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ANALYSIS

OF

ARISTOTLE'S LOGIC,

WITH REMARKS.

BY

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ADVERTISEMENT.

THE following Analysis of Aristotle's Logic has been bitherto known to the Public only as an Appendix to one of Lord Kames's Sketches of the History of Man. The bigh estimation in which it has been long held by the best Judges in both parts of this Island has induced the Editor (in whom the Copy Right of Lord Kames's Philosophical Works is vested) to detach it from the voluminous Pullication of aubich it originally formed a part, and to print it in a separate Tract, for the use of Academical Students. In doing so, be bas the satisfaction of complying with the wishes of some of the most eminent Professors in the Scottish Universities, who have repeatedly urged him to give a more general circulation to a performance of such acknowledged merit and utility.

W. C.



BRIEF ACCOUNT

OF

ARISTOTLE'S LOGIC.

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 inquiries.

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 than for truth, and to have wanted rather to be admired as the prince of philosophers than to be usefal: 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 upon 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 they please. There is even reason to suspect, that he wrote often with affected obscurity, either that the air of mystery might procure great veneration, or that his books might be understood only

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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 bis brethren. Ludovicus Vives charges him with detracting from all philosophers, that he might derive that glory to himself, of which he robbed them. He tarely quotes an author but with a view to censure, and is not very fair in representing the ophions 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 bis Logic ; and, for many ages, Porphyry's Introduction to the Categories has been prefixed to them.

SECT. II.

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 genui is, what a specier, what a specific difference, what a property, and what an accident; that the knowledge of these is also very useful in definition, in division, and even in demonstration : therefore he proposes, in this little tract, to deliver shortly and simply the doctrine of the ancients, and chiefly of the Peripatetics, concerning these five predicable; avoiding the more intricate questions concerning them; such as, Whether genera and species do really exist in nature? or, Whether they are only conceptions of the human mind? If they exist in nature, Whether they are corporeal or incorporeal? and, Whether they are inherent in the objects of sense, or disjoined from them? These, he says, are very difficult questions, and require accurate discussion; but that he is not to medile with them.

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

SECT. III.

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 observed, that what we say is either simple, without composition or structure, as man, borse ; or it has composition and structure, as, a man fights, the borse runs. Next comes a distinction between a subject of predication ; that is, a subject of which any thing is affirmed or denied, and a subject of inhesion. These things are said to be inherent in a subject, which, although they are not a part of the subject, cannot possibly exist without it. as figure in the thing figured. Of things that are, says Aristotle, some may be predicated of a subject, but are in no subject ; as man may be predicated of James or John, but is not in any subject. Some again are in a subject, but can be predicated

of no subject. Thus my knowledge in grammar is in me as its subject, but it can be predicated of no subject; because it is an individual thing. Some are both in a subject, and may be predicated of a subject, as science; which is in the mind as its subject, and may be predicated of geometry. Lastly. Some things can neither be in a subject, nor be predicated of any subject. Such are all individual substances, which cannot be predicated, because they are individuals; and cannot be in a subject, because they are substances. After some other subtletics about predicates and subjects, we come to the categories themselves ; the things above mentioned being called by the schoolmen the ante-prædicamenta. It may be observed, however, that, notwithstanding the distinction now explained, the being a subject, and the being predicated truly of a subject, are, in the Analytics, used as synonymous phrases ; and this variation of style has led some persons to think that

the Categories were not written by Aristotle.

Things that may be expressed without composition or structure are, says the auhor, reducible to the following heads. They are either *ubstance*, or *quantity*, or *quality*, or *relatives*, or *place*, or *time*, or *baving*, or *daing*, or *uffring*. These are the predicaments or categories. The first four are largely treated of in four chapters ; the others are slightly passed over, as sufficiently clear of themselves. As a specimen, I shall give a summary of what he says on the category of substance.

Substances are either primary, to wit, individual substances, or secondary, to wit, the genera and species of substances. Primary substances neither are in a subject, or can be predicated of a subject ; but all other things that exist, either are in primary substances, or may be predicated of them. For whatever can be predicated of that which is in a subject may also be predicated of the subject isself. 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 intention 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 *post-prædicamenta* ; wherein, first, the four kinds of opposition of terms are explained; to wit, *relatives*. 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, priut, simul, motus, and babere.

SECT. IV.

OF THE BOOK CONCERNING INTERPRE-TATION.

WE are to consider, says Aristotle, What a neun 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.

A noun is a sound, which by compact signifies something without respect to time, and of which no part has signification by itself. The cries of beasts may have a natural signification, but they are not nouns: we give that name only to sounds which have their signification by compact. The cases of a noun, as the genitive, dative, are not nouns. Non homo is not a noun, but, for distinction's sake, may be called a nome infinitum.

A verb signifies something by compact with relation to time. Thus *valet* is a verb; but *valetado* is a noun, because its signification has no relation to time. It is only the present tense of the indicative that is properly called a verb; the other tenses and moods are variations of the verb. Non valet may be called a verbum unfinitum.

Speech is sound significant by compact, of which some part is also significant. And it is either enunciative, or not enunciative. Enunciative speech is that which affirms or denies. As to speech which is not enunsideration of it belongs to oratory or poetry. Every enunciative speech must have a verb, or some 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 opposite. This is a summary of the first six chapters.

The seventh and eighth treat of the various kinds of enunciations or propositions, universal, particular, indefinite, and singular; and of the various kinds of opposition in propositions, and the axioms concerning them. These things are repeated in every system of logic. In the ninth chapter he endeavours to prove, by a long metaphysical reasoning, that propositions respecting future contingencies are not, determinately, either true or false; and that, if they were, it would follow that all things happen necessarily, and could not have been otherwise than as they are. The remaining chapters contain many minute observations concerning the equipollency of propositions both pure and modal.

CHAP. II.

REMARKS.

SECT. I.

ON THE FIVE PREDICABLES.

The writers on logic have borrowed their materials almost entirely from Aristotle's Organon, and Porphyry's Introduction. The Organon, however, was not written by Aristotle as one work. It comprehends various tracts, written 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 lost would have made a part of the Organon, if they had been saved.

The three treatises, of which we have given a brief account, are unconnected with each other, and with those that follow. And although the first was undoubtedly compiled by Porphyry, and the two last probably by Aristotle, yet I consider them as the venerable remains of a philosophy more ancient than Aristotle. Archytas of Tarentum, an eminent mathematician and philosopher of the Pythagorean school, is said to have wrote upon the ten categories; and the five predicables probably had their origin in the same school. Aristotle, though abundantly careful to do justice to himself, does not claim the invention of either. And Porphyry, without ascribing the latter to Aristotle, professes only to deliver the doctrine of the ancients, and chiefly of the Peripatetics, concerning them.

The writers on logic have divided that science into three parts; the first treating of simple apprehension and of terms; the second, of judgment and of propositions; and the third, of reasoning and of syllogisms. The materials of the first part are taken from Porphyry's Introduction and the Categories; and those of the second from the book of Interpretation.

A predicable, according to the grammatical form of the word, might seem to signify whatever might be predicated, that is, affirmed or denied, of a subject : and in that sense every predicate would be a predicable. But logicians give a different meaning to the word. They divide propositions into certain classes, according to the relation which the predicate of the proposition bears to the subject. The first class is that wherein the predicate is the genus of the subject; as when we say, This is a triangle, Jupiter is a planet. In the second class, the predicate is a species of the subject; as when we say, This triangle is right-angled. A third class is when the predicate is the specific difference of the subject; as when we say, Every triangle bas three sides and three angles. A fourth. when the predicate is a property of the subject; as when we say, The angles of every triangle are equal to two right angles.

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And a fifth class is when the predicate is something accidental to the subject; as when we say, *This triangle is neatly drawn*.

Each of these classes comprehends a great variety of propositions, having different subjects, and different predicates; but in each class the relation between the predicate and the subject is the same. Now, it is to this relation that logicians have given the name of a predicable. Hence it is, that although the number of predicates be infinite, yet the number of predicables can be no greater than that of the different relations which may be in propositions between the predicate and the subject. And if all propositions belong to one or other of the five classes above mentioned, there can be but five predicables, to wit, genus, species, differentia, proprium, and accidens. These might, with more propriety perhaps, have been called the five classes of predicates ; but use has determined them to be called the five predicables.

It may also be observed, that as some

objects of thought are individuals, such as, Julius Gæsar, the city of Rome; so others are common to many individuals, as good. great, virtuous, vicious. Of this last kind are all things that are expressed by adjectives. Things common to many individuals were by the ancients called universals. All predicates are universals, for they have the nature of adjectives ; and, on the other hand, all universals may be predicates. On this account, universals may be divided into the same classes as predicates ; and as the five classes of predicates, above mentioned, have been called the five predicables, so, by the same kind of phraseology, they have been called the five universals ; although they may more properly be called the five classes of universals.

The doctrine of the five universals, or predicables, makes an essential part of every system of logic, and has been handed down without any change to this day. The very name of *predicables* shows, that the sultor of this division, whoever he was, intended it as a complete enumeration of all the kinds of things that can be affirmed of any subject; and so it has always been understood. It is accordingly implied in this division, that all that can be affirmed of any thing whatever is either the genus of the thing, or its species, or its specific difference, or some property or accident belonging to it.

Burgersdick, a very acute writer in logic, seems to have been aware, that strong objections might be made to the five predicables, considered as a complete enumeration: but, unwilling to allow any imperfection in this ancient division, he endeavours to restrain the meaning of the word *predicable*, so as to obviate objections. Those things only, says he, are to be accounted predicables, which may be affirmed of many individuals, truty, properly, and immediately. The consequence of putting such limitations upon the word predicable is, that in many propositions, perhaps in most, the predicate is not a predicable But, admitting all his limitations, the enumeration will still be very incomplete : for of many things we may affirm truly, properly, and immediately, their existence, their end, their cause, their effect, and various relations which they bear to other things. These, and perhaps many more, are predicables in the strict sense of the word, no less than the five which have been so long famous.

Although Porphyry and all subsequent writers make the predicables to be in number five, yet Aristotle himself, in the beginning of the Topics, reduces them to four, and demonstrates that there can be no more. We shall give his demonstration when we come to the Topics; and shall only here observe, that as Burgersdick justifies the fivefold division, by restraining the meaning of the word predicable, so Aristotle justifies the fourfold division, by enlarging the meaning of the words property and accident.

After all, I apprehend that this ancient

division of predicables, with all its imperfections, will bear a comparison with those which have been substituted in its stead by the most célebrated modern philosophers.

Locke, in his Essay on the Human Understanding, having laid it down as a principle, That all our knowledge consists in perceiving certain agreements and disagreements between our ideas, reduces these agreements and disagreements to four heads: to wit, 1. Identity and diversity ; 2. Relation ; 3. Co-existence ; 4. Real existence*. Here are four predicables given as a complete enumeration, and yet not one of the ancient predicables is included in the number.

The author of the Treatise of Human Nature, proceeding upon the same principle that all our knowledge is only a perception of the relations of our ideas, observes, "That it may perhaps be esteemed "an endless task to enumerate all those "qualities which admit of comparison,

* Book 4. chap. 1.

" and by which the ideas of philosophical "relation are produced: but, if we dili-"gently consider them, we shall find, that "without difficulty they may be comprised "under seven general heads: 1. Resem-"blance; 2. Identity; 3. Relations of Space " and Time; 4. Relations of Quantity and "Number; 5. Degrees of Quality; 6. Con-" trariety; 7. Causation *." Here again are seven 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 division, attended only to categorical propositions which have one subject and one predicate; and of these to such only as have a general term for their subject. The moderns, by their definition of knowledge, have been led to attend only to relative propositions, which express a relation between two subjects, and these subjects they suppose to be alwars ideas.

* Vol. i. p. 33. and 125.

SECT. II.

ON THE TEN CATEGORIES, AND ON

DIVISIONS IN GENERAL.

THE intention of the categories or predicaments is, to muster every object of human apprehension under ten heads : for the categories are given as a complete enumeration of every thing which can be expressed without composition and structure ; that is, of every thing that 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 judgment. As the philosopher's province includes all things human and divine, that can be objects of inquiry, 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 inventor, whoever he was. Nor does it appear that the general divisions which, since the decline of the Peripatetic philosophy, have been substituted in place of the ten categories, are more perfect.. Locke has reduced all things to three

Locke has reduced all things to three categories; viz. 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, viz. ideas and impressions: a division which is very well adapted to his system, and which puts me in mind of another made by a very 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, viz. data and quasita.

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 judgment, his divisions of the things 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 encyclopedias. With these authors the categories are, A, B, C, &cc.

Another end commonly proposed by such divisions, but very rarely attained, is to exhaust the subject divided, so that nothing that belongs to it shall be omitted. It is one of the general rules of division in all systems of logic, That the division should be adequate to the subject divided : a good rule without doubt, but very often beyond the reach of human power. To make a perfect division, a man must have a perfect comprehension of the whole subject at one view. When our knowledge of the subject is imperfect, any division we can make must be like the first sketch of a painter, to be extended, contracted, or mended, as the subject shall be found to require. Yet nothing is more common, not only among the ancient, but even among modern philosophers, than to draw, from their incomplete divisions, conclusions which suppose them to be perfect.

A division is a repository which the philosopher frames for holding his ware in convenient order. The philosopher maintains, that such or such a thing is not good ware, because there is no place in his wareroom that fits it. We are apt to yield to this argument in philosophy, but it would appear ridiculous in any other traffic.

Peter Ramus, who had the spirit of a reformer in philosophy, and who had force of genius sufficient to shake the Aristotelian fabric in many parts, but insufficient to erect any thing more solid in its place, tried to remedy the imperfection of philosophical divisions, by introducing a new manner of dividing. His divisions always consisted of two members, one of which was contradictory to the other; as if one should divide England into Middlesex and what is not Middlesex. It is evident that these two members comprehend all England; for the logicians observe, that a term along with its contradictory comprehends all things. In the same manner, we may divide what is not Middlesex into Kent and what is not Kent. Thus one may go on by divisions and subdivisions that are absolutely complete. This example may 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 integrant, 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 is to be the repository of all members that shall in any future time show a good and valid right to a place in the

SECT. III.

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 inveigh 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, because they make sad work when applied to their flimsy compositions. But every man of true judgment, while he condemns distinctions that have no foundation in the nature of things, must perceive, that indiscriminately to decry distinctions, is to renounce all pretensions to just reasoning : for as false reasoning commonly proceeds from confounding things that are different, so, without distinguishing such things, it is impossible to avoid error, or detect sophistry. The authority of Aquinas, or Suarez, or even of Aristotle, can neither stamp a real value upon distinctions of base metal, nor hinder the currency of those of true metal.

Some distinctions are verbal, others are real. The first kind distinguish the various meanings of a word, whether proper or metaphorical. Distinctions of this kind make a part of the grammar of a language, and are often absurd when translated into another language. Real distinctions are equally good in all languages, and suffer no hurt by translation. They distinguish the different species contained under some gemeral notion, or the different parts contained in one whole.

Many of Aristotle's distinctions are verbal merely, and therefore more proper materials for a dictionary of the Greek language, than for a philosophical treatise. At least, they ought never to have been translated into other languages, when the idiom of the language will not justify them : for this is to adulterate the language, to introduce foreign idioms into it without necessity or use, and to make it ambiguous where it was not. The distinction in the end of the categories of the four words, *prims, imul, motus, and kabere,* are all verbal.

The modes or species of prius, according to Aristotle, are five. One thing may be prior to another; first, in point of time; secondly, in point of dignity; thirdly, in point of order; and so forth. The modes of *simul* are only three. It seems this word was not used in the Greek with so great latitude as the other, although they are relative terms.

The modes or species of motion he makes to be six, viz. generation, corruption, increase, decrease, alteration, and change of place.

The modes or species of *baving* are eight. 1. Having a quality or habit, as having wisdom. 2. Having quantity or magnitude. 3. Having things adjacent, as having a sword. 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 cask is said to have wine. 7. Possessing, as having lands or houses. 8. Having a wife.

Another distinction of this kind is Aristotle's distinction of causes ; of which he makes four kinds, efficient, material, formal, and final. These distinctions may deserve a place in a dictionary of the Greek language; but, in English or Latin, they adulterate the language. Yet so fond were the schoolmen of distinctions of this kind, that they added to Aristotle's enumeration an impulsive cause, an exemplary cause, and I don't know how many more. We seem to have adopted into English a final cause ; but it is merely a term of art, borrowed from the Peripatetic philosophy, without necessity or use; for the English word end is as good as final cause, though not so long nor so learned.

SECT. IV.

ON DEFINITIONS.

It remains that we make some remarks on Aristotle's definitions, which have exposed him to much censure and ridicule. Yet I think it must 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 such things only, his enemies had wanted great matter of triumph. I believe it may likewise be said in his favour, that, until Looke'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.

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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. Aristole 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 have 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.

The works of God are but 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, even of the simplest of them, we can give no definition that 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. 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 enlarge our knowledge, as because they make us sensible of our ignorance, and show that a great part of what speculative men have admired as profound philosophy, is only a darkening of knowledge by words without understanding.

SECT

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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 that 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 Aristole. Their speculations upon this subject, which are neither the least ingenious nor the least useful part of the Peripateic 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 we may add, a question, a command, a promise, a contract, and many others. These A ristotle pronounces to have nothing to do with his subject, and remits them to oratory or poetry; and so they have remained banished from the regions of philosophy to this day: yet I apprehend that an analysis of such speeches, and of the operations of mind which they express, would be of real use, and perhaps would discover how imperfect an enumeration the logicians have given of the powers of human understanding, when they reduce them to simple

SECT. VI.

ON PROPOSITIONS.

MATHEMATICIANS use the word proposition in a larger sense than logicians. A problem is called a proposition in mathematics, but in logic it is not a proposition: it is one of those speeches which are not enunciative, and which Aristotle remits to oratory or poetry.

A proposition, according to Aristotle, is a speech wherein one thing is affirmed or denied of another. Hence it is easy to distinguish the thing affirmed or denied, which is called the predicate, from the thing of which it is affirmed or denied, which is called the subject; and these two are called the terms of the proposition. Hence likewise it appears that propositions are either affirmative or negative; and this is called their quality. All affirmative propositions have the same quality, so likewise have all negative ; but an affirmative and a negative are contrary in their quality.

When the subject of a proposition is a general term, the predicate is affirmed or denied either of the whole, or of a part. Hence propositions are distinguished into universal and particular. All men are mortal, is an universal proposition ; Some men are learned, is a particular ; and this is called the quantity of the proposition. All universal propositions agree in quantity. as also all particular : but an universal and a particular are said to differ in quantity. A proposition is called indefinite, when there is no mark either of universality or particularity annexed to the subject: thus, Man is of few days, is an indefinite propoposition ; but it must be understood either as universal or as particular, and therefore is not a third species, but by interpretation is brought under one of the other two.

There are also singular propositions, which have not a general term, but an individual, for their subject; as, Alexander mas a great conqueror. These are considered by logicians as universal, because, the subject being indivisible, the predicate is affirmed or denied of the whole, and not of a part only. Thus all propositions, with regard to quality, are either affirmative or negative; and, with regard to quantity, are universal or particular; and, taking in both quantity and quality, they are universal affirmatives, or narticular negatives. These four kinds, after the days of Aristotle, came to be named by the names of the four first vowels, A, E, I, O, according to the following distich :

Asserit, A, negat E, sed universaliter ambæ; Asserit I, negat O, sed particulariter ambo.

When the young logician is thus far instructed in the nature of propositions, he is apt to think there is no difficulty in analyzing any proposition, and showing its subject and predicate, its quantity and quality; and indeed, unless he can do this,

he will be unable to apply the rules of logic to use. Yet he will find there are some difficulties in this analysis, which are overlooked by Aristotle altogether; and although they are sometimes touched, they are not 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 bappiness. 3. The same example may serve to show, 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, viz. 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.

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CHAP. III.

ACCOUNT OF THE FIRST ANALYTICS.

SECT. I.

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 though I have often purposed to read the whole with care, and to understand what is intelligible, yet my courage and patience always failed before I had done. Why should I throw away so much time and painful attention upon a thing of so little real use? If I had lived in those ages when the knowledge of Aristotle's Organon entitled a man to the highest rank in philosophy, ambition might have induced me to employ upon it some years of painful study; and less, I conceive, would not be sufficient. Such reflections as these always got the better of my resolution, when the first ardour 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.

There is probably but little in the Categories, or in the book of Interpretation, that 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 fabric, 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 incredients.

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. I. 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, in which the term that 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. II.

OF THE FIGURES AND MODES OF FURE 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 premires*. 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 although 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 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 These four kinds of propositions, as was before observed, have been named by the four wowels, 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 afirmatives; E, A, E, denotes that mode in which the major and conclusion are universal afirmative.

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 sixtyfour. 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 show what are the particular modes in each figure, which do or do not form a just and conclusive syllogism, that so the legitimate may be adopted, and the spurious rejected. This Aristotle has shown in the first three figures, examining all the modes one by one, and passing sentence upon each; and from this examination he collects some rules which may aid the memory in distinguishing the false from the true, and point out the properties of each figure.

The first figure has only four legitimate modes. The major proposition in this figure must be universal, and the minor affirmative; and it has this property, that it yields conclusions of all kinds, affirmative and negative, universal and particular.

The second figure has also four legitimate modes. Its major proposition must be universal, and one of the premises must be negative. It yields conclusions both universal and particular, but all negative.

The third figure has six legitimate modes. Its minor must always be affirmative; and it yields conclusions both affirmative and negative, but all particular.

Besides the rules that are proper to each figure, Aristotle has given some that are common to all, by which the legitimacy of syllogisms may be tried. These may, I think, be reduced to five. 1. There must be only three terms in a syllogism. As each term occurs in two of the propositions, it must be precisely the same in both : if it be not, the syllogism is said to have four terms, which makes a vitious syllogism. 2. The middle term must be taken universally in one of the premises. 3. Both premises must not be particular propositions, nor both negative. 4. The conclusion must be particular, if either of the premises be particular; and negative, if either of the premises be negative. 5. No term can be taken universally in the conclusion, if it be not taken universally in the premises.

For understanding the second and fifth of these rules, it is necessary to observe, that a term is said to be taken universally, not 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. III.

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 propesition to be proved; their definition, their properties, the things which may be affrmed or denied of them, and those of
which they may be affirmed or denied: these 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 ferm 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, 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 other. In this way, the author gives special rules for all the various 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, purposely darkened, by putting letters of the alphabet for the several terms,

SECT. IV.

OF THE REMAINING PART OF THE FIRST BOOK.

The resolution of syllogisms requires no other principles but these 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 understood, by rectifying inversions, and putting the propositions in the proper order.

Here he speaks also of hypothetical syllogisms, which he acknowledges cannot be resolved into any of the figures, although there be many kinds of them that ought diligently to be observed; 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.

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SECT. V.

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, 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, fue 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 Aristotic introduced in his own school the practice of syllogistical disputation, instead of the rhetorical disputations which the sophists were wont to use in more ancient times. CHAP. 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, 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 ne-" gative 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 selfevident.

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 musc undergo some change, in order to fit them for their new station: for in every propoposition the subject must be a substantive, or have the force of a substantive; and the predicate must be an adjective, or have the force of an adjective. Hence it follows, that when the subject is an individual, the proposition admits not of conversion. How, for instance, shall we convert this proposition, God is omniscient ?

These observations show, that the doctrine of the conversion of propositions is not so complete as it appears. The rules are laid down without any limitation; yet they are fitted only to one class of propositions, viz. the categorical; and of these only to such as have a general term for their subject.

SECT. II.

ON ADDITIONS MADE TO ARISTOTLE'S THEORY.

ALTHOUGH the logicians have enlarged the first and second parts of logic, by explaining some technical words and distinctions which Aristotle has omitted, and by giving names to some kinds of propositions which he overlooks, yet, in what concerns the theory of categorical syllogisms, he is more full, more minute and particular, than any of them : so that they seem 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 Aristotle, But there is reason to think that Aristotle omitted the fourth figure, not through ignorance or inattention, but of design,

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as containing only some indirect modes, which, when properly expressed, fall into the first figure.

It is true also that Peter Ramus, a professed enemy of Aristotle, introduced some new modes that are adapted to singular propositions; and that Aristotle takes no notice of singular propositions, either in his rules of conversion, or in the modes of syllogism. But the friends of Aristotle have shown that this improvement of Ramus is more specious than useful. Singular propositions have the force of universal propositions, and are subject to the same rules. The definition given by Aristotle of an universal proposition applies to them; and therefore he might think, that there was no occasion to multiply the modes of syllogism upon their account.

These attempts, therefore, show rather inclination than power to discover any material defect in Aristotle's theory.

The most valuable addition made to the theory of categorical syllogisms seems to be the invention of those technical names given to the legitimate modes, by which they may be easily remembered, and which have been comprised in these barbarous verses :

Barbara, Celarent, Darii, Ferio, dato primæ; Cesare, Camestris, Festino, Baroco, secundæ; Tertia grande sonans recitat Darapti, Felapton; Adjungens Disamis, Datisi, Bocardo, Ferison.

In these verses, every legitimate mode belonging to the three figures has a name given to it, by which it may be distinguished and remembered. And this name is so contrived as to denote its nature; for the name has three vowels, which denote the kind of each of its propositions.

Thus, a syllogism in *Bocardo* must be made up of the propositions denoted by the three vowels, O, A, O; that is, its major and conclusion must be particular negative propositions, and its minor an universal affirmative; and, being in the third figure, the middle term must be the subject of both premises. This is the mystery contained in the vowels of those barbarous words. But there are other mysteries contained in their consonants : for, by their means, a child may be taught to reduce any syllogism of the second or third figure to one of the first. So that the four modes of the first figure being directly proved to be conclusive, all the modes of the other two are proved at the same time, by means of this operation of reduction. For the rules and manner of this reduction, and the different species of it, called ortenive and per imposnible, I refer to the logicians, that I may not disclose all their mysteries.

The invention contained in these verses is so ingenious, and so great an adminicle to the dexterous management of syllogisms, that I think it very probable that Aristotle had some contrivance 'of this kind, which was kept as one of the secret doctrines of his school, and handed down by tradition, until some person brought it to light. This is offered only as a conjecture, leaving it to those who are better acquainted with the most ancient commentators on the Analytics, either to confute or confirm it.

SECT. III.

ON EXAMPLES USED TO ILLUSTRATE THIS THEORY.

WE may observe, that Aristotle hardly ever gives examples of real syllogians to illustrate his rules. In demonstrating the legitimate modes, he takes A, B, C, for the terms of the syllogism. Thus, the first mode of the first figure is demonstrated by him in this manner: "For," asys he, " if A is attributed to every B, and B " to every C, it follows necessarily, that " A may be attributed to every C." For disproving the illegitimate modes, he uses the same manner; with this difference, that he commonly, for an example, gives ...

three real terms, such as, *bonum*, *babitus*, *prudentia*, of which three terms you are to make up a syllogism of the figure and mode in question, which will appear to be inconclusive.

The commentators and systematical writers in logic have supplied this defect, and given us real examples of every legitimate mode in all the figures. We acknowledged this to be charitably done, in order to assist the conception in 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 : it has undoubtedly contributed 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 had is not the work of God;

All the natural passions and appetites of men are the work of God ;

Therefore they are not bad.

Another example :

Every thing virtuous is praise-worthy; Some pleasures are not praise-worthy;

Therefore some pleasures are not vir-

Here the middle term *praise-worthy* being the predicate of both premises, the syllogism is of the second figure; and secing it is made up of the propositions, A, O, O, the mode is *Baraca*. It will be found to agree both with the general and special rules; and it may be reduced into a good syllogism of the first figure, upon converting the major by contraposition, thus:

What is not praise-worthy is not virtuous; Some pleasures are not praise-worthy ;

Therefore some pleasures are not virtuous.

That this syllogism is conclusive, common sense pronounces, and all logicians must allow; but it is somewhat unpliable to rules, and requires a little straining to make it tally with them.

That it is of the first figure is beyond dispute; but to what mode of that figure shall we refer it? This is a question of some difficulty: For, in the first place, the premises seem to be both negative, which contradicts the third, general rule; and, moreover, it is contrary to a special rule of the first figure. That the minor should be negative. These 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 proposition, *What is not praiseworthy is not wirtwaw*, is to be accounted an affirmative proposition. This, if granted,

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solves one difficulty; but the other remains. The most ingenious solution, therefore, is this: Let the middle term be not prainewortby. Thus, making the negative particle a part of the middle term, the syllogism stands thus:

Whatever is not praise-worthy is not virtuous;

Some pleasures are not praise-worthy ;

Therefore some pleasures are not virtuous.

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 affimative 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. IV.

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 authorized 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 be affirmed of all the species and individuals belonging to that genus; and that what is denied of the whole genus may be denied of its species and individuals. The four modes of the first figure are evidently included in this axiom. And as to the legitimate modes of the other figures, they are proved by reducing them to some mode of the first. Nor is there any other principle assumed in these reductions but the axioms concerning the conversion of propositions, and, in some cases, the axioms concerning the opposition of propositions.

As to the illegitimate modes, Aristotle has taken the labour to try and condemn them one by one in all the three figures :

but this is done in such a manner that it is very painful to follow him. To give a specimen : In order to prove that those modes of the first figure, in which the major is particular, do not conclude, he proceeds thus :-- " If A is or is not in " some B, and B in every C, no conclusion " follows. Take for the terms in the af-" firmative case, good, babit, prudence ; in " the negative, good, babit, ignorance." This laconic style, the use of symbols not familiar, and, in place of giving an example, his leaving us to form one from three assigned terms, give such embarrassment to a reader, that he is like one reading a book of riddles.

Having thus ascertained the true and false modes of a figure, he subjoins the particular rules of that figure, which seem to be deduced from the particular cases before determined. The general rules come last of all, as a general corollary from what goes before.

I know not whether it is from a diffidence of Aristotle's demonstrations, or from an apprehension of their obscurity, or from a desire of improving upon his method, that almost all the writers in logic I have met with have inverted his order, beginning where he ends, and ending where he begins. They first demonstrate the general rules, which belong to all the figures, from 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 that 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; and if there is any defect of evidence in the axioms, this defect will be communicated to the whole edifice raised upon them.

It may even be suspected, that an attempt, by any method, to demonstrate that a syllogism is conclusive, is an impropriety somewhat like that of attempting to demonstrate an axiom. In a just syllogism, the connexion between the premises and the conclusion is not only real, but immediate ; so that no proposition can come between them to make their connexion more apparent. The very intention of a syllogism is to leave nothing to be supplied that is necessary to a complete demonstration. Therefore a man of common understanding, who has a perfect comprehension of the premises, finds himself under a necessity of admitting the conclusion, supposing the premises to be true; and the conclusion is connected with the premises with all the force of intuitive evidence. In a word, an immediate conclusion is seen in the premises by the light of common sense; and where that is wanting, no kind of reasoning will supply its place.

SECT. V.

ON THIS THEORY, CONSIDERED AS AN ENGINE OF SCIENCE.

THE slow progress of useful knowledge, during the many ages in which the syllogistic art was most highly cultivated as the only guide to science, and its quick progress since that art was disused, suggest a presumption against it; and this presumption is strengthened by the puerility of the examples which have always been brought to illustrate its rules.

The ancients seem to have had too high notions, both of the force of the reasoning power in man, and of the art of syllogism as its guide. Mere reasoning can carry us but a very little way in most subjects. By observation, and experiments properly conducted, the stock of human knowledge may be enlarged without end; but the power 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, who can avoid the snares of ambiguous words, and who is moderately practised in such matters, sees at once all that can be inferred from the 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 reafoning has ample scope: First, it may be observed, That facts are unfavourable to this opinion: for it does not appear that Euclid, or Apollonius, or Archimedes, or Huygens, 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 show 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 conclusion drawn, and the argument used, to prove it, in each of the three figures.

In the first figure, the conclusion affirms or denies something of a certain species or individual; and the argument to prove this conclusion is, that the same thing may be affirmed or denied of the whole genus to which that species or individual belongs.

In the second figure the conclusion is, That some species or individual does not belong to such a genus; and the argument is, That some attribute common to the whole genus does not belong to that species or individual.

In the third figure, the conclusion is, That such an attribute belongs to part of a genus; and the argument is, That the attribute in question belongs to a species or individual which is part of that genus.

I apprehend, that in this short view, every conclusion that falls within the compass of the three figures, as well as the mean of proof, is comprehended. The rules of all the figures might be easily deduced from it; and it appears that there is only one principle of reasoning in all the three; so that it is not strange, that a syllogism of one figure should be reduced to one of another figure.

The general principle in which the

whole terminates, and of which every categorical syllogism is only a particular application, is this, That what is affirmed or denied of the whole genus may be affirmed or denied of every species and individual belonging to it. This is a principle of undoubted certainty indeed, but of no great depth. Aristotle and all the logicians assume it as an axiom, or first principle, from which the syllogistic system, as it were, takes its departure; and after a tedious voyage, and great expense of demonstration, itlands at last in this principle, as its ultimate conclusion, O curas bomiant. O quantum eft in redux iname !

SECT. VI.

ON MODAL SYLLOGISMS.

CATEGORICAL propositions, besides their quantity and quality, have another affection, by which they are divided into pure

and modal. In a pure proposition, the predicate is barely affirmed or denied of the subject ; but, in a modal proposition, the affirmation or negation is modified, by being declared to be necessary, or contingent, or possible, or impossible. These are the four modes observed by Aristotle. from which he denominates a proposition modal. His genuine disciples maintain, that these 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 said to be certain or uncertain, probable or improbable, this makes a modal proposition, no less than the four modes of Aristotle. We shall not enter into this dispute, but proceed to observe, that the epithets of pure and modal are applied to syllogisms as well as to propositions. A mises are pure propositions. A modal syllogism is that in which either of the premises is a modal proposition.

The syllogisms of which we have already said so much, are those only which are pure as well as categorical. But when we consider, that through all the figures and modes, a syllogism may have one premise modal of any of the four modes, while the other is pure, or it may have both premises modal, and that they may be either of the same mode, or of different modes, what prodigious variety arises from all these combinations? Now, it is the business of a logician to show how the conclusion is affected in all this variety of cases. Aristotle has done this in his First Analytics with immense labour ; and it will not be thought strange, that, when he had employed only four chapters in discussing one hundred and ninety-two modes, true and false, of pure syllogisms, he should employ fifteen upon modal syllogisms.

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I am very willing to excuse myself from entering upon this great branch of logic, by the judgment and example of those who cannot be charged either with want of respect to Aristotle, or with a low esteem of the syllogistic art.

Keckerman, a famous Dantzican professor, who spent his life in teaching and writing logic, in his huge folio system of that science, published anno 1600, calls the doctrine of the modals the crux logicorum. With regard to the scholastic doctors, among whom this was a proverb. De modalibus non gustabit asinus, he thinks it very dubious whether they tortured most the modal syllogisms, or were most tortured by them. But those crabbed geniuses. says he, made this doctrine so very thorny. that it is fitter to tear a man's wits in pieces than to give them solidity. He desires it to be observed, that the doctrine of the modals is adapted to the Greek language. The modal terms were frequently used by the Greeks in their
disputations, and, on that account, are so fully handled by Aristolle: but, in the Latin tongue, you shall hardly every meet with them. Nor do I remember, in all my experience, says he, to have observed any man in danger of being foiled in a dispute, through his ignorance of the modals.

This author, however, out of respect to Aristotle, treats pretty fully of modal propositions, showing how to distinguish their subject and predicate, their quantity and quality. But the modal syllogisms he passes over altogether.

Ludovicus Vives, whom I mention, not as a devotee of Aristotle, but on account of his own judgment and learning, thinks that the doctrine of modals ought to be banished out of logic, and remitted to grammar; and that if the grammar of the Greek tongue had been brought to a system in the time of Aristotle, that most acute philosopher would have saved the great labour he has bestowed on this subject. Burgersdick, after enumerating five classes of modal syllogisms, observes, that they require many rules and cautions, which Aristotle hath handled diligently; but that, as the use of them is not great, and their rules difficult, he thinks it not worth while to enter into the discussion of them; recommending to those who would understand them, the most learned paraphrase of Joannes Monlorius upon the first book of the First Analytics.

All the writers of logic for two hundred years back that have faillen into my hands, have passed over the rules of modal syllogisms with as little ceremony. So that this great branch of the doctrine of syllogism, so diligently handled by Aristotle, fell into neglect, if not contempt, ever while the doctrine of pure syllogisms continued in the highest esteem. Moved by these authorities, I shall let this doctrine rest in peace, without giving the least disturbance to its ashes.

SECT. VII.

ON SYLLOGISMS THAT DO NOT BELONG TO FIGURE AND MODE.

ARISTOTLE gives some observations upon imperfect syllogisms; such as the Enthimema, in which one of the premises is not expressed, but understood; Induction, wherein we collect an universal from a full enumeration of particulars; and Examples, which are an imperfect induction. The logicians have copied Aristotle, upon these kinds of reasoning, without any considerable improvement. But to compensiderable improvement. But to compensate the modal syllogism, which they have laid aside, they have given rules for several kinds of syllogism, of which Aristotle takes no notice. These may be reduced to two classes.

The first class comprehends the syllogisms into which any exclusive, restrictive, exceptive, or reduplicative proposition enters. Such propositions are by some called *exponible*, by others *imperfectly modal*. The rules given with regard to these are obvious, from a just interpretation of the propositions.

The second class is that of hypothetical syllogisms, which take that denomination from having a hypothetical proposition for one or both premises. Most logicians give the name of bypothetical to all complex propositions which have more terms than one subject and one predicate. I use the word in this large sense, and mean, by hypothetical syllogisms, all those in which either of the premises consists of more terms than two. How many various kinds there may be of such syllogisms, has never been ascertained. The logician shave given names to some; such as the copulative, the conditional, by some called hypothetical, and the disjunctive.

Such syllogisms cannot be tried by the rules of figure and mode. Every kind would require rules peculiar to itself. Lo-

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gicians have given rules for some kinds; but there are many that have not so much as a name.

The Dilemma is considered by most logicians as a species of the disjunctive syllogism. A remarkable property of this kind is, that it may sometimes be happily retorted : it is, it seems, like a hand grenade, which, by dexterous management, may be thrown back, so as to spend its force upon the assailant. We shall conclude this tedious account of syllogisms with a dilemma mentioned by A. Gelhus, and from him by many logicians, as insoluble in any other way.

" Euathlus, a rich young man, desirous of learning the art of pleading, applied to Protagoras, a celebrated sophist, to instruct him, promising a great sum of money as his reward; one half of which was paid down i the other half he bound himself to pay as soon as he should plead a cause before the judges, and gain it. Protagoras

found him a very apt scholar; but, after he had made good progress, he was in no haste to plead causes. The master, conceiving that he intended by this means to shift off his second payment, took, as he thought, a sure method 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 against 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."

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 connexion between the premises and the conclusion; and where such a connexion 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 apudictical, 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 Topics. 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

To return to the Last Analytics, which treat of demonstration and of science: We shall not pretend to abridge these books, for Aristotle's writings do not admit of abridgment: no man, in fewer words, can say what he says; 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 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 abfin dum*.

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 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 barbarons Latin, 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. II.

OF THE TOPICS.

THE profeffed design of the Topics is, to show a method by which a man may be able to reason with probability and consistency upon every question that can occur. Every question is either about the genus of the subject, or its specific difference, or something 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 be 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 he 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.

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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 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 shown 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 to 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.

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 truth merely, but for victory.

SECT. III.

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 show what general or special rule it is that is transgressed : so that, if he be 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 to be conjoined. 5. is an ambiguity in prosody, accent, or pronunciation. 6. An ambiguity arising from some figure of speech.

When a sophism of any of these kinds is translated into another language, or even

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rendered into unambiguous expressions in the same language, the fallacy is evident, and the syllogism appears to have four

The seven fallacies which are said not to be in the diction, but in the thing, have their proper names in Greek and in Latin, by which they are distinguished. Without minding their names, we shall give a brief account of their narre.

terms.

 The first is, Taking an accidental conjunction of things for a natural or necessary connexion: as, when from an accident we infer a property; when from an example we infer a rule; when from a single act we infer a habit.

2. Taking that absolutely which ought to be taken comparatively, or with a certain limitation. The construction of language often leads into this fallacy; for, in all languages, it is common to use absolute terms to signify things that carry in them some secret comparison; or to use unlimited terms, to signify what from its nature must be limited.

3. Taking that for the cause of a thing which is only an occasion, or concomitant.

 Begging the queftion. This is done when the thing to be proved, or some thing equivalent, is assumed in the premises.

5. Mistaking the queftion. When the conclusion of the syllogism is not the thing that ought to be proved, but something else that is miltaken for it.

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

7. The last fallacy lies in propositions that are complex, and imply two affirmations, whereof one may be true, and the other false; so that, whether you grant the proposition or deny it, you are entangled : as when it is affirmed that such a man has left off playing the fool. If it be granted,

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it implies that he did play the fool formerly. If it be denied, it implies, or seems to imply, that he plays the fool still.

In this enumeration, we ought, in justice to Aristotle, to expect only the fallacies incident to categorical syllogisms. And I do not find that the logicians have made any additions to it when taken in this view; although they have given some other fallacies that are incident to syllogisms of the hypothetical kind, particularly the fallacy of an incomplete enumeration in disjunctive syllogisms and dilemmas.

The different species of sophisms above mentioned are not so precisely defined by Aristotle, or by subsequent logicians, but that they allow of great latitude in the application; and it is often dubious under what particular species a sophistical syllogism ought to be classed. We even find the same example brought under one species by one author, and under another

species by another. Nay, what is more strange, Aristole himself employs a long chapter in proving, by a particular induction, that all the seven may be brought under that which we have called *mittaking* the question, and which is commonly called gineratio elenchi. And indeed the proof of this is easy, without that laborious detail which Aristotle uses for the purpose : for if you lop off from the conclusion of a sophistical syllogism all that is not supported by the premises, the conclusion in that case will always be found different from that which ought to have been proved; and so it falls under the *ignoratio elenchi*.

It was probably Aristotle's aim to reduce all the possible variety of sophisms, as he had attempted to do of just syllogisms, to certain definite species : but he seems to be sensible that he had 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 inventors, some have made important 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 part of it, and requires the greatest degree of inven-

tion; 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 materials 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 ancient 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 appear 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."

CHAP. V.

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 contrary. It is no wonder, therefore, that the excessive admiration 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 unfavourable an opinion, which seems now prevalent, of its being unworthy of a place in a liberal education. Those who think according 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 faculty is the gift of God, given to men in very different measure. Some have a large portion, some a less; and where there is a remarkable defect of the natural power, it cannot be supplied by any culture. But this natural power, even where it is the strongest, may lie dead for want of the means of improvement: a savage may have been born with as good faculties as a Bacon or a Newton:

but his talent was buried, being never put to use; while theirs 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 judgment or skill of reasoning in any science.

I take this to be Locke's meaning, when, in his Thonghts 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 sessonable; to wit, That the improvement

of our reasoning power is to be expected much more from an intimate acquaintance with the authors who reason the 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 the happiest application of the rules of logic, for unravelling the sophistical reasoning of his antagonist.

Our reasoning power makes no appearance in infancy; but as we grow up, it unfolds itself by degrees, like the bud of a tree. When a child first draws an inference, or perceives the force of an inference drawn by another, we may call this the birth of his reason: but it is yet like a new-born babe, weak and tender; it must be cherished, carried in arms, and have food of easy digestion, till it gather strength.

I believe no man remembers the birth of his reason: but it is probable that his decisions are at first weak and wavering ; and, compared with that steady conviction which he acquires in ripe years, are like the dawn of the morning compared with noon-day. We see that the reason of children yields to authority, as a reed to the wind; nay, that it clings to it, and leans upon it, as if conscious of its own weakness.

When reason acquires such strength as to stand on its own bottom, without the aid of authority, or even in opposition to authority, this may be called its *manly age*. But, in most men, it hardly ever arrives at this period. Many, by their situation in life, have not the opportunity of cultivating their rational powers. Many, from the habit they have acquired of submitting their opinions to the authority of others. or from some other principle which operates more powerfully than the love of truth, suffer their judgment 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 passions, Such persons, however learned, however acute, may be said to be all their days children in understanding. They reason, they dispute, and perhaps write ; but it is not that they may find the truth, but that they may defend opinions which have descended to them by inheritance, or into which they have fallen by accident, or been led by affection.

I agree with Mr Locke, that there is no study better fitted to exercise and strengthen the reasoning powers, than that of the mathematical sciences, for two reasons; first, Because there is no other branch of science which gives such scope to long and accurate trains of reasoning; and, secondly, Because, in mathematics, there is no room for authority, nor for prejudice of any kind, which may give a false bias to the judgment.

When a youth of moderate parts begins to study Euclid, every thing at first is new to him. His apprehension is unsteady: his judgment is feeble, and rests 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 propositions, more light breaks in upon him : the language becomes familiar, and conveys clear and steady conceptions: the judgment is confirmed : he begins to see what demonstration is ; and it is impossible to see it without being charmed with it. He perceives it to be a kind of evidence that has no need of authority to strengthen it. He finds himself emancipated from that bondage, and exults so much in this new state of independence, that he spurns at authority, and would have demonstration for every thing; until experience teaches him, that

this is a kind of evidence that cannot be had in most things; and that, in his most important concerns, he must rest contented with probability.

As he goes on in mathematics, the road of demonstration becomes smooth and easy; he can walk in it firmly, and take wider fleps; and at last he acquires the habit not only of understanding a demonstration, but of discovering and demonstrating mathematical truths.

Thus a man, without rules of logic, may acquire a habit of reasoning justly in mathematics; and I believe he may, by like means, acquire a habit of reasoning justly in mechanics, in jurisprudence, in politics, or in any other science. Good sense, good examples, and assiduous exercise, may bring a man to reason justly aud acutely in his own profession, without rules.

But if any man think, that, from this concession, he may infer the inutility of logic, he betrays a great want of that art by this inference; for it is no better reasoning than this, That because a man may

go from Edinburgh to London by the way of Paris, therefore any other road is useless.

There is perhaps no practical art which may not be acquired, in a very considerable 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 artist knows the utility of having his art reduced to rules, and by that means made a science. He is thereby enlightened in his practice, and works with more assurance. By rules, he sometimes corrects his own errors, and often detects the errors of others; he finds them of great use to confirm his judgment, to justify what is right, and to condemn what is wrong.

Is it of no use in reasoning to be well acquainted with the various powers of the human understanding, by which we reason?

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Is it of no use to resolve the various kinds of reasoning into their simple elements; and to discover, as far as we are able, the rules by which these elements are combined in judging and in reasoning ? Is it of no use to mark the various fallacies in reasoning, by which even the most ingenious men have been led into error? It must surely betray great want of understanding, to think these things useless or unimportant. These are the things which logicians have attempted, and which they have executed; not indeed so completely as to leave no room for improvement, but in such a manner as to give very considerable aid to our reasoning powers. That the principles laid down with regard to . definition and division, with regard to the conversion and opposition of propositions and the general rules of reasoning, are not without use, is sufficiently apparent from the blunders committed by those who disdain any acquaintance with them.

2

Although the art of categorical syllogism is better fitted for scholastic 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, though useless burdens upon the earth: we can bear the most minute description of them, and travel hundreds of leagues to see them: if any person should, with sacrilegious hands, destroy or deface them, his memory would be had in abhorrence. The predicaments and predicables, the rules of syllogism, 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 progress of human reason.

The prejudice against logic has probably been strengthened by its being taught too early in life. Boys are often taught logic as they are taught their creed, when it is an exercise of memory only,

without understanding. One may as wellexpect to understand grammar before he can speak, as to understand logic before he can reason. It must even he acknowledged, that commonly we are capable of reasoning in mathematics more early than in logic. The objects presented to the mind in this science are of a very abstract nature, and can be distinctly conceived only when we are capable of attentive reflection upon the operations of our own understanding, and after we have heen accustomed to reason. There may be an elementary logic, level to the capacity of those who have been but little exercised in reasoning; but the most important parts of this science require a ripe understanding, capable of 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 he corrected.

3

SECT. II.

OF THE IMPROVEMENT OF LOGIC.

Is 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 judgment, 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 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 these 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 ruth 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 Noum 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 era 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 that 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 probable only, for demonstrative : but when the induction is sufficiently copious, and carried on according to the rules of art, it forces conviction no less than demonstration itself does.

The greatest part of human knowledge rests 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 these laws in particular phenomena are open to cur observation; and, by observing a train of uniform effects with due caution, we may at last decypher the law of nature by which they are regulated.

Lord Bacon has displayed no less force of genius in reducing to rules this method of reasoning, than Aristotle did in the method of syllogism. His Novum Organum ought therefore to be held as a most important addition to the ancient logic. Those who understand it, and enter into its spirit, will be able to distinguish the chaff from the wheat in philosophical disquisitions into the works of God. They will learn to hold in due contempt all hypotheses and theories, the creatures of human imagination, and to respect nothing but facts sufficiently vouched, or conclusions drawn from them by a fair and chaste interpretation of nature.

Most arts have been reduced to rules. after they had been brought to a considerable degree of perfection by the natural sagacity of artists; and the rules have been drawn from the best examples of the art that had been before exhibited : but the art of philosophical induction was delineated by Lord Bacon in a very ample manner, before the world had seen any tolerable example of it. This, although it adds greatly to the merit of the author, must have produced some obscurity in the work, and a defect of proper examples for illustration. This defect may now be easily supplied from those authors who, in their philosophical disguisitions, have the most strictly pursued the path pointed out in the Novum Organum. Among these, Sir Isaac Newton appears to hold the first rank ; having, 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 judgment, and which he calls the idols of the buman 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 selfevident propositions; the second, of those which are deduced by just reasoning from self-evident propositions. The line that 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 advancement 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 tatte until is first principles are accertained; after which it advances regularly, and secures the ground it has gained.

Although 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 abbogs a *vacuum*; 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 these were assumed in the Peripatetic philosophy without proof, as if they were self-evident.

Des Cartes, sensible of this weakness in the ancient philosophy, and desirous to guard against it in his own system, resolved to admit nothing until his assent was forced by irresistible evidence. The first thing that he found to be certain and evident was. that he thought, and reasoned, and doubted. He found himself under a necessity of believing the existence of those mental operations of which he was conscious :, and having thus found sure footing in this one principle of consciousness, he rested satisfied 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 progress he unawares assumes many things less evident than those which he attempts

to prove. Although he was not able to snapect the testimony of consciousness, yet he thought the testimony of sense, of memory, and of every other faculty, might be suspected, and ought not to be received until proof was brought that they are not, fullacions. Therefore he applies these faculties, whose character is yet in question, to prove, That there is an infinitely perfect Being, who made him, and who made his senses, his memory, his reason, 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 deserve credit.

It is strange that this philosopher, who found himself under a necessity of yielding to the testimony of consciousness, did not find the same necessity of yielding to the testimony of his senses, his memory, and his understanding; and that, while he was certain that he doubted and reasoned, he was uncertain whether two and three made five, and whether he was dreaming or awake. It is more strange, that so acute a reasoner should not perceive that his whole train of reasoning, to prove that his faculties were not fallacious, was mere sophistry; for if his faculties were fallacious, they might deceive him in this train of reasoning; and so the conclusion, That they were not fallacious, was only the testimony of his faculties in their own favour, and might be a fallacy.

It is difficult to give any reason for distrusting our other faculties that will not reach consciousness itself. And he who distrust the faculties of judging and reasoning which God hath given him, must even rest in his scepticism till he come to a sound mind, or until God give him new faculties to sit in judgment upon the old. If it be not a first principle, That our faculties are not fallacious, we must be absolute sceptics : for this principle is incapable of a proof; and, if it is not certain, nothing else can be certain.

Since the time of Des Cartes, it has been fashionable with those who dealt in abstract philosophy, to employ their invention in finding philosophical arguments, either to prove those truths which ought to be received as first principles, or to overturn them: and it is not easy to say, whether the authority of first principles is more hurt by the first of these attempts, or by the last: for such principles can stand secure only upon their own bottom; and to place them upon any other foundation than that of their intrinsic evidence, is in effect to overturn them.

I have lately met with a very sensible and judicious treatise, wrote by Father Buffier about fifty years ago, concerning first principles and the source of human judgments, which, with great propriety, he prefixed to his treatise of logic. And indeed I apprehend it is a subject of such consequence, that if inquisitive 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 selfevident?), this might be considered as a third grand era in the progress of human reason.

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