Sketches Of The History Of Man

In Two Volumes

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A Brief Account of Aristotle's Logic. With Remarks.

A Brief Account of ARISTOTLE'S LOGIC.

With REMARKS.

CHAP. I.

Of the First Three Treatises.

SECT. I. *Of the Author.*

ARistotle had very uncommon advantages: born in an age when the philosophical spirit in Greece had long flourished, and was in its greatest vigour; brought up in the court of Macedon, where his father was the King's physician; twenty years a favourite scholar of Plato, and tutor to Alexander the Great; who both honoured him with his friendship, and supplied him with every thing necessary for the prosecution of his enquiries.

These advantages he improved by indefatigable study, and immense reading. He was the first we know, says Strabo, who composed a library. And in this the Egyptian and Pergamenian kings, copied his example. As to his genius, it would be disrespectful to mankind, not to allow an uncommon share to a man who governed the opinions of the most enlightened part of the species near two thousand years.

If his talents had been laid out solely for the discovery of truth, and the good of mankind, his laurels would have remained for ever fresh: but he seems to have had a greater passion for fame

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than for truth, and to have wanted rather to be admired as the prince of philosophers, than to be useful: so that it is dubious whether there be in his character most of the philosopher, or of the sophist. The opinion of Lord Bacon is not without probability, That his ambition was as boundless as that of his royal pupil, the one aspiring at universal monarchy over the bodies and fortunes of men, the other over their opinions. If this was the case, it cannot be said, that the philosopher pursued his aim with less industry, less ability, or less success, than the hero.

His writings carry too evident marks of that philosophical pride, vanity, and envy, which have often sullied the character of the learned. He determines boldly things above all human knowledge; and enters upon the most difficult questions, as his pupil entered on a battle, with full assurance of success. He delivers his decisions oracularly, and without any fear of mistake. Rather than confess his ignorance, he hides it under hard words and ambiguous expressions, of which his interpreters can make what pleases them. There is even reason to suspect, that he wrote often with affected obscurity, either that the air of mystery might procure greater veneration, or that his books might be understood only by the adepts who had been initiated in his philosophy.

His conduct towards the writers that went before him has been much censured. After the manner of the Ottoman princes, says Lord Verulam, he thought his throne could not be secure unless he killed all his brethren. Ludovicus Vives charges him with detracting from all philosophers, that he might derive that glory to himself, of which he robbed them. He rarely quotes an author but with a view to censure, and is not very fair in representing the opinions which he censures.

The faults we have mentioned are such as might be expected in a man, who had the daring ambition to be transmitted to all future ages, as the prince of philosophers, as one who had carried

every branch of human knowledge to its utmost limit; and who was not very scrupulous about the means he took to obtain his end.

We ought, however, to do him the justice to observe, that although the pride and vanity of the sophist appear too much in his writings in abstract philosophy, yet in natural history the fidelity of his narrations seems to be equal to his industry; and he always distinguishes between what he knew and what he had by report. And even in abstract philosophy, it would be unfair to impute to Aristotle all the faults, all the obscurities, and all the contradictions that are to be found in his writings. The greatest part, and perhaps the best part, of his writings is lost. There is reason to doubt whether some of those we ascribe to him be really his; and whether what are his be not much vitiated and interpolated. These suspicions are justified by the fate of Aristotle's writings, which is judiciously related, from the best authorities, in Bayle's dictionary, under the article *Tyrannion*, to which I refer.

His books in logic which remain, are, 1. One book of the Categories. 2. One of Interpretation. 3. First Analytics, two books. 4. Last Analytics, two books. 5. Topics, eight books. 6. Of Sophisms, one book. Diogenes Laertius mentions many others that are lost. Those I have mentioned have commonly been published together, under the name of *Aristotle's Organon*, or *his Logic*; and for many ages, Porphyry's Introduction to the Categories has been prefixed to them.

SECT. 2. *Of Porphyry's Introduction.*

In this Introduction, which is addressed to Chrysoarius, the author observes, That in order to understand Aristotle's doctrine concerning the categories, it is necessary to know what a *genus*

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is, what a *species*, what a *specific difference*, what a *property*, and what an *accident*; that the knowledge of thefe is alfo very ufeful in definition, in divifion, and even in demonftration: therefore he propofes, in this little tract, to deliver fhortly and fimply the doctrine of the ancients, and chiefly of the Peripatetics, concerning thefe five *predicables*; avoiding the more intricate queftions concerning them; fuch as, Whether *genera* and *fpecies* do really exift in nature? or, Whether they are only conceptions of the human mind? If they exift in nature, Whether they are corporeal or incorporeal? and, Whether they are inherent in the objects of fenfe, or disjoined from them? Thefe, he fays, are very difficult queftions, and require accurate difcuffion; but that he is not to meddle with them.

After this preface, he explains very minutely each of the five words above mentioned, divides and fubdivides each of them, and then purfues all the agreements and differences between one and another through fixteen chapters.

Sect. 3. *Of the Categories.*

The book begins with an explication of what is meant by univocal words, what by equivocal, and what by denominative. Then it is obferved, that what we fay is either fimple, without compofition or ftructure, as *man, horfe*; or, it has compofition and ftructure, as, *a man fights, the horfe runs.* Next comes a diftinction between a fubject of predication; that is, a fubject of which any thing is affirmed or denied, and a fubject of inhefion. Thefe things are faid to be inherent in a fubject, which although they are not a part of the fubject, cannot poffibly exift without it, as figure in the thing figured. Of things that are, fays Ariftotle, fome may be predicated of a fubject, but are in no fubject; as,

Y 2 *man*

man may be predicated of James or John, but is not in any fubject. Some again are in a fubject, but can be predicated of no fubject. Thus, my knowledge in grammar is in me as its fubject, but it can be predicated of no fubject; becaufe it is an individual thing. Some are both in a fubject, and may be predicated of a fubject, as fcience; which is in the mind as its fubject, and may be predicated of geometry. Laftly, Some things can neither be in a fubject, nor be predicated of any fubject. Such are all individual fubftances, which cannot be predicated, becaufe they are individuals; and cannot be in a fubject, becaufe they are fubftances. After fome other fubtilties about predicates and fubjects, we come to the categories themfelves; the things above mentioned being called by the fchoolmen the *anteprædicamenta*. It may be obferved, however, that notwithftanding the diftinction now explained, the *being in a fubject*, and the *being predicated truly of a fubject*, are in the Analytics ufed as fynonymous phrafes; and this variation of ftyle has led fome perfons to think that the Categories were not wrote by Ariftotle.

Things which may be expreffed without compofition or ftructure, are, fays the author, reducible to the following heads. They are either *fubftance*, or *quantity*, or *quality*, or *relatives*, or *place*, or *time*, or *having*, or *doing*, or *fuffering*. Thefe are the predicaments or categories. The firft four are largely treated of in four chapters; the others are flightly paffed over, as fufficiently clear of themfelves. As a fpecimen, I fhall give a fummary of what he fays on the category of fubftance.

Subftances are either primary, to wit, individual fubftances, or fecondary, to wit, the genera and fpecies of fubftances. Primary fubftances neither are in a fubject, nor can be predicated of a fubject; but all other things that exift, either are in primary fubftances, or may be predicated of them. For whatever can be predicated of that which is in a fubject, may alfo be predicated of the

<div align="right">fubject</div>

subject itself.   Primary substances are more substances than the secondary ; and of the secondary, the species is more a substance than the genus.   If there were no primary, there could be no secondary substances.

The properties of substance are these :   1. No substance is capable of intension or remission.   2. No substance can be in any other thing as its subject of inhesion.   3. No substance has a contrary ; for one substance cannot be contrary to another ; nor can there be contrariety between a substance and that which is no substance.   4. The most remarkable property of substance, is, that one and the same substance may, by some change in itself, become the subject of things that are contrary.   Thus, the same body may be at one time hot, at another cold.

Let this serve as a specimen of Aristotle's manner of treating the categories.   After them, we have some chapters, which the schoolmen call *postprædicamenta* ; wherein, first, the four kinds of opposition of terms are explained ; to wit, *relative, privative,* of *contrariety,* and of *contradiction.*   This is repeated in all systems of logic.   Last of all we have distinctions of the four Greek words which answer to the Latin ones, *prius, simul, motus,* and *habere.*

SECT. 4. *Of the book concerning Interpretation.*

We are to consider, says Aristotle, what a noun is, what a verb, what affirmation, what negation, what speech.   Words are the signs of what passeth in the mind ; writing is the sign of words.   The signs both of writing and of words are different in different nations, but the operations of mind signified by them are the same.   There are some operations of thought which are neither true nor false.   These are expressed by nouns or verbs singly, and without composition.

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A noun is a found which by compact fignifies fomething without refpect to time, and of which no part has fignification by itfelf. The cries of beafts may have a natural fignification, but they are not nouns. We give that name only to founds which have their fignification by compact. The cafes of a noun, as the genitive, dative, are not nouns. *Non homo* is not a noun, but, for diftinction's fake, may be called a *nomen infinitum*.

A verb fignifies fomething by compact with relation to time. Thus, *valet* is a verb; but *valetudo* is a noun, becaufe its fignification has no relation to time. It is only the prefent tenfe of the indicative that is properly called a verb; the other tenfes and moods are variations of the verb. *Non valet* may be called a *verbum infinitum*.

Speech is found fignificant by compact, of which fome part is alfo fignificant. And it is either enunciative, or not enunciative. Enunciative fpeech is that which affirms or denies. As to fpeech which is not enunciative, fuch as a prayer or wifh, the confideration of it belongs to oratory, or poetry. Every enunciative fpeech muft have a verb, or fome variation of a verb. Affirmation is the enunciation of one thing concerning another. Negation is the enunciation of one thing from another. Contradiction is an affirmation and negation that are oppofite. This is a fummary of the firft fix chapters.

The feventh and eighth treat of the various kinds of enunciations or propofitions, univerfal, particular, indefinite, and fingular; and of the various kinds of oppofition in propofitions, and the axioms concerning them. Thefe things are repeated in every fyftem of logic. In the ninth chapter he endeavours to prove, by a long metaphyfical reafoning, that propofitions refpecting future contingencies are not, determinately, either true or falfe; and that if they were, it would follow, that all things happen necef-
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farily, and could not have been otherwife than as they are. The remaining chapters contain many minute obfervations concerning the equipollency of propofitions both pure and modal.

C H A P.   II.

Remarks.

SECT. 1. *On the Five Predicables.*

THE writers on logic have borrowed their materials almoft entirely from Ariftotle's Organon, and Porphyry's Introduction. The Organon however was not wrote by Ariftotle as one work. It comprehends various tracts, wrote without the view of making them parts of one whole, and afterwards thrown together by his editors under one name on account of their affinity. Many of his books that are loft would have made a part of the Organon, if they had been faved.

The three treatifes of which we have given a brief account, are unconnected with each other, and with thofe that follow. And although the firft was undoubtedly compiled by Porphyry, and the two laft probably by Ariftotle, yet I confider them as the venerable remains of a philofophy more ancient than Ariftotle. Archytas of Tarentum, an eminent mathematician and philofopher of the Pythagorean fchool, is faid to have wrote upon the ten categories. And the five predicables probably had their origin in the fame fchool. Ariftotle, tho' abundantly careful to do juftice to himfelf, does not claim the invention of either. And Porphyry,

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without afcribing the latter to Ariftotle, profeffes only to deliver the doctrine of the ancients, and chiefly of the Peripatetics, concerning them.

The writers on logic having divided that fcience into three parts ; the firft treating of fimple apprehenfion, and of terms ; the fecond, of judgement, and of propofitions ; and the third, of reafoning, and of fyllogifms. The materials of the firft part are taken from Porphyry's Introduction, and the Categories ; and thofe of the fecond from the book of Interpretation.

A predicable, according to the grammatical form of the word, might feem to fignify, whatever may be predicated, that is, affirmed or denied, of fome fubject. And in this fenfe every predicate would be a predicable. But the logicians give a different meaning to the word. They divide propofitions into certain claffes, according to the relation which the predicate of the propofition bears to the fubject. The firft clafs is that wherein the predicate is the *genus* of the fubject ; as when we fay, *This is a triangle, Jupiter is a planet*. In the fecond clafs, the predicate is a *fpecies* of the fubject ; as when we fay, *This triangle is right-angled*. A third clafs is when the predicate is the fpecific difference of the fubject ; as when we fay, *Every triangle has three fides and three angles*. A fourth when the predicate is a property of the fubject ; as when we fay, *The angles of every triangle are equal to two right angles*. And a fifth clafs is when the predicate is fomething accidental to the fubject ; as when we fay, *This triangle is neatly drawn*.

Each of thefe claffes comprehends a great variety of propofitions, having different fubjects, and different predicates ; but in each clafs the relation between the predicate and the fubject is the fame. Now it is to this relation that logicians have given the name of *a predicable*. Hence it is, that altho' the number of predicates be infinite, yet the number of predicables can be no greater than

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that of the different relations which may be in propofitions between the predicate and the fubject. And if all propofitions belong to one or other of the five claffes above mentioned, there can be but five predicables, to wit, *genus, fpecies, differentia, proprium,* and *accidens.* Thefe might, with more propriety perhaps, have been called *the five claffes of predicates*; but ufe has determined them to be called *the five predicables*.

It may alfo be obferved, that as fome objects of thought are individuals, fuch as, *Julius Cæfar, the city Rome*; fo others are common to many individuals, as *good, great, virtuous, vicious.* Of this laft kind are all things expreffed by adjectives. Things common to many individuals were by the ancients called *univerfals.* All predicates are univerfals, for they all have the nature of adjectives; and, on the other hand, all univerfals may be predicates. On this account univerfals may be divided into the fame claffes as predicates; and as the five claffes of predicates above mentioned have been called the five predicables, fo by the fame kind of phrafeology they have been called *the five univerfals*; altho' they may more properly be called *the five claffes of univerfals.*

The doctrine of the five univerfals or predicables makes an effential part of every fyftem of logic, and has been handed down without any change to this day. The very name of *predicables* fhews, that the author of this divifion, whoever he was, intended it as a complete enumeration of all the kinds of things that can be affirmed of any fubject; and fo it has always been underftood. So that it is implied in this divifion, that all that can be affirmed of any thing whatfoever, is either the *genus* of the thing, or its *fpecies*, or its *fpecific difference*, or fome *property* or *accident* belonging to it.

Burgerfdick, a very acute writer in logic, feems to have been aware, that ftrong objections might be made to the five predicables, confidered as a complete enumeration; but unwilling to al-

low any imperfection in this ancient divifion, he endeavours to reftrain the meaning of the word *predicable*, fo as to obviate objections. Thofe things only, fays he, are to be accounted predicables, which may be affirmed of *many individuals*, *truly*, *properly*, and *immediately*. The confequence of putting fuch limitations upon the word *predicable* is, that in many propofitions, perhaps in moft, the predicate is not a predicable. But admitting all his limitations, the enumeration will ftill be very incomplete: for of many things we may affirm truly, properly, and immediately, their exiftence, their end, their caufe, their effect, and various relations which they bear to other things. Thefe, and perhaps many more, are predicables in the ftrict fenfe of the word, no lefs than the five which have been fo long famous.

Altho' Porphyry, and all fubfequent writers, make the predicables to be, in number, five; yet Ariftotle himfelf, in the beginning of the Topics, reduces them to four; and demonftrates, that they can be no more. We fhall give his demonftration when we come to the Topics; and fhall only here obferve, that as Burgerfdick juftifies the fivefold divifion, by reftraining the meaning of the word *predicable*; fo Ariftotle juftifies the fourfold divifion, by enlarging the meaning of the words *property* and *accident*.

After all, I apprehend, that this ancient divifion of predicables, with all its imperfections, will bear a comparifon with thofe which have been fubftituted in its ftead by the moft celebrated modern philofophers.

Locke, in his Effay on the Human Underftanding, having laid it down as a principle, That all our knowledge confifts in perceiving certain agreements and difagreements between our ideas, reduces thefe agreements and difagreements to four heads: to wit, 1. Identity and Diverfity; 2. Relation; 3. Coexiftence; 4. Real Exiftence (a). Here are four predicables given as a complete e-

(a) Book 4, chap. 1.

numeration,

numeration, and yet not one of the ancient predicables is included in the number.

The author of the Treatife of Human Nature, proceeding upon the fame principle, That all our knowledge is only a perception of the relations of our ideas, obferves, " That it may perhaps be " efteemed an endlefs tafk, to enumerate all thofe qualities which " admit of comparifon, and by which the ideas of philofophical " relation are produced : but if we diligently confider them, we " fhall find, that without difficulty they may be comprifed under " feven general heads : 1. Refemblance ; 2. Identity ; 3. Rela-" tions of Space and Time ; 4. Relations of Quantity and Num-" ber ; 5. Degrees of Quality ; 6. Contrariety ; 7. Caufation (a)." Here again are feven predicables given as a complete enumeration, wherein all the predicables of the ancients, as well as two of Locke's, are left out.

The ancients in their divifion attended only to categorical propofitions which have one fubject and one predicate ; and of thefe, only to fuch as have a general term for their fubject. The moderns, by their definition of knowledge, have been led to attend only to relative propofitions, which exprefs a relation between two fubjects, and thofe fubjects they fuppofe to be always ideas.

SECT. 2. *On the Ten Categories, and on Divifions in general.*

The intention of the categories or predicaments is, to mufter every object of human apprehenfion under ten heads : for the categories are given as a complete enumeration of every thing which can be expreffed without *compofition* and *ftructure* ; that is,

(a) Vol. 1 p. 33 and 125.

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of every thing which can be either the subject or the predicate of a proposition. So that as every soldier belongs to some company, and every company to some regiment; in like manner every thing that can be the object of human thought, has its place in one or other of the ten categories; and by dividing and subdividing properly the several categories, all the notions that enter into the human mind may be mustered in rank and file, like an army in the day of battle.

The perfection of the division of categories into ten heads, has been strenuously defended by the followers of Aristotle, as well as that of the five predicables. They are indeed of kin to each other. They breathe the same spirit, and probably had the same origin. By the one we are taught to marshal every term that can enter into a proposition, either as subject or predicate; and by the other, we are taught all the possible relations which the subject can have to the predicate. Thus, the whole furniture of the human mind is presented to us at one view, and contracted, as it were, into a nut-shell. To attempt, in so early a period, a methodical delineation of the vast region of human knowledge, actual and possible, and to point out the limits of every district, was indeed magnanimous in a high degree, and deserves our admiration, while we lament that the human powers are unequal to so bold a flight.

A regular distribution of things under proper classes or heads, is, without doubt, a great help both to memory and judgement. And as the philosopher's province includes all things human and divine that can be objects of enquiry, he is naturally led to attempt some general division, like that of the categories. And the invention of a division of this kind, which the speculative part of mankind acquiesced in for two thousand years, marks a superiority of genius in the inventer, whoever he was. Nor does it appear, that the general divisions which, since the decline of the Peripatetic

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tic philosophy, have been substituted in place of the ten categories, are more perfect.

Locke has reduced all things to three categories; to wit, substances, modes, and relations. In this division, time, space, and number, three great objects of human thought, are omitted.

The author of the Treatise of Human Nature has reduced all things to two categories; to wit, ideas, and impressions : a division which is very well adapted to his system; and which puts me in mind of another made by an excellent mathematician in a printed thesis I have seen. In it the author, after a severe censure of the ten categories of the Peripatetics, maintains, that there neither are nor can be more than two categories of things ; to wit, *data*, and *quæsita*.

There are two ends that may be proposed by such divisions. The first is, to methodize or digest in order what a man actually knows. This is neither unimportant nor impracticable; and in proportion to the solidity and accuracy of a man's judgement, his divisions of things which he knows, will be elegant and useful. The same subject may admit, and even require, various divisions, according to the different points of view from which we contemplate it : nor does it follow, that because one division is good, therefore another is naught. To be acquainted with the divisions of the logicians and metaphysicians, without a superstitious attachment to them, may be of use in dividing the same subjects, or even those of a different nature. Thus, Quintilian borrows from the ten categories his division of the topics of rhetorical argumentation. Of all methods of arrangement, the most antiphilosophical seems to be the invention of this age; I mean, the arranging the arts and sciences by the letters of the alphabet, in dictionaries and encyclopedies. With these authors the categories are, A, B, C, &c.

Another end commonly proposed by such divisions, but very

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rarely attained, is, to exhauft the fubject divided; fo that nothing that belongs to it fhall be omitted. It is one of the general rules of divifion in all fyftems of logic, That the divifion fhould be adequate to the fubject divided: a good rule, without doubt; but very often beyond the reach of human power. To make a perfect divifion, a man muft have a perfect comprehenfion of the whole fubject at one view. When our knowledge of the fubject is imperfect, any divifion we can make of it, muft be like the firft fketch of a painter, to be extended, contracted, or mended, as the fubject fhall be found to require. Yet nothing is more common, not only among the ancient, but even among modern philofophers, than to draw, from their incomplete divifions, conclufions which fuppofe them to be perfect.

A divifion is a repofitory which the philofopher frames for holding his ware in convenient order. The philofopher maintains, that fuch or fuch a thing is not good ware, becaufe there is no place in his ware-room that fits it. We are apt to yield to this argument in philofophy, but it would appear ridiculous in any other traffic.

Peter Ramus, who had the fpirit of a reformer in philofophy, and who had a force of genius fufficient to fhake the Ariftotelian fabric in many parts, but infufficient to erect any thing more folid in its place, tried to remedy the imperfection of philofophical divifions, by introducing a new manner of dividing. His divifions always confifted of two members, one of which was contradictory of the other; as if one fhould divide England into Middlefex and what is not Middlefex. It is evident that thefe two members comprehend all England: for the logicians obferve, that a term, along with its contradictory, comprehend all things. In the fame manner, we may divide what is not Middlefex into Kent and what is not Kent. Thus one may go on by divifions and fubdivifions that are abfolutely complete. This example may

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serve to give an idea of the spirit of Ramean divisions, which were in no small reputation about two hundred years ago.

Aristotle was not ignorant of this kind of division. But he used it only as a touchstone to prove by induction the perfection of some other division, which indeed is the best use that can be made of it; when applied to the common purpose of division, it is both inelegant, and burdensome to the memory; and, after it has put one out of breath by endless subdivisions, there is still a negative term left behind, which shows that you are no nearer the end of your journey than when you began.

Until some more effectual remedy be found for the imperfection of divisions, I beg leave to propose one more simple than that of Ramus. It is this: When you meet with a division of any subject imperfectly comprehended, add to the last member an *et cætera*. That this *et cætera* makes the division complete, is undeniable; and therefore it ought to hold its place as a member, and to be always understood, whether expressed or not, until clear and positive proof be brought, that the division is complete without it. And this same *et cætera* shall be the repository of all members that shall in any future time shew a good and valid right to a property in the subject.

SECT. 3. *On Distinctions.*

Having said so much of logical divisions, we shall next make some remarks upon distinctions.

Since the philosophy of Aristotle fell into disrepute, it has been a common topic of wit and raillery, to enveigh against metaphysical distinctions. Indeed the abuse of them in the scholastic ages, seems to justify a general prejudice against them: and shallow thinkers and writers have good reason to be jealous of distinctions,

tinctions, becaufe they make fad work when applied to their flim-
fy compofitions. But every man of true judgement, while he
condemns diftinctions that have no foundation in the nature of
things, muft perceive, that indifcriminately to decry diftinctions,
is, to renounce all pretenfions to juft reafoning: for as falfe rea-
foning commonly proceeds from confounding things that are dif-
ferent, fo without diftinguifhing fuch things, it is impoffible to
avoid error, or detect fophiftry. The authority of Aquinas, or
Suarez, or even of Ariftotle, can neither ftamp a real value upon
diftinctions of bafe metal, nor ought it to hinder the currency of
thofe that have intrinfic value.

Some diftinctions are verbal, others are real. The firft kind
diftinguifh the various meanings of a word; fome of which may
be proper, others metaphorical. Diftinctions of this kind make
a part of the grammar of a language, and are often abfurd when
tranflated into another language. Real diftinctions are equally
good in all languages, and fuffer no hurt by tranflation. They
diftinguifh the different fpecies contained under fome general no-
tion, or the different parts contained in one whole.

Many of Ariftotle's diftinctions are verbal merely; and there-
fore more proper materials for a dictionary of the Greek language
than for a philofophical treatife. At leaft, they ought never to
have been tranflated into other languages, when the idiom of the
language will not juftify them: for this is to adulterate the lan-
guage, to introduce foreign idioms into it without neceffity or
ufe, and to make it ambiguous where it was not. The diftinc-
tions in the end of the Categories of the four words *prius*, *fimul*,
motus, and *habere*, are all verbal.

The modes or fpecies of *prius*, according to Ariftotle, are five.
One thing may be prior to another; firft, in point of time; fe-
condly, in point of dignity; thirdly, in point of order; and fo
forth. The modes of *fimul* are only three. It feems this word was

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not ufed in the Greek with fo great latitude as the other, although they are relative terms.

The modes or fpecies of motion he makes to be fix, to wit, generation, corruption, increafe, decreafe, alteration, and change of place.

The modes or fpecies of *having* are eight. 1. Having a quality or habit, as having wifdom. 2. Having quantity or magnitude. 3. Having things adjacent, as having a fword. 4. Having things as parts, as having hands or feet. 5. Having in a part or on a part, as having a ring on one's finger. 6. Containing, as a cafk is faid to have wine. 7. Poffeffing, as having lands or houfes. 8. Having a wife.

Another diftinction of this kind is Ariftotle's diftinction of caufes; of which he makes four kinds, efficient, material, formal, and final. Thefe diftinctions may deferve a place in a dictionary of the Greek language; but in Englifh or Latin they adulterate the language. Yet fo fond were the fchoolmen of diftinctions of this kind, that they added to Ariftotle's enumeration, an impulfive caufe, an exemplary caufe, and I don't know how many more. We feem to have adopted into Englifh a final caufe; but it is merely a term of art, borrowed from the Peripatetic philofophy, without neceffity or ufe: for the Englifh word *end* is as good as *final caufe*, though not fo long nor fo learned.

SECT. 4. *On Definitions.*

It remains that we make fome remarks on Ariftotle's definitions, which have expofed him to much cenfure and ridicule. Yet I think it muft be allowed, that in things which need definition, and admit of it, his definitions are commonly judicious and accurate; and had he attempted to define fuch things only, his ene-

mies had wanted great matter of triumph. I believe it may likewise be said in his favour, that until Locke's essay was wrote, there was nothing of importance delivered by philosophers with regard to definition, beyond what Aristotle has said upon that subject.

He considers a definition as a speech declaring what a thing is. Every thing essential to the thing defined, and nothing more, must be contained in the definition. Now the essence of a thing consists of these two parts: First, What is common to it with other things of the same kind; and, secondly, What distinguishes it from other things of the same kind. The first is called the *genus* of the thing, the second its *specific difference*. The definition therefore consists of these two parts. And for finding them, we must have recourse to the ten categories; in one or other of which every thing in nature is to be found. Each category is a *genus*, and is divided into so many species, which are distinguished by their specific differences. Each of these species is again subdivided into so many species, with regard to which it is a genus. This division and subdivision continues until we come to the lowest species, which can only be divided into individuals, distinguished from one another, not by any specific difference, but by accidental differences of time, place, and other circumstances.

The category itself being the highest genus, is in no respect a species, and the lowest *species* is in no respect a *genus*; but every intermediate order is a genus compared with those that are below it, and a species compared with those above it. To find the definition of any thing, therefore, you must take the genus which is immediately above its place in the category, and the specific *difference*, by which it is distinguished from other species of the same *genus*. These two make a perfect definition. This I take to be the substance of Aristotle's system; and probably the system of the Pythagorean school before Aristotle, concerning definition.

But

But notwithstanding the specious appearance of this system, it has its defects. Not to repeat what was before said, of the imperfection of the division of things into ten categories, the subdivisions of each category are no less imperfect. Aristotle has given some subdivisions of a few of them; and as far as he goes, his followers pretty unanimously take the same road. But when they attempt to go farther, they take very different roads. It is evident, that if the series of each category could be completed, and the division of things into categories could be made perfect, still the highest genus in each category could not be defined, because it is not a species; nor could individuals be defined, because they have no specific difference. There are also many species of things, whose specific difference cannot be expressed in language, even when it is evident to sense, or to the understanding. Thus, green, red, and blue, are very distinct species of colour; but who can express in words wherein green differs from red or blue?

Without borrowing light from the ancient system, we may perceive, that every definition must consist of words that need no definition; and that to define the common words of a language that have no ambiguity, is trifling, if it could be done; the only use of a definition being to give a clear and adequate conception of the meaning of a word.

The logicians indeed distinguish between the definition of a word, and the definition of a thing; considering the former as the mean office of a lexicographer, but the last as the grand work of a philosopher. But what they have said about the definition of a thing, if it has a meaning, is beyond my comprehension. All the rules of definition agree to the definition of a word: and if they mean by the definition of a thing, the giving an adequate conception of the nature and essence of any thing that exists; this is impossible, and is the vain boast of men unconscious of the weakness of human understanding.

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The works of God are all imperfectly known by us. We see their outside, or perhaps we discover some of their qualities and relations, by observation and experiment, assisted by reasoning; but we can give no definition of the meanest of them which comprehends its real essence. It is justly observed by Locke, that nominal essences only, which are the creatures of our own minds, are perfectly comprehended by us, or can be properly defined; and even of these there are many too simple in their nature to admit of definition. When we cannot give precision to our notions by a definition, we must endeavour to do it by attentive reflection upon them, by observing minutely their agreements and differences, and especially by a right understanding of the powers of our own minds by which such notions are formed.

The principles laid down by Locke with regard to definition, and with regard to the abuse of words, carry conviction along with them; and I take them to be one of the most important improvements made in logic since the days of Aristotle; not so much because they enlarge our knowledge, as because they make us sensible of our ignorance, and shew that a great part of what speculative men have admired as profound philosophy, is only a darkening of knowledge by words without understanding.

If Aristotle had understood those principles, many of his definitions, which furnish matter of triumph to his enemies, had never seen the light: let us impute them to the times rather than to the man. The sublime Plato, it is said, thought it necessary to have the definition of a man, and could find none better than *Animal implume bipes*; upon which Diogenes sent to his school a cock with his feathers plucked off, desiring to know whether it was a man or not.

SECT.

Sect. 5. *On the Structure of Speech.*

The few hints contained in the beginning of the book concerning Interpretation, relating to the structure of speech, have been left out in treatises of logic, as belonging rather to grammar; yet I apprehend this is a rich field of philosophical speculation. Language being the express image of human thought, the analysis of the one must correspond to that of the other. Nouns adjective and substantive, verbs active and passive, with their various moods, tenses, and persons, must be expressive of a like variety in the modes of thought. Things which are distinguished in all languages, such as substance and quality, action and passion, cause and effect, must be distinguished by the natural powers of the human mind. The philosophy of grammar, and that of the human understanding, are more nearly allied than is commonly imagined.

The structure of language was pursued to a considerable extent, by the ancient commentators upon this book of Aristotle. Their speculations upon this subject, which are neither the least ingenious nor the least useful part of the Peripatetic philosophy, were neglected for many ages, and lay buried in ancient manuscripts, or in books little known, till they were lately brought to light by the learned Mr Harris in his Hermes.

The definitions given by Aristotle, of a noun, of a verb, and of speech, will hardly bear examination. It is easy in practice to distinguish the various parts of speech; but very difficult, if at all possible, to give accurate definitions of them.

He observes justly, that besides that kind of speech called *a proposition*, which is always either true or false, there are other kinds which are neither true nor false; such as, a prayer, or wish; to

which

which we may add, a queftion, a command, a promife, a contract, and many others. Thefe Ariftotle pronounces to have nothing to do with his fubject, and remits them to oratory, or poetry; and fo they have remained banifhed from the regions of philofophy to this day: yet I apprehend, that an analyfis of fuch fpeeches, and of the operations of mind which they exprefs, would be of real ufe, and perhaps would difcover how imperfect an enumeration the logicians have given of the powers of human underftanding, when they reduce them to fimple apprehenfion, judgement, and reafoning.

Sect. 6. *On Propofitions.*

Mathematicians ufe the word *propofition* in a larger fenfe than logicians. A problem is called a *propofition* in mathematics, but in logic it is not a propofition: it is one of thofe fpeeches which are not enunciative, and which Ariftotle remits to oratory or poetry.

A propofition, according to Ariftotle, is a fpeech wherein one thing is affirmed or denied of another. Hence it is eafy to diftinguifh the thing affirmed or denied, which is called *the predicate*, from the thing of which it is affirmed or denied, which is called *the fubject*; and thefe two are called *the terms of the propofition*. Hence likewife it appears, that propofitions are either affirmative or negative; and this is called *their quality*. All affirmative propofitions have the fame quality, fo likewife have all the negative; but an affirmative and a negative are contrary in their quality.

When the fubject of a propofition is a general term, the predicate is affirmed or denied, either of the whole, or of a part. Hence propofitions are diftinguifhed into univerfal and particular. *All men are mortal*, is an univerfal propofition; *Some men are learn-*
ed,

ed, is a particular, and this is called *the quantity of the propofition*. All univerfal propofitions agree in quantity, as alfo all particular : while an univerfal and a particular are faid to differ in quantity. A propofition is called *indefinite*, when there is no mark either of univerfality or particularity annexed to the fubject : thus, *Man is of few days*, is an indefinite propofition ; but it muft be underftood either as univerfal or as particular, and therefore is not a third fpecies, but by interpretation is brought under one of the other two.

There are alfo fingular propofitions, which have not a general term but an individual for their fubject ; as, *Alexander was a great conqueror*. Thefe are confidered by logicians as univerfal, becaufe, the fubject being indivifible, the predicate is affirmed or denied of the whole, and not of a part only. Thus all propofitions, with regard to quality, are either affirmative or negative ; and with regard to quantity, are univerfal or particular ; and taking in both quantity and quality, they are univerfal affirmatives, or univerfal negatives, or particular affirmatives, or particular negatives. Thefe four kinds, after the days of Ariftotle, came to be named by the names of the four firft vowels, A, E, I, O, according to the following diftich :

> *Afferit A, negat E, fed univerfaliter ambæ ;*
> *Afferit I, negat O, fed particulariter ambo.*

When the young logician is thus far inftructed in the nature of propofitions, he is apt to think there is no difficulty in analyfing any propofition, and fhewing its fubject and predicate, its quantity and quality ; and indeed, unlefs he can do this, he will be unable to apply the rules of logic to ufe. Yet he will find, there are fome difficulties in this analyfis, which are overlooked by Ariftotle altogether ; and altho' they are fometimes touched, they are not

removed]

removed by his followers. For, 1. There are propositions in which it is difficult to find a subject and a predicate; as in these, *It rains*, *It snows*. 2. In some propositions either term may be made the subject or the predicate as you like best; as in this, *Virtue is the road to happiness*. 3. The same example may serve to shew, that it is sometimes difficult to say, whether a proposition be universal or particular. 4. The quality of some propositions is so dubious, that logicians have never been able to agree whether they be affirmative or negative; as in this proposition, *Whatever is insentient is not an animal*. 5. As there is one class of propositions which have only two terms, to wit, one subject and one predicate, which are called *categorical propositions*; so there are many classes that have more than two terms. What Aristotle delivers in this book is applicable only to categorical propositions; and to them only the rules concerning the conversion of propositions, and concerning the figures and modes of syllogisms, are accommodated. The subsequent writers of logic have taken notice of some of the many classes of complex propositions, and have given rules adapted to them; but finding this work endless, they have left us to manage the rest by the rules of common sense.

C H A P.

CHAP. III.

Account of the First Analytics.

SECT. 1. *Of the Conversion of Propositions.*

IN attempting to give some account of the Analytics and of the Topics of Aristotle, ingenuity requires me to confess, that tho' 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 painful attention upon a thing of so little real use? If I had lived in those ages when the knowledge of Aristotle's Organon intitled a man to the highest rank in philosophy, ambition might have induced me to employ upon it some years painful study; and less, I conceive, would not be sufficient. Such reflections as these, always got the better of my resolution, when the first ardor began to cool. All I can say is, that I have read some parts of the different books with care, some slightly, and some perhaps not at all. I have glanced over the whole often, and when any thing attracted my attention, 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 affected obscurity; and all to prove general propositions, which when applied to particular instances appear self-evident.

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There is probably but little in the Categories, or in the book of Interpretation, which Ariſtotle could claim as his own invention: but the whole theory of ſyllogiſms he claims as his own, and as the fruit of much time and labour. And indeed it is a ſtately fabrick, a monument of a great genius, which we could wiſh to have been more uſefully employed. There muſt be ſomething however adapted to pleaſe the human underſtanding, or to flatter human pride, in a work which occupied men of ſpeculation for more than a thouſand years. Theſe books are called *Analytics*, becauſe the intention of them is to reſolve all reaſoning into its ſimple ingredients.

The firſt book of the Firſt Analytics, conſiſting of forty-ſix chapters, may be divided into four parts; the firſt treating of the converſion of propoſitions; the ſecond, of the ſtructure of ſyllogiſms in all the different figures and modes; the third, of the invention of a middle term; and the laſt, of the reſolution of ſyllogiſms. We ſhall give a brief account of each.

To convert a propoſition, is to infer from it another propoſition, whoſe ſubject is the predicate of the firſt, and whoſe predicate is the ſubject of the firſt. This is reduced by Ariſtotle to three rules. 1. An univerſal negative may be converted into an univerſal negative: thus, *No man is a quadruped*; therefore, *No quadruped is a man*. 2. An univerſal affirmative can be converted only into a particular affirmative: thus, *All men are mortal*; therefore, *Some mortal beings are men*. 3. A particular affirmative may be converted into a particular affirmative: as, *Some men are juſt*; therefore, *Some juſt perſons are men*. When a propoſition may be converted without changing its quantity, this is called *ſimple converſion*; but when the quantity is diminiſhed, as in the univerſal affirmative, it is called converſion *per accidens*.

There is another kind of converſion, omitted in this place by Ariſtotle, but ſupplied by his followers, called *converſion by contrapoſition,*

position, in which the term which is contradictory to the predicate is put for the subject, and the quality of the proposition is changed; as, *All animals are sentient*; therefore, *What is insentient is not an animal*. A fourth rule of conversion therefore is, That an universal affirmative, and a particular negative, may be converted by contraposition.

SECT. 2. *Of the Figures and Modes of pure Syllogisms.*

A syllogism is an argument, or reasoning, consisting of three propositions, the last of which, called *the conclusion*, is inferred from the two preceding, which are called *the premises*. The conclusion having two terms, a subject and a predicate, its predicate is called the *major* term, and its subject the *minor* term. In order to prove the conclusion, each of its terms is in the premises compared with a third term, called the *middle* term. By this means one of the premises will have for its two terms the major term and the middle term; and this premise is called the *major* premise, or the *major* proposition of the syllogism. The other premise must have for its two terms the minor term and the middle term, and it is called the *minor* proposition. Thus the syllogism consists of three propositions, distinguished by the names of the *major*, the *minor*, and the *conclusion*: and altho' each of these has two terms, a subject and a predicate, yet there are only three different terms in all. The major term is always the predicate of the conclusion, and is also either the subject or predicate of the major proposition. The minor term is always the subject of the conclusion, and is also either the subject or predicate of the minor proposition. The middle term never enters into the conclusion, but stands in both premises, either in the position of subject or of predicate.

According to the various positions which the middle term may

have

have in the premises, syllogisms are said to be of various figures. Now all the possible positions of the middle term are only four: for, first, it may be the subject of the major proposition, and the predicate of the minor, and then the syllogism is of the first figure; or it may be the predicate of both premises, and then the syllogism is of the second figure; or it may be the subject of both, which makes a syllogism of the third figure; or it may be the predicate of the major proposition, and the subject of the minor, which makes the fourth figure. Aristotle takes no notice of the fourth figure. It was added by the famous Galen, and is often called *the Galenical figure*.

There is another division of syllogisms according to their modes. The mode of a syllogism is determined by the quality and quantity of the propositions of which it consists. Each of the three propositions must be either an universal affirmative, or an universal negative, or a particular affirmative, or a particular negative. These four kinds of propositions, as was before observed, have been named by the four vowels, A, E, I, O; by which means the mode of a syllogism is marked by any three of those four vowels. Thus A, A, A, denotes that mode in which the major, minor, and conclusion, are all universal affirmatives; E, A, E, denotes that mode in which the major and conclusion are universal negatives, and the minor is an universal affirmative.

To know all the possible modes of syllogism, we must find how many different combinations may be made of three out of the four vowels, and from the art of combination the number is found to be sixty-four. So many possible modes there are in every figure, consequently in the three figures of Aristotle there are one hundred and ninety-two, and in all the four figures two hundred and fifty-six.

Now the theory of syllogism requires, that we shew what are the particular modes in each figure, which do, or do not, form a

just

juft and conclufive fyllogifm, that fo the legitimate may be adopted, and the fpurious rejected. This Ariftotle has fhewn in the firft three figures, examining all the modes one by one, and paffing fentence upon each; and from this examination he collects fome rules which may aid the memory in diftinguifhing the falfe from the true, and point out the properties of each figure.

The firft figure has only four legitimate modes. The major propofition in this figure muft be univerfal, and the minor affirmative; and it has this property, that it yields conclufions of all kinds, affirmative and negative, univerfal and particular.

The fecond figure has alfo four legitimate modes. Its major propofition muft be univerfal, and one of the premifes muft be negative. It yields conclufions both univerfal and particular, but all negative.

The third figure has fix legitimate modes. Its minor muft always be affirmative; and it yields conclufions both affirmative and negative, but all particular.

Befides the rules that are proper to each figure, Ariftotle has given fome that are common to all, by which the legitimacy of fyllogifms may be tried. Thefe may, I think, be reduced to five. 1. There muft be only three terms in a fyllogifm. As each term occurs in two of the propofitions, it muft be precifely the fame in both: if it be not, the fyllogifm is faid to have four terms, which makes a vitious fyllogifm. 2. The middle term muft be taken univerfally in one of the premifes. 3. Both premifes muft not be particular propofitions, nor both negative. 4. The conclufion muft be particular, if either of the premifes be particular; and negative, if either of the premifes be negative. 5. No term can be taken univerfally in the conclufion, if it be not taken univerfally in the premifes.

For underftanding the fecond and fifth of thefe rules, it is neceffary to obferve, that a term is faid to be taken univerfally, not

only

only when it is the subject of an universal proposition, but when it is the predicate of a negative proposition; on the other hand, a term is said to be taken particularly, when it is either the subject of a particular, or the predicate of an affirmative proposition.

SECT. 3. *Of the Invention of a Middle Term.*

The third part of this book contains rules general and special for the invention of a middle term; and this the author conceives to be of great utility. The general rules amount to this, That you are to consider well both terms of the proposition to be proved; their definition, their properties, the things which may be affirmed or denied of them, and those of which they may be affirmed or denied: those things collected together, are the materials from which your middle term is to be taken.

The special rules require you to consider the quantity and quality of the proposition to be proved, that you may discover in what mode and figure of syllogism the proof is to proceed. Then from the materials before collected, you must seek a middle term which has that relation to the subject and predicate of the proposition to be proved, which the nature of the syllogism requires. Thus, suppose the proposition I would prove is an universal affirmative, I know by the rules of syllogisms, that there is only one legitimate mode in which an universal affirmative proposition can be proved; and that is the first mode of the first figure. I know likewise, that in this mode both the premises must be universal affirmatives; and that the middle term must be the subject of the major, and the predicate of the minor. Therefore of the terms collected according to the general rule, I seek out one or more which have these two properties; first, That the predicate of the proposition to be proved can be universally affirmed of it; and,

secondly,

secondly, That it can be univerſally affirmed of the ſubject of the propoſition to be proved. Every term you can find which has thoſe two properties, will ſerve you as a middle term, but no o-ther. In this way, the author gives ſpecial rules for all the va-rious kinds of propoſitions to be proved; points out the various modes in which they may be proved, and the properties which the middle term muſt have to make it fit for anſwering that end. And the rules are illuſtrated, or rather, in my opinion, pur-poſely darkened, by putting letters of the alphabet for the ſeveral terms.

SECT. 4. *Of the remaining part of the Firſt Book.*

The reſolution of ſyllogiſms requires no other principles but thoſe before laid down for conſtructing them. However it is treated of largely, and rules laid down for reducing reaſoning to ſyllogiſms, by ſupplying one of the premiſes when it is under-ſtood, by rectifying inverſions, and putting the propoſitions in the proper order.

Here he ſpeaks alſo of hypothetical ſyllogiſms; which, he ac-knowledges, cannot be reſolved into any of the figures, although there be many kinds of them which ought diligently to be ob-ſerved; and which he promiſes to handle afterwards. But this promiſe is not fulfilled, as far as I know, in any of his works that are extant.

SECT. 5. *Of the Second Book of the Firſt Analytics.*

The ſecond book treats of the powers of ſyllogiſms, and ſhows, in twenty-ſeven chapters, how we may perform many feats by them,

them, and what figures and modes are adapted to each. Thus, in some syllogisms several distinct conclusions may be drawn from the same premises : in some, true conclusions may be drawn from false premises : in some, by assuming the conclusion and one premise, you may prove the other ; you may turn a direct syllogism into one leading to an absurdity.

We have likewise precepts given in this book, both to the assailant in a syllogistical dispute, how to carry on his attack with art, so as to obtain the victory ; and to the defendant, how to keep the enemy at such a distance as that he shall never be obliged to yield. From which we learn, that Aristotle introduced in his own school, the practice of disputing syllogistically, instead of the rhetorical disputations which the sophists were wont to use in more ancient times.

C H A P.   IV.

Remarks.

SECT. I. *Of the Conversion of Propositions.*

WE have given a summary view of the theory of pure syllogisms as delivered by Aristotle, a theory of which he claims the sole invention. And I believe it will be difficult, in any science, to find so large a system of truths of so very abstract and so general a nature, all fortified by demonstration, and all invented and perfected by one man. It shows a force of genius, and labour of

investigation,

investigation, equal to the most arduous attempts. I shall now make some remarks upon it.

As to the conversion of propositions, the writers on logic commonly satisfy themselves with illustrating each of the rules by an example, conceiving them to be self-evident when applied to particular cases. But Aristotle has given demonstrations of the rules he mentions. As a specimen, I shall give his demonstration of the first rule. " Let A B be an universal negative proposition ; I " say, that if A is in no B, it will follow that B is in no A. If " you deny this consequence, let B be in some A, for example, " in C ; then the first supposition will not be true; for C is of the " B's." In this demonstration, if I understand it, the third rule of conversion is assumed, that if B is in some A, then A must be in some B, which indeed is contrary to the first supposition. If the third rule be assumed for proof of the first, the proof of all the three goes round in a circle; for the second and third rules are proved by the first. This is a fault in reasoning which Aristotle condemns, and which I would be very unwilling to charge him with, if I could find any better meaning in his demonstration. But it is indeed a fault very difficult to be avoided, when men attempt to prove things that are self-evident.

The rules of conversion cannot be applied to all propositions, but only to those that are categorical ; and we are left to the direction of common sense in the conversion of other propositions. To give an example : Alexander was the son of Philip ; therefore Philip was the father of Alexander : A is greater than B ; therefore B is less than A. These are conversions which, as far as I know, do not fall within any rule in logic ; nor do we find any loss for want of a rule in such cases.

Even in the conversion of categorical propositions, it is not enough to transpose the subject and predicate. Both must undergo some change, in order to fit them for their new station : for in e-

very propofition the fubject muft be a fubftantive, or have the force of a fubftantive; and the predicate muft be an adjective, or have the force of an adjective. Hence it follows, that when the fubject is an individual, the propofition admits not of converfion. How, for inftance, fhall we convert this propofition, God is omnifcient?

Thefe obfervations fhow, that the doctrine of the converfion of propofitions is not fo complete as it appears. The rules are laid down without any limitation; yet they are fitted only to one clafs of propofitions, to wit, the categorical; and of thefe only to fuch as have a general term for their fubject.

SECT. 2. *On Additions made to Ariftotle's Theory.*

Although the logicians have enlarged the firft and fecond parts of logic, by explaining fome technical words and diftinctions which Ariftotle had omitted, and by giving names to fome kinds of propofitions which he overlooks; yet in what concerns the theory of categorical fyllogifms, he is more full, more minute and particular, than any of them: fo that they feem to have thought this capital part of the Organon rather redundant than deficient.

It is true, that Galen added a fourth figure to the three mentioned by Ariftotle. But there is reafon to think that Ariftotle omitted the fourth figure, not through ignorance or inattention, but of defign, as containing only fome indirect modes, which, when properly expreffed, fall into the firft figure.

It is true alfo, that Peter Ramus, a profeffed enemy of Ariftotle, introduced fome new modes that are adapted to fingular propofitions; and that Ariftotle takes no notice of fingular propofitions, either in his rules of converfion, or in the modes of fyllogifm. But the friends of Ariftotle have fhewn, that this improvement

of

of Ramus is more fpecious than ufeful. Singular propofitions have the force of univerfal propofitions, and are fubject to the fame rules. The definition given by Ariftotle of an univerfal propofition applies to them; and therefore he might think, that there was no occafion to multiply the modes of fyllogifm upon their account.

Thefe attempts, therefore, fhow rather inclination than power, to difcover any material defect in Ariftotle's theory.

The moft valuable addition made to the theory of categorical fyllogifms, feems to be the invention of thofe technical names given to the legitimate modes, by which they may be eafily remembered, and which have been comprifed in thefe barbarous verfes.

> Barbara, Celarent, Darii, Ferio, dato primæ;
> Cefare, Cameftris, Feftino, Baroco, fecundæ;
> Tertia grande fonans recitat Darapti, Felapton;
> Adjungens Difamis, Datifi, Bocardo, Ferifon.

In thefe verfes, every legitimate mode belonging to the three figures has a name given to it, by which it may be diftinguifhed and remembered. And this name is fo contrived as to denote its nature: for the name has three vowels, which denote the kind of each of its propofitions.

Thus, a fyllogifm in Bocardo muft be made up of the propofitions denoted by the three vowels, O, A, O; that is, its major and conclufion muft be particular negative propofitions, and its minor an univerfal affirmative; and being in the third figure, the middle term muft be the fubject of both premifes.

This is the myftery contained in the vowels of thofe barbarous words. But there are other myfteries contained in their confonants: for, by their means, a child may be taught to reduce any

C c 2   fyllogifm

fyllogifm of the fecond or third figure to one of the firft.   So that the four modes of the firft figure being directly proved to be conclufive, all the modes of the other two are proved at the fame time, by means of this operation of reduction.   For the rules and manner of this reduction, and the different fpecies of it, called *oftenfive* and *per impoffibile*, I refer to the logicians, that I may not difclofe all their myfteries.

The invention contained in thefe verfes is fo ingenious, and fo great an adminicle to the dextrous management of fyllogifms, that I think it very probable that Ariftotle had fome contrivance of this kind, which was kept as one of the fecret doctrines of his fchool, and handed down by tradition, until fome body brought it to light.   This is offered only as a conjecture, leaving it to thofe who are better acquainted with the moft ancient commentators on the Analytics, either to refute or to confirm it.

SECT. 3.   *On Examples ufed to illuftrate this Theory.*

We may obferve, that Ariftotle hardly ever gives examples of real fyllogifms to illuftrate his rules.   In demonftrating the legitimate modes, he takes A, B, C, for the terms of the fyllogifm. Thus, the firft mode of the firft figure is demonftrated by him in this manner.   " For," fays he, " if A is attributed to every " B, and B to every C, it follows neceffarily, that A may be at- " tributed to every C."   For difproving the illegitimate modes, he ufes the fame manner; with this difference, that he commonly for an example gives three real terms, fuch as, *bonum, habitus, prudentia;* of which three terms you are to make up a fyllogifm of the figure and mode in queftion, which will appear to be inconclufive.

The commentators, and fyftematical writers in logic, have fupplied

plied this defect; and given us real examples of every legitimate mode in all the figures. This we muſt acknowledge to be charitably done, to aſſiſt the imagination in the conception of matters ſo very abſtract; but whether it was prudently done for the honour of the art, may be doubted. I am afraid this was to uncover the nakedneſs of the theory; and has contributed much to bring it into contempt: for when one conſiders the ſilly and uninſtructive reaſonings that have been brought forth by this grand organ of ſcience, he can hardly forbear crying out, *Parturiunt montes, et naſcitur ridiculus mus.* Many of the writers of logic are acute and ingenious, and much practiſed in the ſyllogiſtical art; and there muſt be ſome reaſon why the examples they have given of ſyllogiſms are ſo lean.

We ſhall ſpeak of the reaſon afterwards; and ſhall now give a ſyllogiſm in each figure as an example.

No work of God is bad;
The natural paſſions and appetites of men are the work of God;
Therefore none of them is bad.

In this ſyllogiſm, the middle term, *work of God*, is the ſubject of the major and the predicate of the minor; ſo that the ſyllogiſm is of the firſt figure. The mode is that called *Celarent*; the major and concluſion being both univerſal negatives, and the minor an univerſal affirmative. It agrees to the rules of the figure, as the major is univerſal, and the minor affirmative; it is alſo agreeable to all the general rules; ſo that it maintains its character in every trial. And to ſhow of what ductile materials ſyllogiſms are made, we may, by converting ſimply the major propoſition, reduce it to a good ſyllogiſm of the ſecond figure, and of the mode *Ceſare*, thus:

Whatever is bad is not the work of God;
All the natural paſſions and appetites of men are the work of God;
Therefore they are not bad.

<div align="right">Another</div>

Another example :

 Every thing virtuous is praife-worthy ;
 Some pleafures are not praife-worthy ;
 Therefore fome pleafures are not virtuous.

Here the middle term *praife-worthy* being the predicate of both premifes, the fyllogifm is of the fecond figure ; and feeing it is made up of the propofitions, A, O, O, the mode is *Baroco*. It will be found to agree both with the general and fpecial rules : and it may be reduced into a good fyllogifm of the firft figure upon converting the major by contrapofition, thus :

 What is not praife-worthy is not virtuous ;
 Some pleafures are not praife-worthy ;
 Therefore fome pleafures are not virtuous.

That this fyllogifm is conclufive, common fenfe pronounces, and all logicians muft allow ; but it is fomewhat unpliable to rules, and requires a little ftraining to make it tally with them.

That it is of the firft figure is beyond difpute ; but to what mode of that figure fhall we refer it ? This is a queftion of fome difficulty. For, in the firft place, the premifes feem to be both negative, which contradicts the third general rule ; and mo: e)ver, it is contrary to a fpecial rule of the firft figure, That the minor fhould be negative. Thefe are the difficulties to be removed.

Some logicians think, that the two negative particles in the major are equivalent to an affirmative ; and that therefore the major propofition, *What is not praife-worthy, is not virtuous*, is to be accounted an affirmative propofition. This, if granted, folves one difficulty ; but the other remains. The moft ingenious folution, therefore, is this : Let the middle term be *not praife-worthy*. Thus, making the negative particle a part of the middle term, the fyllogifm ftands thus :

 Whatever is *not praife-worthy* is not virtuous ;
 Some pleafures are *not praife-worthy* ;
 Therefore fome pleafures are not virtuous.

<div align="right">By</div>

By this analyſis, the major becomes an univerſal negative, the minor a particular affirmative, and the concluſion a particular negative, and ſo we have a juſt ſyllogiſm in *Ferio*.

We ſee, by this example, that the quality of propoſitions is not ſo invariable, but that, when occaſion requires, an affirmative may be degraded into a negative, or a negative exalted to an affirmative. Another example:

> All Africans are black;
> All Africans are men;
> Therefore ſome men are black.

This is of the third figure, and of the mode *Darapti*; and it may be reduced to *Darii* in the firſt figure, by converting the minor.

> All Africans are black;
> Some men are Africans;
> Therefore ſome men are black.

By this time I apprehend the reader has got as many examples of ſyllogiſms as will ſtay his appetite for that kind of entertainment.

SECT. 4. *On the Demonſtration of the Theory.*

Ariſtotle and all his followers have thought it neceſſary, in order to bring this theory of categorical ſyllogiſms to a ſcience, to demonſtrate, both that the fourteen authoriſed modes conclude juſtly, and that none of the reſt do. Let us now ſee how this has been executed.

As to the legitimate modes, Ariſtotle, and thoſe who follow him the moſt cloſely, demonſtrate the four modes of the firſt figure directly from an axiom called the *Dictum de omni et nullo*. The amount of the axiom is, That what is affirmed of a whole *genus*,

may

may be affirmed of all the fpecies and individuals belonging to that *genus*; and that what is denied of the whole genus, may be denied of its fpecies and individuals. The four modes of the firft figure are evidently included in this axiom. And as to the legitimate modes of the other figures, they are proved by reducing them to fome mode of the firft. Nor is there any other principle affumed in thefe reductions but the axioms concerning the converfion of propofitions, and in fome cafes the axioms concerning the oppofition of propofitions.

As to the illegitimate modes, Ariftotle has taken the labour to try and condemn them one by one in all the three figures: but this is done in fuch a manner that it is very painful to follow him. To give a fpecimen. In order to prove, that thofe modes of the firft figure in which the major is particular, do not conclude, he proceeds thus: " If A is or is not in fome B, and B in every C, " no conclufion follows. Take for the terms in the affirmative " cafe, *good, habit, prudence*, in the negative, *good, habit, igno-* " *rance*." This laconic ftyle, the ufe of fymbols not familiar, and, in place of giving an example, his leaving us to form one from three affigned terms, give fuch embarraffment to a reader, that he is like one reading a book of riddles.

Having thus afcertained the true and falfe modes of a figure, he fubjoins the particular rules of that figure, which feem to be deduced from the particular cafes before determined. The general rules come laft of all, as a general corollary from what goes before.

I know not whether it is from a diffidence of Ariftotle's demonftrations, or from an apprehenfion of their obfcurity, or from a defire of improving upon his method, that almoft all the writers in logic I have met with, have inverted his order, beginning where he ends, and ending where he begins. They firft demonftrate the general rules, which belong to all the figures, from

three

three axioms; then from the general rules and the nature of each figure, they demonstrate the special rules of each figure. When this is done, nothing remains but to apply these general and special rules, and to reject every mode which contradicts them.

This method has a very scientific appearance; and when we consider, that by a few rules once demonstrated, an hundred and seventy-eight false modes are destroyed at one blow, which Aristotle had the trouble to put to death one by one, it seems to be a great improvement. I have only one objection to the three axioms.

The three axioms are these: 1. Things which agree with the same third, agree with one another. 2. When one agrees with the third, and the other does not, they do not agree with one another. 3. When neither agrees with the third, you cannot thence conclude, either that they do, or do not agree with one another. If these axioms are applied to mathematical quantities, to which they seem to relate when taken literally, they have all the evidence which an axiom ought to have : but the logicians apply them in an analogical sense to things of another nature. In order, therefore, to judge whether they are truly axioms, we ought to strip them of their figurative dress, and to set them down in plain English, as the logicians understand them. They amount therefore to this. 1. If two things be affirmed of a third, or the third be affirmed of them; or if one be affirmed of the third, and the third affirmed of the other; then they may be affirmed one of the other. 2. If one is affirmed of the third, or the third of it, and the other denied of the third, or the third of it, they may be denied one of the other. 3. If both are denied of the third, or the third of them; or if one is denied of the third, and the third denied of the other; nothing can be inferred.

When the three axioms are thus put in plain English, they seem not to have that degree of evidence which axioms ought to have;

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and if there is any defect of evidence in the axioms, this defect will be communicated to the whole edifice raifed upon them.

It may even be fufpected, that an attempt, by any method, to demonftrate, that a fyllogifm is conclufive, is an impropriety fomewhat like that of attempting to demonftrate an axiom. In a juft fyllogifm, the connection between the premifes and the conclufion is not only real, but immediate; fo that no propofition can come between them to make their connection more apparent. The very intention of a fyllogifm is, to leave nothing to be fupplied that is neceffary to a complete demonftration. Therefore a man of common underftanding, who has a perfect comprehenfion of the premifes, finds himfelf under a neceffity of admitting the conclufion, fuppofing the premifes to be true; and the conclufion is connected with the premifes with all the force of intuitive evidence. In a word, an immediate conclufion is feen in the premifes, by the light of common fenfe; and where that is wanting, no kind of reafoning will fupply its place.

SECT. 5. *On this Theory, confidered as an Engine of Science.*

The flow progrefs of ufeful knowledge, during the many ages in which the fyllogiftic art was moft highly cultivated as the only guide to fcience, and its quick progrefs fince that art was difufed, fuggeft a prefumption againft it; and this prefumption is ftrengthened by the puerility of the examples which have always been brought to illuftrate its rules.

The ancients feem to have had too high notions, both of the force of the reafoning power in man, and of the art of fyllogifm as its guide. Mere reafoning can carry us but a very little way in moft fubjects. By obfervation, and experiments properly conducted, the ftock of human knowledge may be enlarged without end; but the power

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of reasoning alone, applied with vigour through a long life, would only carry a man round, like a horse in a mill, who labours hard, but makes no progress. There is indeed an exception to this observation in the mathematical sciences. The relations of quantity are so various, and so susceptible of exact mensuration, that long trains of accurate reasoning on that subject may be formed, and conclusions drawn very remote from the first principles. It is in this science, and those which depend upon it, that the power of reasoning triumphs : in other matters its trophies are inconsiderable. If any man doubt this, let him produce, in any subject unconnected with mathematics, a train of reasoning of some length, leading to a conclusion, which without this train of reasoning would never have been brought within human sight. Every man acquainted with mathematics can produce thousands of such trains of reasoning. I do not say, that none such can be produced in other sciences ; but I believe they are few, and not easily found ; and that if they are found, it will not be in subjects that can be expressed by categorical propositions, to which alone the theory of figure and mode extends.

In matters to which that theory extends, a man of good sense, who can distinguish things that differ, and avoid the snares of ambiguous words, and is moderately practised in such matters, sees at once all that can be inferred from his premises ; or finds, that there is but a very short step to the conclusion.

When the power of reasoning is so feeble by nature, especially in subjects to which this theory can be applied, it would be unreasonable to expect great effects from it. And hence we see the reason why the examples brought to illustrate it by the most ingenious logicians, have rather tended to bring it into contempt.

If it should be thought, that the syllogistic art may be an useful engine in mathematics, in which pure reasoning has ample scope : First, It may be observed, That facts are unfavourable to

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this opinion : for it does not appear, that Euclid, or Apollonius, or Archimedes, or Hugens, or Newton, ever made the least use of this art ; and I am even of opinion, that no use can be made of it in mathematics. I would not wish to advance this rashly, since Aristotle has said, that mathematicians reason for the most part in the first figure. What led him to think so was, that the first figure only yields conclusions that are universal and affirmative, and the conclusions of mathematics are commonly of that kind. But it is to be observed, that the propositions of mathematics are not categorical propositions, consisting of one subject and one predicate. They express some relation which one quantity bears to another, and on that account must have three terms. The quantities compared make two, and the relation between them is a third. Now to such propositions we can neither apply the rules concerning the conversion of propositions, nor can they enter into a syllogism of any of the figures or modes. We observed before, that this conversion, *A is greater than B*, therefore *B is less than A*, does not fall within the rules of conversion given by Aristotle or the logicians ; and we now add, that this simple reasoning, *A is equal to B, and B to C*; therefore *A is equal to C*, cannot be brought into any syllogism in figure and mode. There are indeed syllogisms into which mathematical propositions may enter, and of such we shall afterwards speak : but they have nothing to do with the system of figure and mode.

When we go without the circle of the mathematical sciences, I know nothing in which there seems to be so much demonstration as in that part of logic which treats of the figures and modes of syllogism ; but the few remarks we have made, shew, that it has some weak places : and besides, this system cannot be used as an engine to rear itself.

The compass of the syllogistic system as an engine of science, may be discerned by a compendious and general view of the con

clusion

clufion drawn, and the argument ufed to prove it, in each of the three figures.

In the firft figure, the conclufion affirms or denies fomething, of a certain fpecies or individual; and the argument to prove this conclufion is, That the fame thing may be affirmed or denied of the whole genus to which that fpecies or individual belongs.

In the fecond figure, the conclufion is, That fome fpecies or individual does not belong to fuch a genus; and the argument is, That fome attribute common to the whole genus does not belong to that fpecies or individual.

In the third figure, the conclufion is, That fuch an attribute belongs to part of a genus; and the argument is, That the attribute in queftion belongs to a fpecies or individual which is part of that genus.

I apprehend, that, in this fhort view, every conclufion that falls within the compafs of the three figures, as well as the mean of proof, is comprehended. The rules of all the figures might be eafily deduced from it; and it appears, that there is only one principle of reafoning in all the three; fo that it is not ftrange, that a fyllogifm of one figure fhould be reduced to one of another figure.

The general principle in which the whole terminates, and of which every categorical fyllogifm is only a particular application, is this, That what is affirmed or denied of the whole genus, may be affirmed or denied of every fpecies and individual belonging to it. This is a principle of undoubted certainty indeed, but of no great depth. Ariftotle and all the logicians affume it as an axiom or firft principle, from which the fyllogiftic fyftem, as it were, takes its departure: and after a tedious voyage, and great expence of demonftration, it lands at laft in this principle as its ultimate conclufion. *O curas hominum! O quantum eft in rebus inane!*

SECT.

SECT. 6. *On Modal Syllogifms.*

Categorical propofitions, befides their quantity and quality, have another affection, by which they are divided into pure and modal. In a pure propofition, the predicate is barely affirmed or denied of the fubject; but in a modal propofition, the affirmation or negation is modified, by being declared to be neceffary or contingent, or poffible or impoffible. Thefe are the four modes obferved by Ariftotle, from which he denominates a propofition modal. His genuine difciples maintain, that thefe are all the modes that can affect an affirmation or negation, and that the enumeration is complete. Others maintain, that this enumeration is incomplete; and that when an affirmation or negation is faid to be certain or uncertain, probable or improbable, this makes a modal propofition, no lefs than the four modes of Ariftotle. We fhall not enter into this difpute; but proceed to obferve, that the epithets of *pure* and *modal* are applied to fyllogifms as well as to propofitions. A pure fyllogifm is that in which both premifes are pure propofitions. A modal fyllogifm is that in which either of the premifes is a modal propofition.

The fyllogifms of which we have already faid fo much, are thofe only which are pure as well as categorical. But when we confider, that through all the figures and modes, a fyllogifm may have one premife modal of any of the four modes, while the other is pure, or it may have both premifes modal, and that they may be either of the fame mode or of different modes; what prodigious variety arifes from all thefe combinations? Now it is the bufinefs of a logician, to fhew how the conclufion is affected in all this variety of cafes. Ariftotle has done this in his Firft Analytics, with immenfe labour; and it will not be thought ftrange,

that

that when he had employed only four chapters in difcuffing one hundred and ninety-two modes, true and falfe, of pure fyllogifms, he fhould employ fifteen upon modal fyllogifms.

I am very willing to excufe myfelf from entering upon this great branch of logic, by the judgement and example of thofe who cannot be charged either with want of refpect to Ariftotle, or with a low efteem of the fyllogiftic art.

Keckerman, a famous Dantzican profeffor, who fpent his life in teaching and writing logic, in his huge folio fyftem of that fcience, publifhed ann. 1600, calls the doctrine of the modals the *crux logicorum*. With regard to the fcholaftic doctors, among whom this was a proverb, *De modalibus non guftabit afinus*, he thinks it very dubious, whether they tortured moft the modal fyllogifms, or were moft tortured by them. But thofe crabbed geniufes, fays he, made this doctrine fo very thorny, that it is fitter to tear a man's wits in pieces than to give them folidity. He defires it to be obferved, that the doctrine of the modals is adapted to the Greek language. The modal terms were frequently ufed by the Greeks in their difputations; and, on that account, are fo fully handled by Ariftotle: but in the Latin tongue you fhall hardly e-ver meet with them. Nor do I remember, in all my experience, fays he, to have obferved any man in danger of being foiled in a difpute, through his ignorance of the modals.

This author, however, out of refpect to Ariftotle, treats pretty fully of modal propofitions, fhewing how to diftinguifh their fub-ject and predicate, their quantity and quality. But the modal fyllogifms he paffes over altogether.

Ludovicus Vives, whom I mention, not as a devotee of Ari-ftotle, but on account of his own judgement and learning, thinks that the doctrine of modals ought to be banifhed out of logic, and remitted to grammar; and that if the grammar of the Greek tongue had been brought to a fyftem in the time of Ariftotle, that

moft

moft acute philofopher would have faved the great labour he has beftowed on this fubject.

Burgerfdick, after enumerating five claffes of modal fyllogifms, obferves, that they require many rules and cautions, which Ariftotle hath handled diligently; but as the ufe of them is not great, and their rules are very difficult, he thinks it not worth while to enter into the difcuffion of them; recommending to thofe who would underftand them, the moft learned paraphrafe of Joannes Monlorius, upon the firft book of the Firft Analytics.

All the writers of logic for two hundred years back that have fallen into my hands, have paffed over the rules of modal fyllogifms with as little ceremony. So that this great branch of the doctrine of fyllogifm, fo diligently handled by Ariftotle, fell into neglect, if not contempt, even while the doctrine of pure fyllogifms continued in the higheft efteem. Moved by thefe authorities, I fhall let this doctrine reft in peace, without giving the leaft difturbance to its afhes.

SECT. 7. *On Syllogisms that do not belong to Figure and Mode.*

Ariftotle gives fome obfervations upon imperfect fyllogifms: fuch as, the Enthimema, in which one of the premifes is not expreffed but underftood: Induction, wherein we collect an univerfal from a full enumeration of particulars: and Examples, which are an imperfect induction. The logicians have copied Ariftotle upon thefe kinds of reafoning, without any confiderable improvement. But to compenfate the modal fyllogifms, which they have laid afide, they have given rules for feveral kinds of fyllogifm, of which Ariftotle takes no notice. Thefe may be reduced to two claffes.

The firft clafs comprehends the fyllogifms into which any exclu-
five,

five, reftrictive, exceptive, or reduplicative propofition enters. Such propofitions are by fome called *exponible*, by others *imperfectly modal*. The rules given with regard to thefe are obvious, from a juft interpretation of the propofitions.

The fecond clafs is that of hypothetical fyllogifms, which take that denomination from having a hypothetical propofition for one or both premifes. Moft logicians give the name of *hypothetical* to all complex propofitions which have more terms than one fubject and one predicate. I ufe the word in this large fenfe; and mean by hypothetical fyllogifms, all thofe in which either of the premifes confifts of more terms than two. How many various kinds there may be of fuch fyllogifms, has never been afcertained. The logicians have given names to fome; fuch as, the copulative, the conditional, by fome called hypothetical, and the difjunctive.

Such fyllogifms cannot be tried by the rules of figure and mode. Every kind would require rules peculiar to it. Logicians have given rules for fome kinds; but there are many that have not fo much as a name.

The Dilemma is confidered by moft logicians as a fpecies of the disjunctive fyllogifm. A remarkable property of this kind is, that it may fometimes be happily retorted: it is, it feems, like a hand-grenade, which, by dextrous management, may be thrown back, fo as to fpend its force upon the affailant. We fhall conclude this tedious account of fyllogifms, with a dilemma mentioned by *A. Gellius*, and from him by many logicians, as infoluble in any other way.

" Euathlus, a rich young man, defirous of learning the art of
" pleading, applied to Protagoras, a celebrated fophift, to inftruct
" him, promifing a great fum of money as his reward; one half
" of which was paid down; the other half he bound himfelf to
" pay as foon as he fhould plead a caufe before the judges, and

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" gain it. Protagoras found him a very apt scholar; but, after
" he had made good progress, he was in no haste to plead cau-
" ses. The master, conceiving that he intended by this means to
" shift off his second payment, took, as he thought, a sure me-
" thod to get the better of his delay. He sued Euathlus before
" the judges; and, having opened his cause at the bar, he pleaded
" to this purpose. O most foolish young man, do you not see,
" that, in any event, I must gain my point? for if the judges
" give sentence for me, you must pay by their sentence; if a-
" gainst me, the condition of our bargain is fulfilled, and you
" have no plea left for your delay, after having pleaded and gained
" a cause. To which Euathlus answered. O most wise master,
" I might have avoided the force of your argument, by not
" pleading my own cause. But, giving up this advantage, do
" you not see, that whatever sentence the judges pass, I am safe?
" If they give sentence for me, I am acquitted by their sentence;
" if against me, the condition of our bargain is not fulfilled, by
" my pleading a cause, and losing it. The judges, thinking the
" arguments unanswerable on both sides, put off the cause to a
" long day."

C H A P.

CHAP. V.

Account of the remaining books of the Organon.

Sect. I. *Of the Last Analytics.*

IN the First Analytics, syllogisms are considered in respect of their form; they are now to be considered in respect of their matter. The form lies in the necessary connection between the premises and the conclusion; and where such a connection is wanting, they are said to be informal, or vicious in point of form.

But where there is no fault in the form, there may be in the matter; that is, in the propositions of which they are composed, which may be true or false, probable or improbable.

When the premises are certain, and the conclusion drawn from them in due form, this is demonstration, and produces science. Such syllogisms are called *apodictical*; and are handled in the two books of the Last Analytics. When the premises are not certain, but probable only, such syllogisms are called *dialectical*; and of them he treats in the eight books of the Topicks. But there are some syllogisms which seem to be perfect both in matter and form, when they are not really so: as, a face may seem beautiful which is but painted. These being apt to deceive, and produce a false opinion, are called *sophistical*; and they are the subject of the book concerning Sophisms.

To return to the Last Analytics, which treat of demonstration

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and of science: We shall not pretend to abridge those books; for Aristotle's writings do not admit of abridgement: no man can say what he says in fewer words; and he is not often guilty of repetition. We shall only give some of his capital conclusions, omitting his long reasonings and nice distinctions, of which his genius was wonderfully productive.

All demonstration must be built upon principles already known; and these upon others of the same kind; until we come at last to first principles, which neither can be demonstrated, nor need to be, being evident of themselves.

We cannot demonstrate things in a circle, supporting the conclusion by the premises, and the premises again by the conclusion. Nor can there be an infinite number of middle terms between the first principle and the conclusion.

In all demonstration, the first principles, the conclusion, and all the intermediate propositions, must be necessary, general, and eternal truths: for of things fortuitous, contingent, or mutable, or of individual things, there is no demonstration.

Some demonstrations prove only, that the thing is thus affected; others prove, why it is thus affected. The former may be drawn from a remote cause, or from an effect: but the latter must be drawn from an immediate cause; and are the most perfect.

The first figure is best adapted to demonstration, because it affords conclusions universally affirmative; and this figure is commonly used by the mathematicians.

The demonstration of an affirmative proposition is preferable to that of a negative; the demonstration of an universal to that of a particular; and direct demonstration to that *ad absurdum*.

The principles are more certain than the conclusion.

There cannot be opinion and science of the same thing at the same time.

In the second book we are taught, that the questions that may

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be put, with regard to any thing, are four: 1. Whether the thing be thus affected. 2. Why it is thus affected. 3. Whether it exists. 4. What it is.

The last of these questions Aristotle, in good Greek, calls the *What is it* of a thing. The schoolmen, in very barbarous Latin, called this, the *quiddity* of a thing. This quiddity, he proves by many arguments, cannot be demonstrated, but must be fixed by a definition. This gives occasion to treat of definition, and how a right definition should be formed. As an example he gives a definition of the number *three*, and defines it to be the first odd number.

In this book he treats also of the four kinds of causes; efficient, material, formal, and final.

Another thing treated of in this book is, the manner in which we acquire first principles, which are the foundation of all demonstration. These are not innate, because we may be for a great part of life ignorant of them: nor can they be deduced demonstratively from any antecedent knowledge, otherwise they would not be first principles. Therefore he concludes, that first principles are got by induction, from the informations of sense. The senses give us informations of individual things, and from these by induction we draw general conclusions: for it is a maxim with Aristotle, That there is nothing in the understanding which was not before in some sense.

The knowledge of first principles, as it is not acquired by demonstration, ought not to be called science; and therefore he calls it *intelligence*.

SECT.

Sect. 2. *Of the Topics.*

The profeſſed deſign of the Topics is, to ſhew a method by which a man may be able to reaſon with probability and conſiſtency upon every queſtion that may occur.

Every queſtion is either about the genus of the ſubject, or its ſpecific difference, or ſome thing proper to it, or ſomething accidental.

To prove that this diviſion is complete, Ariſtotle reaſons thus: Whatever is attributed to a ſubject, it muſt either be, that the ſubject can be reciprocally attributed to it, or that it cannot. If the ſubject and attribute can be reciprocated, the attribute either declares what the ſubject is, and then it is a definition; or it does not declare what the ſubject is, and then it is a property. If the attribute cannot be reciprocated, it muſt be ſomething contained in the definition, or not. If it is contained in the definition of the ſubject, it muſt be the genus of the ſubject, or its ſpecific difference; for the definition conſiſts of theſe two. If it is not contained in the definition of the ſubject, it muſt be an accident.

The furniture proper to fit a man for arguing dialectically may be reduced to theſe four heads: 1. Probable propoſitions of all ſorts, which may on occaſion be aſſumed in an argument. 2. Diſtinctions of words which are nearly of the ſame ſignification. 3. Diſtinctions of things which are not ſo far aſunder but that they may be taken for one and the ſame. 4. Similitudes.

The ſecond and the five following books are taken up in enumerating the topics or heads of argument that may be uſed in queſtions about the genus, the definition, the properties, and the accidents of a thing; and occaſionally he introduces the topics for

<div align="right">proving</div>

proving things to be the same, or different; and the topics for proving one thing to be better or worse than another.

In this enumeration of topics, Aristotle has shewn more the fertility of his genius, than the accuracy of method. The writers of logic seem to be of this opinion: for I know none of them that has followed him closely upon this subject. They have considered the topics of argumentation as reducible to certain axioms. For instance, when the question is about the genus of a thing, it must be determined by some axiom about genus and species; when it is about a definition, it must be determined by some axiom relating to definition, and things defined: and so of other questions. They have therefore reduced the doctrine of the topics to certain axioms or canons, and disposed these axioms in order under certain heads.

This method seems to be more commodious and elegant than that of Aristotle. Yet it must be acknowledged, that Aristotle has furnished the materials from which all the logicians have borrowed their doctrine of topics: and even Cicero, Quintilian, and other rhetorical writers, have been much indebted to the topics of Aristotle.

He was the first, as far as I know, who made an attempt of this kind: and in this he acted up to the magnanimity of his own genius, and that of ancient philosophy. Every subject of human thought had been reduced to ten categories; every thing that can be attributed to any subject, to five predicables: he attempted to reduce all the forms of reasoning to fixed rules of figure and mode, and to reduce all the topics of argumentation under certain heads; and by that means to collect as it were into one store all that can be said on one side or the other of every question, and provide a grand arsenal, from which all future combatants might be furnished with arms offensive and defensive in every cause, so as to leave no room to future generations to invent any thing new.

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The laſt book of the Topics is a code of the laws, according to which a ſyllogiſtical diſputation ought to be managed, both on the part of the aſſailant and defendant. From which it is evident, that this philoſopher trained his diſciples to contend, not for the truth merely, but for victory.

Sect. 3. *Of the book concerning Sophiſms.*

A ſyllogiſm which leads to a falſe concluſion, muſt be vicious, either in matter or form: for from true principles nothing but truth can be juſtly deduced. If the matter be faulty, that is, if either of the premiſes be falſe, that premiſe muſt be denied by the defendant. If the form be faulty, ſome rule of ſyllogiſm is tranſgreſſed; and it is the part of the defendant to ſhew, what general or ſpecial rule it is that is tranſgreſſed. So that, if he is an able logician, he will be impregnable in the defence of truth, and may reſiſt all the attacks of the ſophiſt. But as there are ſyllogiſms which may ſeem to be perfect both in matter and form, when they are not really ſo, as a piece of money may ſeem to be good coin, when it is adulterate; ſuch fallacious ſyllogiſms are conſidered in this treatiſe, in order to make a defendant more expert in the uſe of his defenſive weapons.

And here the author, with his uſual magnanimity, attempts to bring all the fallacies that can enter into a ſyllogiſm under thirteen heads; of which ſix lie in the diction or language, and ſeven not in the diction.

The fallacies in diction are, 1. When an ambiguous word is taken at one time in one ſenſe, and at another time in another. 2. When an ambiguous phraſe is taken in the ſame manner. 3. and 4. are ambiguities in ſyntax; when words are conjoined in ſyntax that ought to be disjoined; or disjoined when they ought

ought to be conjoined. 5. is an ambiguity in profody, accent, or pronunciation. 6. An ambiguity arifing from fome figure of fpeech.

When a fophifm of any of thefe kinds is tranflated into another language, or even rendered into unambiguous expreffions in the fame language, the fallacy is evident, and the fyllogifm appears to have four terms.

The feven fallacies which are faid not to be in the diction, but in the thing, have their proper names in Greek and in Latin, by which they are diftinguifhed. Without minding their names, we fhall give a brief account of their nature.

1. The firft is, Taking an accidental conjunction of things for a natural or neceffary connection: as, when from an accident we infer a property; when from an example we infer a rule; when from a fingle act we infer a habit.

2. Taking that abfolutely which ought to be taken comparatively, or with a certain limitation. The conftruction of language often leads into this fallacy: for in all languages it is common to ufe abfolute terms, to fignify things which carry in them fome fecret comparifon; or to ufe unlimited terms, to fignify what from its nature muft be limited.

3. Taking that for the caufe of a thing which was only an occafion, or concomitant.

4. Begging the queftion. This is done, when the thing to be proved, or fome thing equivalent, is affumed in the premifes.

5. Miftaking the queftion. When the conclufion of the fyllogifm is not the thing that ought to be proved, but fomething elfe that is miftaken for it.

6. When that which is not a confequence is miftaken for a confequence; as if, becaufe all Africans are black, it were taken for granted that all blacks are Africans.

7. The laft fallacy lies in propofitions that are complex, and

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imply two affimations, whereof one may be true, and the other falfe; fo that whether you grant the propofition, or deny it, you are intangled: as when it is affirmed, that fuch a man has left off playing the fool. If it be granted, it implies, that he did play the fool formerly. If it be denied, it implies, or feems to imply, that he plays the fool ftill.

In this enumeration, we ought, in juftice to Ariftotle, to expect only the fallacies incident to categorical fyllogifms. And I do not find, that the logicians have made any additions to it when taken in this view; altho' they have given fome other fallacies that are incident to fyllogifms of the hypothetical kind, particularly the fallacy of an incomplete enumeration in disjunctive fyllo-gifms and dilemmas.

The different fpecies of fophifms above mentioned are not fo precifely defined by Ariftotle, or by fubfequent logicians, but that they allow of great latitude in the application; and it is often dubious under what particular fpecies a fophiftical fyllogifm ought to be claffed. We even find the fame example brought un-der one fpecies by one author, and under another fpecies by an-ther. Nay, what is more ftrange, Ariftotle himfelf employs a long chapter in proving by a particular induction, that all the feven may be brought under that which we have called *miftaking the que-ftion*, and which is commonly called *ignoratio elenchi*. And in-deed the proof of this is eafy, without that laborious detail which Ariftotle ufes for the purpofe: for if you lop off from the conclu-fion of a fophiftical fyllogifm all that is not fupported by the pre-mifes, the conclufion, in that cafe, will always be found different from that which ought to have been proved; and fo it falls under the *ignoratio elenchi*.

It was probably Ariftotle's aim, to reduce all the poffible va-riety of fophifms, as he had attempted to do of juft fyllogifms, to certain definite fpecies: but he feems to be fenfible that he had

fallen

fallen short in this last attempt. When a genus is properly divided into its species, the species should not only, when taken together, exhaust the whole genus; but every species should have its own precinct so accurately defined, that one shall not encroach upon another. And when an individual can be said to belong to two or three different species, the division is imperfect; yet this is the case of Aristotle's division of the sophisms, by his own acknowledgement. It ought not therefore to be taken for a division strictly logical. It may rather be compared to the several species or forms of action invented in law for the redress of wrongs. For every wrong there is a remedy in law by one action or another: but sometimes a man may take his choice among several different actions. So every sophistical syllogism may, by a little art, be brought under one or other of the species mentioned by Aristotle, and very often you may take your choice of two or three.

Besides the enumeration of the various kinds of sophisms, there are many other things in this treatise concerning the art of managing a syllogistical dispute with an antagonist. And indeed, if the passion for this kind of litigation, which reigned for so many ages, should ever again lift up its head, we may predict, that the Organon of Aristotle will then become a fashionable study: for it contains such admirable materials and documents for this art, that it may be said to have brought it to a science.

The conclusion of this treatise 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. I shall therefore give the substance of it.

" Of those who may be called inventers, some have made im-
" portant additions to things long before begun, and carried on
" through a course of ages; others have given a small beginning
" to things which, in succeeding times, will be brought to greater
" perfection. The beginning of a thing, though small, is the

" chief

" chief part of it, and requires the greateſt degree of invention ;
" for it is eaſy to make additions to inventions once begun. Now
" with regard to the dialectical art, there was not ſomething done,
" and ſomething remaining to be done. There was abſolutely
" nothing done : for thoſe who profeſſed the art of diſputation,
" had only a ſet of orations compoſed, and of arguments, and
" of captious queſtions, which might ſuit many occaſions. Theſe
" their ſcholars ſoon learned, and fitted to the occaſion. This
" was not to teach you the art, but to furniſh you with the mate-
" rials produced by the art: as if a man profeſſing to teach you
" the art of making ſhoes, ſhould bring you a parcel of ſhoes of
" various ſizes and ſhapes, from which you may provide thoſe
" who want. This may have its uſe ; but it is not to teach the
" art of making ſhoes. And indeed, with regard to rhetorical
" declamation, there are many precepts handed down from an-
" cient times ; but with regard to the conſtruction of ſyllogiſms,
" not one.

" We have therefore employed much time and labour upon
" this ſubject ; and if our ſyſtem appears to you not to be in the
" number of thoſe things, which, being before carried a certain
" length, were left to be perfected ; we hope for your favourable
" acceptance of what is done, and your indulgence in what is left
" imperfect."

<div align="right">C H A P.</div>

C H A P.   VI.

Reflections on the Utility of Logic, and the Means of its
Improvement.

SECT. I. *Of the Utility of Logic.*

MEN rarely leave one extreme without running into the con-
trary. It is no wonder, therefore, that the exceſſive admira-
tion of Ariſtotle, which continued for ſo many ages, ſhould end
in an undue contempt; and that the high eſteem of logic as the
grand engine of ſcience, ſhould at laſt make way for too unfa-
vourable an opinion, which ſeems now prevalent, of its being
unworthy of a place in a liberal education. Thoſe who think ac-
cording to the faſhion, as the greateſt part of men do, will be as
prone to go into this extreme, as their grandfathers were to go into
the contrary.

Laying aſide prejudice, whether faſhionable or unfaſhionable,
let us conſider whether logic is, or may be made, ſubſervient to
any good purpoſe. Its profeſſed end is, to teach men to think,
to judge, and to reaſon, with preciſion and accuracy. No man
will ſay that this is a matter of no importance; the only thing,
therefore, that admits of doubt, is, whether it can be taught.

To reſolve this doubt, it may be obſerved, that our rational fa-
culty is the gift of God, given to men in very different meaſure.
Some have a larger portion, ſome a leſs; and where there is a re-
markable defect of the natural power, it cannot be ſupplied by
any

any culture whatſoever. But this natural power, even where it is ſtrongeſt, may lie dead for want of the means of improvement; and a ſavage may have been born with as good faculties as a Bacon or a Newton. The amazing difference that appears in advanced life, is owing to this, that the talent of one was buried, being never put to uſe, while that of the other was cultivated to the beſt advantage.

It may likewiſe be obſerved, that the chief mean of improving our rational power, is the vigorous exerciſe of it, in various ways, and in different ſubjects, by which the habit is acquired of exerciſing it properly. Without ſuch exerciſe, and good ſenſe over and above, a man who has ſtudied logic all his life may, after all, be only a petulant wrangler, without true judgement, or ſkill of reaſoning, in any ſcience.

I take this to be Locke's meaning, when, in his Thoughts on Education, he ſays, " If you would have your ſon to reaſon well, " let him read Chillingworth." The ſtate of things is much altered ſince Locke wrote. Logic has been much improved, chiefly by his writings; and yet much leſs ſtreſs is laid upon it, and leſs time conſumed in it. His counſel, therefore, was judicious and ſeaſonable; to wit, That the improvement of our reaſoning power is to be expected much more from an intimate acquaintance with the authors who reaſon beſt, than from ſtudying voluminous ſyſtems of logic. But if he had meant, that the ſtudy of logic was of no uſe, nor deſerved any attention, he ſurely would not have taken the pains to have made ſo conſiderable an addition to it, by his *Eſſay on the Human Underſtanding*, and by his *Thoughts on the Conduct of the Underſtanding*. Nor would he have remitted his pupil to Chillingworth, the acuteſt logician, as well as the beſt reaſoner, of his age; and one who, in innumerable places of his excellent book, without pedantry even in that pedantic age,

makes

makes the happieft application of the rules of logic, for unraveling the fophiftical reafoning of his antagonift.

Our reafoning power makes no appearance in infancy; but as we grow up, it unfolds itfelf by degrees, like the bud of a tree. When a child firft draws an inference, or perceives the force of an inference drawn by another perfon, we may call this *the birth of his reafon:* but it is yet like a new-born babe, weak and tender; it muft be cherifhed, and carried in arms, and have food of eafy digeftion, till it gathers ftrength.

I believe no man remembers this birth of his reafon; but it is probable that his decifions will at firft be weak and wavering; and, compared with that fteady conviction which he acquires in ripe years, will be like the dawn of the morning compared with noon-day. We fee that the reafon of children yields to authority, as a reed to the wind; nay, that it clings to it, and leans upon it, as if confcious of its own weaknefs.

When reafon acquires fuch ftrength as to ftand on its own bottom, without the aid of authority, or even in oppofition to authority, this may be called its *manly age.* But in moft men, it hardly ever arrives at this period. Many, by their fituation in life, have not the opportunity of cultivating their rational powers. Many, from the habit they have acquired, of fubmitting their opinions to the authority of others, or from fome other principle which operates more powerfully than the love of truth, fuffer their judgement to be carried along, to the end of their days, either by the authority of a leader, or of a party, or of the multitude, or by their own paffions. Such perfons, however learned, however acute, may be faid to be all their days children in underftanding. They reafon, they difpute, and perhaps write; but it is not that they may find the truth; but that they may defend opinions which have defcended to them by inheritance, or into which they have fallen by accident, or been led by affection.

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I agree with Mr Locke, that there is no study better fitted to exercife and ftrengthen the reafoning powers, than that of the mathematical fciences; for two reafons; firft, Becaufe there is no other branch of fcience which gives fuch fcope to long and accurate trains of reafoning; and, fecondly, Becaufe in mathematics there is no room for authority, or for prejudice of any kind, which may give a falfe bias to the judgement.

When a youth of moderate parts begins to ftudy Euclid, every thing at firft is new to him. His apprehenfion is unfteady; his judgement is feeble; and refts partly upon the evidence of the thing, and partly upon the authority of his teacher. But every time he goes over the definitions, the axioms, the elementary propofitions, more light breaks in upon him; the language becomes familiar, and conveys clear and fteady conceptions; the judgement is confirmed; he begins to fee what demonftration is; and it is impoffible to fee it without being charmed with it. He perceives it to be a kind of evidence which has no need of authority to ftrengthen it. He finds himfelf emancipated from that bondage, and exults fo much in this new ftate of independence, that he fpurns at authority, and would have demonftration for every thing; until experience teaches him, that this is a kind of evidence which cannot be had in moft things; and that in his moft important concerns, he muft reft contented with probability.

As he goes on in mathematics, the road of demonftration becomes fmooth and eafy; he can walk in it firmly, and take wider fteps: and, at laft, he acquires the habit, not only of underftanding a demonftration, but of difcovering and demonftrating mathematical truths.

Thus, a man without rules of logic, may acquire the habit of reafoning juftly in mathematics; and, I believe, he may, by like means, acquire the habit of reafoning juftly in mechanics, in jurifprudence,

rifprudence, in politics, or in any other fcience. Good fenfe, good examples, and affiduous exercife, may bring a man to reafon juftly and acutely in his own profeffion, without rules.

But if any man think, that from this conceffion he may infer the inutility of logic, he betrays a great want of that art by this inference: for it is no better reafoning than this, That becaufe a man may go from Edinburgh to London by the way of Paris, therefore any other road is ufelefs.

There is perhaps no practical art which may not be acquired, in a very confiderable degree, by example and practice, without reducing it to rules. But practice, joined with rules, may carry a man on in his art farther and more quickly, than practice without rules. Every ingenious artift knows the utility of having his art reduced to rules, and by that means made a fcience. He is thereby enlightened in his practice, and works with more affurance. By rules, he fometimes corrects his own errors, and often detects the errors of others: he finds them of great ufe to confirm his judgement, to juftify what is right, and to condemn what is wrong.

Is it of no ufe in reafoning, to be well acquainted with the various powers of the human underftanding, by which we reafon? Is it of no ufe, to refolve the various kinds of reafoning into their fimple elements; and to difcover, as far as we are able, the rules by which thofe elements are combined in judging and in reafoning? Is it of no ufe, to mark the various fallacies in reafoning, by which even the moft ingenious men have been led into error? It muft furely betray great want of underftanding, to think thefe things ufelefs or unimportant. Thefe are the things which logicians have attempted; and which they have executed; not indeed fo completely as to leave no room for improvement, but in fuch a manner as to give very confiderable aid to our reafoning powers. That the principles laid down with regard to definition

and divifion, with regard to the converfion and oppofition of propofitions and the general rules of reafoning, are not without ufe, is fufficiently apparent from the blunders committed by thofe who difdain any acquaintance with them.

Although the art of categorical fyllogifm is better fitted for fcholaftic litigation, than for real improvement in knowledge, it is a venerable piece of antiquity, and a great effort of human genius. We admire the pyramids of Egypt, and the wall of China, tho' ufelefs burdens upon the earth. We can bear the moft minute defcription of them, and travel hundreds of leagues to fee them. If any perfon fhould, with facrilegious hands, deftroy or deface them, his memory would be had in abhorrence. The predicaments and predicables, the rules of fyllogifm, and the topics, have a like title to our veneration as antiquities: they are uncommon efforts, not of human power, but of human genius; and they make a remarkable period in the progrefs of human reafon.

The prejudice againft logic has probably been ftrengthened by its being taught too early in life. Boys are often taught logic as they are taught their creed, when it is an exercife of memory only, without underftanding. One may as well expect to underftand grammar before he can fpeak, as to underftand logic before he can reafon. It muft even be acknowledged, that commonly we are capable of reafoning in mathematics more early than in logic. The objects prefented to the mind in this fcience, are of a very abftract nature, and can be diftinctly conceived only when we are capable of attentive reflection upon the operations of our own underftanding, and after we have been accuftomed to reafon. There may be an elementary logic, level to the capacity of thofe who have been but little exercifed in reafoning; but the moft important parts of this fcience require a ripe underftanding, capable of

reflecting

reflecting upon its own operations. Therefore to make logic the first branch of science that is to be taught, is an old error that ought to be corrected.

SECT. 2. *Of the Improvement of Logic.*

In compositions of human thought expressed by speech or by writing, whatever is excellent and whatever is faulty, fall within the province, either of grammar, or of rhetoric, or of logic. Propriety of expression is the province of grammar; grace, elegance, and force, in thought and in expression, are the province of rhetoric; justness and accuracy of thought are the province of logic.

The faults in composition, therefore, which fall under the censure of logic, are obscure and indistinct conceptions, false judgement, inconclusive reasoning, and all improprieties in distinctions, definitions, division, or method. To aid our rational powers, in avoiding these faults and in attaining the opposite excellencies, is the end of logic; and whatever there is in it that has no tendency to promote this end, ought to be thrown out.

The rules of logic being of a very abstract nature, ought to be illustrated by a variety of real and striking examples taken from the writings of good authors. It is both instructive and entertaining, to observe the virtues of accurate composition in writers of fame. We cannot see them, without being drawn to the imitation of them, in a more powerful manner than we can be by dry rules. Nor are the faults of such writers less instructive or less powerful monitors. A wreck, left upon a shoal, or upon a rock, is not more useful to the sailor, than the faults of good writers, when set up to view, are to those who come after them. It was a

happy

happy thought in a late ingenious writer of English grammar, to collect under the several rules, examples of bad English found in the most approved authors. It were to be wished that the rules of logic were illustrated in the same manner. By this means, a system of logic would become a repository; wherein whatever is most acute in judging and in reasoning, whatever is most accurate in dividing, distinguishing, and defining, should be laid up and disposed in order for our imitation; and wherein the false steps of eminent authors should be recorded for our admonition.

After men had laboured in the search of truth near two thousand years, by the help of syllogisms, Lord Bacon proposed the method of induction, as a more effectual engine for that purpose. His *Novum Organum* gave a new turn to the thoughts and labours of the inquisitive, more remarkable, and more useful, than that which the *Organum* of Aristotle had given before; and may be considered as a second grand æra in the progress of human reason.

The art of syllogism produced numberless disputes, and numberless sects, who fought against each other with much animosity, without gaining or losing ground; but did nothing considerable for the benefit of human life. The art of induction, first delineated by Lord Bacon, produced numberless laboratories and observatories, in which Nature has been put to the question by thousands of experiments, and forced to confess many of her secrets, which before were hid from mortals. And by these, arts have been improved, and human knowledge wonderfully increased.

In reasoning by syllogism, from general principles we descend to a conclusion virtually contained in them. The process of induction is more arduous; being an ascent from particular premises to a general conclusion. The evidence of such general conclusions is not demonstrative, but probable: but when the induc-

tion

tion is fufficiently copious, and carried on according to the rules of art, it forces conviction no lefs than demonftration itfelf does.

The greateft part of human knowledge refts upon evidence of this kind. Indeed we can have no other for general truths which are contingent in their nature, and depend upon the will and ordination of the maker of the world. He governs the world he has made, by general laws. The effects of thefe laws in particular phenomena are open to our obfervation; and by obferving a train of uniform effects with due caution, we may at laft decypher the law of nature by which they are regulated.

Lord Bacon has difplayed no lefs force of genius in reducing to rules this method of reafoning, than Ariftotle did in the method of fyllogifm. His *Novum Organum* ought therefore to be held as a moft important addition to the ancient logic. Thofe who underftand it, and enter into the fpirit of it, will be able to diftinguifh the chaff from the wheat in philofophical difquifitions into the works of God. They will learn to hold in due contempt all hypothefes and theories, the creatures of human imagination, and to refpect nothing but facts fufficiently vouched, or conclufions drawn from them by a fair and chafte interpretation of nature.

Moft arts have been reduced to rules, after they had been brought to a confiderable degree of perfection by the natural fagacity of artifts; and the rules have been drawn from the beft examples of the art that had been before exhibited: but the art of philofophical induction was delineated by Lord Bacon in a very ample manner, before the world had feen any tolerable example of it. This, altho' it adds greatly to the merit of the author, muft have produced fome obfcurity in the work, and a defect of proper examples for illuftration. This defect may now be eafily fupplied, from thofe authors who, in their philofophical difquifitions, have moft ftrictly purfued the path pointed out in the *Novum Organum*. Among thefe Sir Ifaac Newton feems to hold the firft rank, having,

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in the third book of his *Principia*, and in his Optics, had the rules of the *Novum Organum* conſtantly in his eye.

I think Lord Bacon was alſo the firſt who endeavoured to reduce to a ſyſtem the prejudices or biaſſes of the mind, which are the cauſes of falſe judgement, and which he calls *the idols of the human underſtanding*. Some late writers of logic have very properly introduced this into their ſyſtem; but it deſerves to be more copiouſly handled, and to be illuſtrated by real examples.

It is of great conſequence to accurate reaſoning, to diſtinguiſh firſt principles which are to be taken for granted, from propoſitions which require proof. All the real knowledge of mankind may be divided into two parts: the firſt conſiſting of ſelf-evident propoſitions; the ſecond, of thoſe which are deduced by juſt reaſoning from ſelf-evident propoſitions. The line which divides theſe two parts ought to be marked as diſtinctly as poſſible, and the principles that are ſelf-evident reduced, as far as can be done, to general axioms. This has been done in mathematics from the beginning, and has tended greatly to the emolument of that ſcience. It has lately been done in natural philoſophy: and by this means that ſcience has advanced more in an hundred and fifty years, than it had done before in two thouſand. Every ſcience is in an unformed ſtate until its firſt principles are aſcertained: after that is done, it advances regularly, and ſecures the ground it has gained.

Altho' firſt principles do not admit of direct proof, yet there muſt be certain marks and characters, by which thoſe that are truly ſuch may be diſtinguiſhed from counterfeits. Theſe marks ought to be deſcribed, and applied, to diſtinguiſh the genuine from the ſpurious.

In the ancient philoſophy there is a redundance, rather than a defect, of firſt principles. Many things were aſſumed under that character without a juſt title: That nature abhors a *vacuum*;

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That bodies do not gravitate in their proper place ; That the heavenly bodies undergo no change ; That they move in perfect circles, and with an equable motion. Such principles as thefe were affumed in the Peripatetic philofophy, without proof, as if they were felf-evident.

Des Cartes, fenfible of this weaknefs in the ancient philofophy, and defirous to guard againft it in his own fyftem, refolved to admit nothing until his affent was forced by irrefiftible evidence. The firft thing which he found to be certain and evident was, that he thought, and reafoned, and doubted. He found himfelf under a neceffity of believing the exiftence of thofe operations of mind of which he was confcious : and having thus found fure footing in this one principle of confcioufnefs, he refted fatisfied with it, hoping to be able to build the whole fabric of his knowledge upon it ; like Archimedes, who wanted but one fixed point to move the whole earth. But the foundation was too narrow ; and in his progrefs he unawares affumes many things lefs evident than thofe which he attempts to prove. Altho' he was not able to fufpect the teftimony of confcioufnefs, yet he thought the teftimony of fenfe, of memory, and of every other faculty, might be fufpected, and ought not to be received until proof was brought that they are not fallacious. Therefore he applies thefe faculties, whofe character is yet in queftion, to prove, That there is an infinitely perfect Being, who made him, and who made his fenfes, his memory, his reafon, and all his faculties ; That this Being is no deceiver, and therefore could not give him faculties that are fallacious ; and that on this account they deferve credit.

It is ftrange, that this philofopher, who found himfelf under a neceffity of yielding to the teftimony of confcioufnefs, did not find the fame neceffity of yielding to the teftimony of his fenfes, his memory, and his underftanding : and that while he was certain that he doubted, and reafoned, he was uncertain whether two

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and three made five, and whether he was dreaming or awake. It is more ftrange, that fo acute a reafoner fhould not perceive, that his whole train of reafoning to prove that his faculties were not fallacious, was mere fophiftry: for if his faculties were fallacious, they might deceive him in this train of reafoning; and fo the conclufion, That they were not fallacious, was only the teftimony of his faculties in their own favour, and might be a fallacy.

It is difficult to give any reafon for diftrufting our other faculties, that will not reach confcioufnefs itfelf. And he who diftrufts thofe faculties of judging and reafoning which God hath given him, muft even reft in his fcepticifm till he come to a found mind, or until God give him new faculties to fit in judgement upon the old. If it be not a firft principle, That our faculties are not fallacious, we muft be abfolute fceptics: for this principle is incapable of proof; and if it is not certain, nothing elfe can be certain.

Since the time of Des Cartes, it has been fafhionable with thofe who dealt in abftract philofophy, to employ their invention in finding philofophical arguments, either to prove thofe truths which ought to be received as firft principles, or to overturn them: and it is not eafy to fay, whether the authority of firft principles is more hurt by the firft of thefe attempts, or by the laft; for fuch principles can ftand fecure only upon their own bottom; and to place them upon any other foundation than that of their intrinfic evidence, is in effect to overturn them.

I have lately met with a very fenfible and judicious treatife, wrote by Father Buffier about fifty years ago, concerning firft principles, and the fource of human judgements, which, with great propriety, he prefixed to his treatife of logic. And indeed I apprehend it is a fubject of fuch confequence, that if inquifitive

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men can be brought to the same unanimity in the first principles of the other sciences, as in those of mathematics and natural philosophy, (and why should we despair of a general agreement in things that are self-evident ?), this might be considered as a third grand æra in the progress of human reason.