scientific details, must be allowed to be immense; and they would be well entitled to an ample illustration in a system of inductive logic. To those who may wish to prosecute the subject in this view, I would beg leave to suggest the word *mensuration* as equally precise, and more comprehensive, than the word *calculation*, as employed by Condorcet.

* These primary and essential organs of accurate information (*observation* and *experiment*) which furnish the basis to the whole superstructure of physical science, are very clearly and concisely described by *Boscovich*, in one of his notes on Stay's poem, *De Systemate Mundi*. "*Observationes* fiunt spectando id quod natura per se ipsam sponte exhibet: hujusmodi sunt observationes pertinentes ad astronomiam et historiam naturalem.