

XIII. Of Invention

(1) Invention is of two kinds much differing—the one of arts and sciences, and the other of speech and arguments. The former of these I do report deficient; which seemeth to me to be such a deficiency as if, in the making of an inventory touching the state of a defunct, it should be set down that there is no ready money. For as money will fetch all other commodities, so this knowledge is that which should purchase all the rest. And like as the West Indies had never been discovered if the use of the mariner's needle had not been first discovered, though the one be vast regions, and the other a small motion; so it cannot be found strange if sciences be no further discovered, if the art itself of invention and discovery hath been passed over.

(2) That this part of knowledge is wanting, to my judgment standeth plainly confessed; for first, logic doth not pretend to invent sciences, or the axioms of sciences, but passeth it over with a *cuique in sua arte credendum*. And Celsus acknowledgeth it gravely, speaking of the empirical and dogmatical sects of physicians, "That medicines and cures were first found out, and then after the reasons and causes were discoursed; and not the causes first found out, and by light from them the medicines and cures discovered." And Plato in his "Theætetus" noteth well, "That particulars are infinite, and the higher generalities give no sufficient direction; and that the pith of all sciences, which maketh the artsman differ from the inexpert, is in the middle propositions, which in every particular knowledge are taken from tradition and experience." And therefore we see, that they which discourse of the inventions and originals of things refer them rather to chance than to art, and rather to beasts, birds, fishes, serpents, than to men.

"Dictamnum genetrix Cretæa carpit ab Ida,
Puberibus caulem foliis et flore camantem
Purpureo; non illa feris incognita capris
Gramina, cum tergo volucres hæserè sagittæ."

So that it was no marvel (the manner of antiquity being to consecrate inventors) that the Egyptians had so few human idols in their temples, but almost all brute:

"Omnigenumque Deum monstra, et latrator Anubis,
Contra Neptunum, et Venerem, contraque Minervam, &c."

And if you like better the tradition of the Grecians, and ascribe the first inventions to men, yet you will rather believe that Prometheus first stroke the flints, and marvelled at the spark, than that when he first stroke the flints he expected the spark; and therefore we see the West Indian Prometheus had no intelligence with the European, because of the rareness with them of flint, that gave the first occasion. So as it should seem, that hitherto men are rather beholden to a wild goat for surgery, or to a nightingale for music, or to the ibis for some part of physic, or to the pot-lid that flew open for artillery, or generally to chance or anything else than to logic for the invention of arts and sciences.

Neither is the form of invention which Virgil describeth much other:

“Ut varias usus meditande extunderet artes
Paulatim.”

For if you observe the words well, it is no other method than that which brute beasts are capable of, and do put in ure; which is a perpetual intending or practising some one thing, urged and imposed by an absolute necessity of conservation of being. For so Cicero saith very truly, *Usus uni rei deditus et naturam et artem sæpe vincit*. And therefore if it be said of men,

“Labor omnia vincit
Improbis, et duris urgens in rebus egestas,”

it is likewise said of beasts, *Quis psittaco docuit suum* ?????? Who taught the raven in a drought to throw pebbles into a hollow tree, where she spied water, that the water might rise so as she might come to it? Who taught the bee to sail through such a vast sea or air, and to find the way from a field in a flower a great way off to her hive? Who taught the ant to bite every grain of corn that she burieth in her hill, lest it should take root and grow? Add then the word *extundere*, which importeth the extreme difficulty, and the word *paulatim*, which importeth the extreme slowness, and we are where we were, even amongst the Egyptians’ gods; there being little left to the faculty of reason, and nothing to the duty or art, for matter of invention.

(3) Secondly, the induction which the logicians speak of, and which seemeth familiar with Plato, whereby the principles of sciences may be pretended to be invented, and so the middle propositions by derivation from the principles; their form of induction, I say, is utterly vicious and incompetent; wherein their error is the fouler, because it is the duty of art to perfect and exalt nature; but they contrariwise have wronged, abused, and traduced nature. For he that shall attentively observe how the mind doth gather this excellent dew of knowledge, like unto that which the poet speaketh of, *Aërei mellis cælestia dona*, distilling and contriving it out of particulars natural and artificial, as the flowers of the field and garden, shall find that the mind of herself by nature doth manage and act an induction much better than they describe it. For to conclude upon an enumeration of particulars, without instance contradictory, is no conclusion, but a conjecture; for who can assure (in many subjects) upon those particulars which appear of a side, that there are not other on the contrary side which appear not? As if Samuel should have rested upon those sons of Jesse which were brought before him, and failed of David which was in the field. And this form (to say truth), is so gross, as it had not been possible for wits so subtle as have managed these things to have offered it to the world, but that they hasted to their theories and dogmaticals, and were imperious and scornful toward particulars; which their manner was to use but as *lictores* and *viatores*, for sergeants and whiffers, *ad summovendam turbam*, to make way and make room for their opinions, rather than in their true use and service. Certainly it is a thing may touch a man with a religious wonder, to see how the footsteps of seducement are the very same in divine and human truth; for, as in divine truth man cannot endure to become as a child, so in human, they reputed the attending the inductions (whereof we speak), as if it were a second infancy or childhood.

(4) Thirdly, allow some principles or axioms were rightly induced, yet, nevertheless, certain it is that middle propositions cannot be deduced from them in subject of nature by syllogism—that is, by touch and reduction of them to principles in a middle term. It is true that in sciences popular, as moralities, laws, and the like, yea, and divinity (because it pleaseth God to apply Himself to the capacity of the simplest), that form may have use; and in natural philosophy likewise, by way of argument or satisfactory reason, *Quæ assensum parit operis effæta est*; but the subtlety of nature and operations will not be enchained in those bonds. For arguments consist of propositions, and propositions of words, and words are but the current tokens or marks of popular notions of things; which notions, if they be grossly and variably collected out of particulars, it is not the laborious examination either of consequences of arguments, or of the truth of propositions, that can ever correct that error, being (as the physicians speak) in the first digestion. And, therefore, it was not without cause, that so many excellent philosophers became sceptics and academics, and denied any certainty of knowledge or comprehension; and held opinion that the knowledge of man extended only to appearances and probabilities. It is true that in Socrates it was supposed to be but a form of irony, *Scientiam dissimulando simulavit*; for he used to disable his knowledge, to the end to enhance his knowledge; like the humour of Tiberius in his beginnings, that would reign, but would not acknowledge so much. And in the later academy, which Cicero embraced, this opinion also of *acatalepsia* (I doubt) was not held sincerely; for that all those which excelled in copy of speech seem to have chosen that sect, as that which was fittest to give glory to their eloquence and variable discourses; being rather like progresses of pleasure than journeys to an end. But assuredly many scattered in both academies did hold it in subtlety and integrity. But here was their chief error: they charged the deceit upon the senses; which in my judgment (notwithstanding all their cavillations) are very sufficient to certify and report truth, though not always immediately, yet by comparison, by help of instrument, and by producing and urging such things as are too subtle for the sense to some effect comprehensible by the sense, and other like assistance. But they ought to have charged the deceit upon the weakness of the intellectual powers, and upon the manner of collecting and concluding upon the reports of the senses. This I speak, not to disable the mind of man, but to stir it up to seek help; for no man, be he never so cunning or practised, can make a straight line or perfect circle by steadiness of hand, which may be easily done by help of a ruler or compass.

(5) This part of invention, concerning the invention of sciences, I purpose (if God give me leave) hereafter to propound, having digested it into two parts: whereof the one I term *experientia literata*, and the other *interpretatio naturæ*; the former being but a degree and rudiment of the latter. But I will not dwell too long, nor speak too great upon a promise.

(6) The invention of speech or argument is not properly an invention; for to invent is to discover that we know not, and not to recover or resummon that which we already know; and the use of this invention is no other but, out of the knowledge whereof our mind is already possessed to draw forth or call before us that which may be pertinent to the purpose which we take into our consideration. So as to speak truly, it is no invention, but a remembrance or suggestion, with an application; which is the cause why the schools do place it after judgment, as subsequent and not precedent. Nevertheless, because we do account it a chase as well of deer in an enclosed park as in a forest at large, and that it hath already obtained the name, let it be called invention; so as it be perceived and discerned, that the scope and end of this invention is readiness and present use of our knowledge, and not addition or amplification thereof.

(7) To procure this ready use of knowledge there are two courses, preparation and suggestion. The former of these seemeth scarcely a part of knowledge, consisting rather of diligence than of any

artificial erudition. And herein Aristotle wittily, but hurtfully, doth deride the sophists near his time, saying, “They did as if one that professed the art of shoemaking should not teach how to make up a shoe, but only exhibit in a readiness a number of shoes of all fashions and sizes.” But yet a man might reply, that if a shoemaker should have no shoes in his shop, but only work as he is bespoken, he should be weakly customed. But our Saviour, speaking of divine knowledge, saith, “That the kingdom of heaven is like a good householder, that bringeth forth both new and old store;” and we see the ancient writers of rhetoric do give it in precept, that pleaders should have the places, whereof they have most continual use, ready handled in all the variety that may be; as that, to speak for the literal interpretation of the law against equity, and contrary; and to speak for presumptions and inferences against testimony, and contrary. And Cicero himself, being broken unto it by great experience, delivereth it plainly, that whatsoever a man shall have occasion to speak of (if he will take the pains), he may have it in effect premeditate and handled *in thesi*. So that when he cometh to a particular he shall have nothing to do, but to put to names, and times, and places, and such other circumstances of individuals. We see likewise the exact diligence of Demosthenes; who, in regard of the great force that the entrance and access into causes hath to make a good impression, had ready framed a number of prefaces for orations and speeches. All which authorities and precedents may overweigh Aristotle’s opinion, that would have us change a rich wardrobe for a pair of shears.

(8) But the nature of the collection of this provision or preparatory store, though it be common both to logic and rhetoric, yet having made an entry of it here, where it came first to be spoken of, I think fit to refer over the further handling of it to rhetoric.

(9) The other part of invention, which I term suggestion, doth assign and direct us to certain marks, or places, which may excite our mind to return and produce such knowledge as it hath formerly collected, to the end we may make use thereof. Neither is this use (truly taken) only to furnish argument to dispute, probably with others, but likewise to minister unto our judgment to conclude aright within ourselves. Neither may these places serve only to apprompt our invention, but also to direct our inquiry. For a faculty of wise interrogating is half a knowledge. For as Plato saith, “Whosoever seeketh, knoweth that which he seeketh for in a general notion; else how shall he know it when he hath found it?” And, therefore, the larger your anticipation is, the more direct and compendious is your search. But the same places which will help us what to produce of that which we know already, will also help us, if a man of experience were before us, what questions to ask; or, if we have books and authors to instruct us, what points to search and revolve; so as I cannot report that this part of invention, which is that which the schools call topics, is deficient.

(10) Nevertheless, topics are of two sorts, general and special. The general we have spoken to; but the particular hath been touched by some, but rejected generally as inartificial and variable. But leaving the humour which hath reigned too much in the schools (which is, to be vainly subtle in a few things which are within their command, and to reject the rest), I do receive particular topics; that is, places or directions of invention and inquiry in every particular knowledge, as things of great use, being mixtures of logic with the matter of sciences. For in these it holdeth *ars inveniendi adolescit cum inventis*; for as in going of a way, we do not only gain that part of the way which is passed, but we gain the better sight of that part of the way which remaineth, so every degree of proceeding in a science giveth a light to that which followeth; which light, if we strengthen by drawing it forth into questions or places of inquiry, we do greatly advance our pursuit.