

VII. Of Natural Philosophy, Physical and Metaphysical

(1) Leaving therefore divine philosophy or natural theology (not divinity or inspired theology, which we reserve for the last of all as the haven and sabbath of all man's contemplations) we will now proceed to natural philosophy. If then it be true that Democritus said, "That the truth of nature lieth hid in certain deep mines and caves;" and if it be true likewise that the alchemists do so much inculcate, that Vulcan is a second nature, and imitateth that dexterously and compendiously, which nature worketh by ambages and length of time, it were good to divide natural philosophy into the mine and the furnace, and to make two professions or occupations of natural philosophers—some to be pioneers and some smiths; some to dig, and some to refine and hammer. And surely I do best allow of a division of that kind, though in more familiar and scholastical terms: namely, that these be the two parts of natural philosophy—the inquisition of causes, and the production of effects; speculative and operative; natural science, and natural prudence. For as in civil matters there is a wisdom of discourse, and a wisdom of direction; so is it in natural. And here I will make a request, that for the latter (or at least for a part thereof) I may revive and reintegrate the misapplied and abused name of natural magic, which in the true sense is but natural wisdom, or natural prudence; taken according to the ancient acception, purged from vanity and superstition. Now although it be true, and I know it well, that there is an intercourse between causes and effects, so as both these knowledges, speculative and operative, have a great connection between themselves; yet because all true and fruitful natural philosophy hath a double scale or ladder, ascendent and descendent, ascending from experiments to the invention of causes, and descending from causes to the invention of new experiments; therefore I judge it most requisite that these two parts be severally considered and handled.

(2) Natural science or theory is divided into physic and metaphysic; wherein I desire it may be conceived that I use the word metaphysic in a differing sense from that that is received. And in like manner, I doubt not but it will easily appear to men of judgment, that in this and other particulars, wheresoever my conception and notion may differ from the ancient, yet I am studious to keep the ancient terms. For hoping well to deliver myself from mistaking, by the order and perspicuous expressing of that I do propound, I am otherwise zealous and affectionate to recede as little from antiquity, either in terms or opinions, as may stand with truth and the proficience of knowledge. And herein I cannot a little marvel at the philosopher Aristotle, that did proceed in such a spirit of difference and contradiction towards all antiquity; undertaking not only to frame new words of science at pleasure, but to confound and extinguish all ancient wisdom; insomuch as he never nameth or mentioneth an ancient author or opinion, but to confute and reprove; wherein for glory, and drawing followers and disciples, he took the right course. For certainly there cometh to pass, and hath place in human truth, that which was noted and pronounced in the highest truth:—*Veni in nomine partis, nec recipits me; si quis venerit in nomine suo eum recipietis*. But in this divine aphorism (considering to whom it was applied, namely, to antichrist, the highest deceiver), we may discern well that the coming in a man's own name, without regard of antiquity or paternity, is no good sign of truth, although it be joined with the fortune and success of an *eum recipietis*. But for this excellent person Aristotle, I will think of him that he learned that humour of his scholar, with whom it seemeth he did emulate; the one to conquer all opinions, as the other to conquer all nations. Wherein, nevertheless, it may be, he may at some men's hands, that are of a bitter disposition, get a like title as his scholar did:—

“Felix terrarum prædo, non utile mundo
Editus exemplum, &c.”

So,

“Felix doctrinæ prædo.”

But to me, on the other side, that do desire as much as lieth in my pen to ground a sociable intercourse between antiquity and proficience, it seemeth best to keep way with antiquity *usque ad aras*; and, therefore, to retain the ancient terms, though I sometimes alter the uses and definitions, according to the moderate proceeding in civil government; where, although there be some alteration, yet that holdeth which Tacitus wisely noteth, *eadem magistratuum vocabula*.

(3) To return, therefore, to the use and acception of the term metaphysic as I do now understand the word; it appeareth, by that which hath been already said, that I intend *philosophia prima*, summary philosophy and metaphysic, which heretofore have been confounded as one, to be two distinct things. For the one I have made as a parent or common ancestor to all knowledge; and the other I have now brought in as a branch or descendant of natural science. It appeareth likewise that I have assigned to summary philosophy the common principles and axioms which are promiscuous and indifferent to several sciences; I have assigned unto it likewise the inquiry touching the operation or the relative and adventive characters of essences, as quantity, similitude, diversity, possibility, and the rest, with this distinction and provision; that they be handled as they have efficacy in nature, and not logically. It appeareth likewise that natural theology, which heretofore hath been handled confusedly with metaphysic, I have enclosed and bounded by itself. It is therefore now a question what is left remaining for metaphysic; wherein I may without prejudice preserve thus much of the conceit of antiquity, that physic should contemplate that which is inherent in matter, and therefore transitory; and metaphysic that which is abstracted and fixed. And again, that physic should handle that which supposeth in nature only a being and moving; and metaphysic should handle that which supposeth further in nature a reason, understanding, and platform. But the difference, perspicuously expressed, is most familiar and sensible. For as we divided natural philosophy in general into the inquiry of causes and productions of effects, so that part which concerneth the inquiry of causes we do subdivide according to the received and sound division of causes. The one part, which is physic, inquireth and handleth the material and efficient causes; and the other, which is metaphysic, handleth the formal and final causes.

(4) Physic (taking it according to the derivation, and not according to our idiom for medicine) is situate in a middle term or distance between natural history and metaphysic. For natural history describeth the variety of things; physic the causes, but variable or respective causes; and metaphysic the fixed and constant causes.

“Limus ut hic durescit, et hæc ut cera liquescit,
Uno eodemque igni.”

Fire is the cause of induration, but respective to clay; fire is the cause of colliquation, but respective to wax. But fire is no constant cause either of induration or colliquation; so then the physical causes are but the efficient and the matter. Physic hath three parts, whereof two respect nature united or collected, the third contemplateth nature diffused or distributed. Nature is collected either into one entire total, or else into the same principles or seeds. So as the first doctrine is touching the contexture or configuration of things, as *de mundo, de universitate rerum*. The second is the doctrine concerning the principles or originals of things. The third is the doctrine concerning all variety and particularity of things; whether it be of the differing substances, or their differing qualities and natures; whereof there needeth no enumeration, this part being but as a gloss or paraphrase that attendeth upon the text of natural history. Of these three I cannot report any as deficient. In what truth or perfection they are handled, I make not now any judgment; but they are parts of knowledge not deserted by the labour of man.

(5) For metaphysic, we have assigned unto it the inquiry of formal and final causes; which assignation, as to the former of them, may seem to be nugatory and void, because of the received and inveterate opinion, that the inquisition of man is not competent to find out essential forms or true differences; of which opinion we will take this hold, that the invention of forms is of all other parts of knowledge the worthiest to be sought, if it be possible to be found. As for the possibility, they are ill discoverers that think there is no land, when they can see nothing but sea. But it is manifest that Plato, in his opinion of ideas, as one that had a wit of elevation situate as upon a cliff, did descry that forms were the true object of knowledge; but lost the real fruit of his opinion, by considering of forms as absolutely abstracted from matter, and not confined and determined by matter; and so turning his opinion upon theology, wherewith all his natural philosophy is infected. But if any man shall keep a continual watchful and severe eye upon action, operation, and the use of knowledge, he may advise and take notice what are the forms, the disclosures whereof are fruitful and important to the state of man. For as to the forms of substances (man only except, of whom it is said, *Formavit hominem de limo terræ, et spiravit in faciem ejus spiraculum vitæ*, and not as of all other creatures, *Producant aquæ, producat terra*), the forms of substances I say (as they are now by compounding and transplanting multiplied) are so perplexed, as they are not to be inquired; no more than it were either possible or to purpose to seek in gross the forms of those sounds which make words, which by composition and transposition of letters are infinite. But, on the other side, to inquire the form of those sounds or voices which make simple letters is easily comprehensible; and being known induceth and manifesteth the forms of all words, which consist and are compounded of them. In the same manner to inquire the form of a lion, of an oak, of gold; nay, of water, of air, is a vain pursuit; but to inquire the forms of sense, of voluntary motion, of vegetation, of colours, of gravity and levity, of density, of tenuity, of heat, of cold, and all other natures and qualities, which, like an alphabet, are not many, and of which the essences (upheld by matter) of all creatures do consist; to inquire, I say, the true forms of these, is that part of metaphysic which we now define of. Not but that physic doth make inquiry and take consideration of the same natures; but how? Only as to the material and efficient causes of them, and not as to the forms. For example, if the cause of whiteness in snow or froth be inquired, and it be rendered thus, that the subtle intermixture of air and water is the cause, it is well rendered; but, nevertheless, is this the form of whiteness? No; but it is the efficient, which is ever but *vehiculum formæ*. This part of metaphysic I do not find laboured and performed; whereat I marvel not; because I hold it not possible

to be invented by that course of invention which hath been used; in regard that men (which is the root of all error) have made too untimely a departure, and too remote a recess from particulars.

(6) But the use of this part of metaphysic, which I report as deficient, is of the rest the most excellent in two respects: the one, because it is the duty and virtue of all knowledge to abridge the infinity of individual experience, as much as the conception of truth will permit, and to remedy the complaint of *vita brevis, ars longa*; which is performed by uniting the notions and conceptions of sciences. For knowledges are as pyramids, whereof history is the basis. So of natural philosophy, the basis is natural history; the stage next the basis is physic; the stage next the vertical point is metaphysic. As for the vertical point, *opus quod operatur Deus à principio usque ad finem*, the summary law of nature, we know not whether man's inquiry can attain unto it. But these three be the true stages of knowledge, and are to them that are depraved no better than the giants' hills:—

“Ter sunt conati imponere Pelio Ossam,
Scilicet atque Ossæ frondsum involvere Olympum.”

But to those which refer all things to the glory of God, they are as the three acclamations, *Sante, sancte, sancte!* holy in the description or dilatation of His works; holy in the connection or concatenation of them; and holy in the union of them in a perpetual and uniform law. And, therefore, the speculation was excellent in Parmenides and Plato, although but a speculation in them, that all things by scale did ascend to unity. So then always that knowledge is worthiest which is charged with least multiplicity, which appeareth to be metaphysic; as that which considereth the simple forms or differences of things, which are few in number, and the degrees and co-ordinations whereof make all this variety. The second respect, which valueth and commendeth this part of metaphysic, is that it doth enfranchise the power of man unto the greatest liberty and possibility of works and effects. For physic carrieth men in narrow and restrained ways, subject to many accidents and impediments, imitating the ordinary flexuous courses of nature. But *latae undique sunt sapientibus viæ*; to sapience (which was anciently defined to be *rerum divinarum et humanarum scientia*) there is ever a choice of means. For physical causes give light to new invention in *simili materia*. But whosoever knoweth any form, knoweth the utmost possibility of superinducing that nature upon any variety of matter; and so is less restrained in operation, either to the basis of the matter, or the condition of the efficient; which kind of knowledge Solomon likewise, though in a more divine sense, elegantly describeth: *non arctabuntur gressus tui, et currens non habebis offendiculum*. The ways of sapience are not much liable either to particularity or chance.

(7) The second part of metaphysic is the inquiry of final causes, which I am moved to report not as omitted, but as misplaced. And yet if it were but a fault in order, I would not speak of it; for order is matter of illustration, but pertaineth not to the substance of sciences. But this misplacing hath caused a deficiency, or at least a great improficiency in the sciences themselves. For the handling of final causes, mixed with the rest in physical inquiries, hath intercepted the severe and diligent inquiry of all real and physical causes, and given men the occasion to stay upon these satisfactory and specious causes, to the great arrest and prejudice of further discovery. For this I find done not only by Plato, who ever anchoreth upon that shore, but by Aristotle, Galen, and others which do usually likewise fall upon these flats of discoursing causes. For to say that “the hairs of the eyelids are for a quickset and fence about the sight;” or that “the firmness of the skins and hides of living creatures is to defend them from the extremities of heat or cold;” or that “the bones are for the columns or beams, whereupon the

frames of the bodies of living creatures are built;" or that "the leaves of trees are for protecting of the fruit;" or that "the clouds are for watering of the earth;" or that "the solidness of the earth is for the station and mansion of living creatures;" and the like, is well inquired and collected in metaphysic, but in physic they are impertinent. Nay, they are, indeed, but *remoras* and hindrances to stay and slug the ship from further sailing; and have brought this to pass, that the search of the physical causes hath been neglected and passed in silence. And, therefore, the natural philosophy of Democritus and some others, who did not suppose a mind or reason in the frame of things, but attributed the form thereof able to maintain itself to infinite essays or proofs of Nature, which they term fortune, seemeth to me (as far as I can judge by the recital and fragments which remain unto us) in particularities of physical causes more real and better inquired than that of Aristotle and Plato; whereof both intermingled final causes, the one as a part of theology, and the other as a part of logic, which were the favourite studies respectively of both those persons; not because those final causes are not true and worthy to be inquired, being kept within their own province, but because their excursions into the limits of physical causes hath bred a vastness and solitude in that tract. For otherwise, keeping their precincts and borders, men are extremely deceived if they think there is an enmity or repugnancy at all between them. For the cause rendered, that "the hairs about the eyelids are for the safeguard of the sight," doth not impugn the cause rendered, that "pilosity is incident to orifices of moisture—*muscosi fontes*, &c." Nor the cause rendered, that "the firmness of hides is for the armour of the body against extremities of heat or cold," doth not impugn the cause rendered, that "contraction of pores is incident to the outwardest parts, in regard of their adjacence to foreign or unlike bodies;" and so of the rest, both causes being true and compatible, the one declaring an intention, the other a consequence only. Neither doth this call in question or derogate from Divine Providence, but highly confirm and exalt it. For as in civil actions he is the greater and deeper politique that can make other men the instruments of his will and ends, and yet never acquaint them with his purpose, so as they shall do it and yet not know what they do, than he that imparteth his meaning to those he employeth; so is the wisdom of God more admirable, when Nature intendeth one thing and Providence draweth forth another, than if He had communicated to particular creatures and motions the characters and impressions of His Providence. And thus much for metaphysic; the latter part whereof I allow as extant, but wish it confined to his proper place.