

Aristotelous peri psyches = Aristotle on the vital principle / translated from the original text, with notes by Charles Collier.

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1855-7
ARISTOTLE

ON THE VITAL PRINCIPLE.

Translated from the original Text;

WITH NOTES BY

CHARLES COLLIER, M.D., F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,
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Διόδοτος πάλιν ἴδια μὲν τινα τοῦ λογικοῦ φησι τῆς ψυχῆς πάθη, ἴδια δὲ τοῦ συμφυοῦς καὶ ἀλόγου εἶναι, ῥιπταζόμενος ἐπὶ πάντα καὶ ψηλαφῶντι προσεικῶς τὰς διαφοράς.

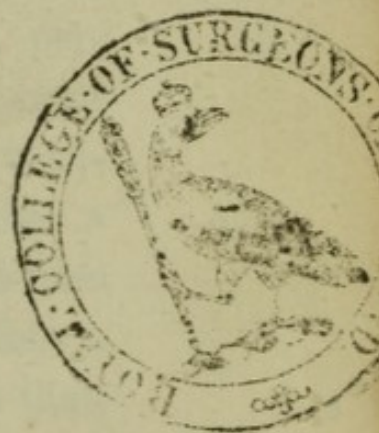
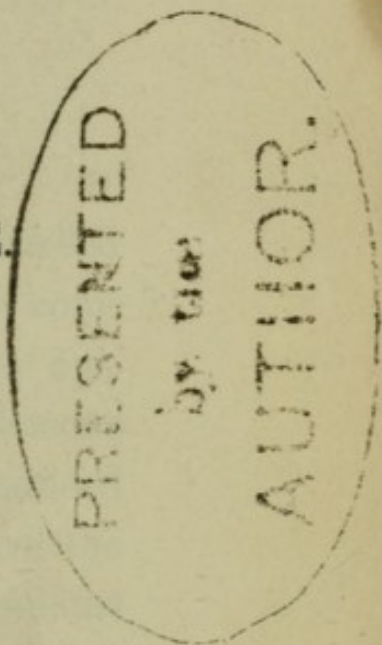
Πλουτάρχου λείψανα περὶ ψυχῆς.

Cambridge:

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LONDON: D. NUTT.

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ON THE VITAL PRINCIPLE

Translated from the original Latin

BY JAMES COLLIER, M.D.

Author of "The Principles of Life" and "The Principles of Health"

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P R E F A C E.

HAVING, after careful study of this Treatise, been led to the conclusion that Aristotle's object, in its composition, was to put before the world his own opinions as well as those of former and contemporaneous writers upon the Vital Principle, I have been induced to undertake a translation of it, in order to give the general reader the theories, hypotheses, and opinions which prevailed, at that early period of natural and physiological knowledge, upon life and its manifestations. The Treatise, indeed, records all the prevailing opinions upon living beings and sentient properties, which lie scattered through Aristotle's other physiological writings; and it displays, perhaps more than any other of his works, the extent of his knowledge, and the perspicacity of his intellect. Should it, however, be questioned whether a work, composed at a time when the special sciences pertaining to its subject were yet in their infancy, can be now of any value, it might be answered that, irrespective of any positive result, an interest must ever be taken in the investigation, truthfully conducted, of nature's operations; and that this, brief

as it is, comprises many of the dogmata, of an otherwise enlightened age, upon the more abstruse topics of natural philosophy and physiology.

It is scarcely necessary to observe, that several versions of this Treatise are extant, but as they have been written under an impression that its design is rather psychological than physiological, this misapprehension has tended to vitiate, or render unintelligible what otherwise, as literary productions, might have done justice to the original. Some of the translators, besides, seem to have been but imperfectly acquainted with physiology, and this want of preliminary knowledge has sometimes led to a misapprehension of the text, and sometimes to an inadequate appreciation of what could be only suggestive. Thus, the causes which have contributed to make the text abstruse, and even in places unintelligible, have concurred in making the translations obscure, and occasionally incomprehensible; for besides indications of imperfect anatomical knowledge, the arguments in the Treatise can be regarded but as suggestions, and be elucidated only by reference to the more matured science of modern times. It cannot derogate from what is due to Aristotle, to admit that physiology, in his age, was not only encumbered with the hypotheses of earlier schools, but also dwarfed and distorted by imperfect acquaintance with those systems and organs of the living body, which

he perceived, intuitively, to be necessary to a full comprehension of his subject. But although the opinions and conjectures of this Treatise may, from the advanced state of anatomy and physiology, have but little intrinsic value, the method adopted by Aristotle may not be undeserving the attention of those who, with a wider range of special knowledge, are better prepared for the undertaking; unless, indeed, the Vital Principle is to be set down among those final causes, which, lying beyond the human comprehension, are to be admitted as ultimate facts. Although this may be the case, however, some interest must be taken in a Treatise which is, not only indicative of Aristotle's style and mode of argument, but pregnant also, by allusion, with collateral information.

This version has been made with the intention of rendering it, in so far as the analogies of language would allow, a faithful transcript of the opinions and manner of Aristotle; and notes are added for the elucidation of passages which by no periphrasis could be made intelligible to the general reader. It may be observed that the mind, (*ὁ νοῦς*), although nowhere defined, appears, in this Treatise, to represent the abstract immaterial principle usually attributed to the *ψυχή*; for it alone is excluded from all direct participation in corporeal functions or changes.

Although the title given to this version embodies, as I believe, Aristotle's idea, yet it is not pretended that the writers cited by him always employed the term $\psi\upsilon\chi\eta$ in his sense; or even that he, himself, was always consistent in the use of it. Plato was certainly not engaged upon material agencies or properties in his *Phædo*, and in the *Timæus*, which partakes of a physiological character, and as such has been criticised in this Treatise, the animating motor principle is treated of rather as an abstraction than as the originating and natural cause of life, through all its manifestations. The term Vital Principle, however, has been retained throughout, even where it may seem to be less apposite, as well to avoid the misapprehension which might be occasioned by the substitution of another term, (that of *soul* I mean,) which might then to some appear to be its synonym, as on account of the extreme difficulty of determining the point where the metonymy might, without question, be adopted.

This Translation is from the Oxford edition, collated with that of Trendelenburg; and this allusion to that eminent scholar affords me the opportunity of acknowledging the assistance which has been derived from his comments upon passages, which require, for elucidation, all the light that can be thrown upon them by tradition and learning.

INTRODUCTION.

As this treatise may interest some who have never considered the subject for the elucidation of which it was composed, it will be well to offer a summary of that which Aristotle had undertaken to delineate, and to give, at the same time, an epitome of the opinions which, in modern times, have been entertained concerning it.

It is then that principle, which, inherent in genial matter, establishes functions distinctive of animated beings; and those functions are *nutrition*, and, through *nutrition*, *growth* or *development*, within a certain prescribed range, and *absorption* or rather change wrought by *absorption*, that is, *decay*. These two functions constitute, in fact, animated beings, and distinguish them broadly from whatever is inanimate; and as those functions are inherent in the simplest

forms of being, it is in such that we might expect to find a clue to the nature of that something which, whether entity or mere quality, confers upon living matter its distinctive properties. But whether we examine a seed before development, or watch the rudimental forms of life, that something lies shrouded in matter which, although to appearance inanimate, is yet, through its influence, under genial conditions, capable of developing into a perfect being; and of resisting, for a stated time, the agency of surrounding elements. Thus, *growth* and *development* with their antagonisms *absorption* and *decay*, effected through the actions of the material framework of living beings, constitute, essentially, *life*; and the subject of this essay is that something which gives to matter those attributes. The processes, then, of *reproduction*, *growth*, and *decay*, that is, *generation*, *life*, and *death*, are the essential characteristics of living beings, and conferred upon them, as has been said, by *that something* which is designated *Vital Principle*.

Now, to homogeneous forms and solitary functions others of more complex nature are superadded, and these give rise to that long chain of being of which man may be regarded as the head; but yet, amid all the simplicity of organs, of action, and of reaction, those two functions still prevail, and constitute life,

whatever the type of being, in its strictest signification. This is the teaching of Aristotle, as it is the doctrine of modern physiologists; and those functions are always here referred to as the essential conditions of whatever is animated, although, for higher forms of being, other organs and functions are required. The nature, however, of the essence or principle which originates and orders those living functions is hitherto for us, as it was for Aristotle, inscrutable; and it may be that the wide survey which he took of life, by complicating simple functions with sentient and even intellectual faculties, tended only to disturb and pervert the course of his inquiry. But whether Aristotle's mode of inquiry was or not faulty, and whether the principle which animates the world (it may be the universe) is or not among those causes which are inscrutable, it will be ever a topic of deep interest to the learned and the thoughtful of every age.

In an opening chapter, Aristotle has in so clear and succinct a manner reviewed the prevailing doctrines and opinions as well of his own as of a preceding age, that that summary may be regarded as the exposition of all that was then most authoritative; and as, from that time, physiology may be said to have declined, it would be almost supererogatory to

allude to any other writer before the rise of modern science. It may be mentioned, however, in deference to the name, that Cicero¹ has alluded, with a just appreciation of Aristotle's superiority, to this treatise; but as the topic was foreign to his pursuits and little in accordance with his talents, we cannot be surprised if he mistook the scope of the design, and perverted thereby the tendency of the argument.

This treatise is, it may be added, both an introduction and a sequel to the other physiological treatises of Aristotle; and, as it treats of all the characteristics of living beings, it may contribute to a clearer understanding of them, as they, in their turn, may serve to elucidate it; for they all proceed from the same hand, maintain the same doctrines, and emanate from the same laborious and original intellect.

This topic engaged the attention of eminent anatomists and physiologists towards the opening of the present century, and their writings will shew the opinions entertained by the moderns concerning it; but it has, generally, been made an incidental rather than a special subject of inquiry, a prelude, as it were, to the teaching of anatomy and physiology. The opinions entertained concerning vital principle

¹ *Tusc. Disp. Lib. I. I.*

by the eminent men here alluded to (Hunter and Barclay, Bichât and Cuvier) may well be collated with those of Aristotle, who wrote at a time when science was in its infancy, and when, for profitable investigation, he had to depend almost exclusively, amid so much hypothesis, upon his own laborious and perspicacious intellect.

In quoting those writers, there is hardly occasion for observing any order of precedence, as they flourished about the same time, and contributed equally to the present development of physiological science.

According to Hunter¹, "Animal matter is endowed with a principle called, in common language, *life*. This principle is perhaps conceived of with more difficulty than any other in nature, which arises from its being more complex in its effects than any other; and it is, therefore, no wonder that it is the least understood. But, although life may appear compounded in its effects in a complicated animal like man, it is as simple in him as in the most simple animal, and is reducible to one simple property in every animal." In another paragraph, he adds, "the first and most simple idea of life is its being the principle of self-preservation, by its preventing

¹ *On Vital Principle.*

matter from falling into dissolution—for dissolution immediately takes place when matter is deprived of it; the second is its being the principle of action. These are two very different properties, though they arise from the same principle.”

Barclay¹ observes that, “in every living organized structure there is plainly a power that preserves, regulates, and controls the whole; directing, at first, the different processes in forming one part of the organs, afterwards employing the assistance of the organs which it has formed to produce more, till at last it completes the whole of the system in such a manner as to suit its future conveniences and wants. This power, or rather this agent, physiologists have named *Vital Principle*; though not a few are inclined to suppose it to be the effect, rather than the cause, of the organization. But in all operations that are performed without either volition or consciousness, it appears subordinate to a much higher power—to that Almighty and Omniscient Being, who dispenses his laws to the boundless Universe, and whose laws, except by himself, can never be improved, altered, or abrogated.”

Bichât² makes *Vital Principle* to be “the assemblage of the functions which resist death;” and this

¹ Introduction to Anatomical Nomenclature.

² *La Vie et la Mort*.

definition was adopted substantively by Cuvier, who, in his introductory lecture to the "Comparative Anatomy," has illustrated the influences of this assumed principle, by a description, alike graphic and beautiful, of what takes place when it has been withdrawn or extinguished. "If¹," he observes, "in order to have a correct idea of life, we consider it in simple forms of being, we shall soon perceive that it consists in the faculty possessed by particular corporeal combinations of lasting for a given time and under a determined form; of attracting, incessantly, into their composition a portion of the surrounding substances, and in giving back to the elements portions of their own substance. So long as this series of movements is maintained, the body, in which it is manifested, is a living body; and when it is irrecoverably arrested it is dead."

But although the definition of Bichât involves a great truth, and is a summary of all that has been ever said upon the subject, it is open to the criticism of M. Magendie, that, by its admitting the idea of *death*, it presupposes *life*, and thus establishes a vicious circle of reasoning. It is criticised also by M. Comte², as a *fancied antagonism* between animate and inanimate matter, a *chimerical struggle* between

¹ *Règne Animal.*

² *Science Biologique.*

living beings and surrounding influences; for "the idea of life," he observes, "presupposes something able to live, and it requires no less a certain assemblage of external influences for its fulfilment."

The nature of Vital Principle, then, is still for us, as it was for Aristotle, a great mystery; and as opinions upon it are at best but speculations, we may proceed, without further comment, to the text, which, besides miscellaneous matter, will be found to contain suggestions for reflexion and inquiry.

PRELUDE TO CHAPTER I.

THIS chapter is an elaborate statement of the subject as well as the object of the inquiry. The term $\psi\upsilon\chi\acute{\eta}$, here rendered "Vital Principle," has several significations, as was observed in the preface, in the course of this and the other physiological treatises: in one passage, it implies the *life of an animal*; in another, the *nutritive function*; in another, a *vital part*; in another, a *motor force*; and in another, the *visual power* ($\tau\omicron\upsilon\acute{\nu}$ ὄμματος ἢ $\psi\upsilon\chi\acute{\eta}$ ¹); some writers, besides, derived the term $\psi\upsilon\chi\eta$ from $\psi\upsilon\chi\rho\acute{o}s$ or $\psi\upsilon\chi\acute{o}s$, *coolness* or *cold*, because respiration was held to be a cooling process, and as such essential to life. The object of Aristotle, then, in this treatise, was to learn the nature of that essence or principle which, under whatever denomination, is the innate source of *motion*, and, consequently, of vital actions *in all bodies capable of being animated*; for although, in the more complicated forms of being, it is involved in

¹ De Sensu et Sens. II. 16.

the manifestation of perceptions and passions, its great office still is to originate, to maintain, and to perpetuate life, through all its gradations. It may be that, from some such conclusion, Aristotle was led to regard the vital principle as inferior in destiny and office to the faculty which he has designated¹ mind (*ὁ νοῦς*), and made to be impassive, homogeneous, apart from, and independent of, the body. These opinions have much in common with those adopted by Plato in the *Timæus*; as, while, in that most beautiful and intellectual disquisition, the senses, appetites, and passions, the mortal framework, that is, of the sentient being, are located about the heart and liver,—the intellectual faculty, that which is divine, and intended to direct and control the animal powers, is placed in the head. The life is represented, in fact, by *ψυχή*, which is bound up with corporeal functions and appetites; and reason by *νοῦς*, which, if any where, is, “as the divine seed of wisdom,” in the brain; and, being homogeneous, does not depend, for existence, upon the life of the body. These few words will suffice to shew that there is an analogy between the two systems of physiology and psychology.

¹ De An. I. 4; I. 5; III. 4, 6.

BOOK THE FIRST.

CHAPTER I.

IT may be assumed that all knowledge is beautiful and estimable; but as one branch may be more so than another, either because of the exactness which is requisite for its examination, or from its treating of objects more exalted and wonderful than any others, so, on both these accounts, we may reasonably assign the first place to an inquiry into Vital Principle. For the knowledge of it promises to contribute largely to all truth, and most especially to truth in relation to nature, since it is the origin, as it were, of living beings. The object of our inquiry, then, is to study and ascertain its nature and its essence, as well as its accidents, of which some seem to be its own peculiar affections, and some to belong to living beings, as original properties, through it.

Let us premise, however, that the attempt to attain to any certainty with respect to it is beset with almost insuperable difficulties; for as this has much in

common with many other inquiries, with every inquiry, I mean, instituted for ascertaining the essence and the thing itself, it might hastily be supposed that, as demonstration is the method for studying particular bodies in their accidents, there may be some one special method of investigation when our object is to learn what is the essence of a thing, and that that method ought to be sought for on this occasion. If, however, there is no one common method for ascertaining what any thing in itself is, the systematic treatment of our subject is rendered still more difficult; for, in that case, it will be necessary to adopt, for each particular subject, some one particular method. Although it may be manifest, besides, that the inquiry should be by some kind of demonstration, or division, or other method, there will still remain many difficulties and many liabilities to error in fixing upon the principles from which the inquiry should set out; for the principles of different subjects differ, as those of number are not those of plane surfaces.

It may be well, perhaps, before proceeding further, to distinguish the "*genus*" to which Vital Principle belongs, and determine what it is—determine, I mean, whether it is a *something* and *essence*, or *quantity*, or *quality*, or any other of the classified *categories*; as also, a distinction of no small importance, whether it is among entities in *potentiality*, or whether rather it is a *reality*. We have to consider too whether

Vital Principle is divisible or without parts, and whether every Vital Principle is or is not the same in kind, and, if not the same, whether the difference is generic or specific; but they who now are engaged in discussing and exploring Vital Principle seem to give exclusive attention to that of man. We must be on our guard against this, however, so that it may not escape us whether there is but one definition for Vital Principle as for *animal*, or whether it must be different for each creature, as for a horse, a dog, or a man. The term *animal*, besides, taken in an universal sense, is either without meaning, or of very secondary value; and so equally is every other *common term* which might be predicated of this subject. If, on the other hand, there are not several Vital Principles, but parts only of a single Principle, we have to settle whether we should commence the inquiry with the Principle as a whole, or, contrariwise, with its parts; and, with respect to the parts, it is difficult to determine which of them have been constituted differently from others; it is difficult also to say whether we should study the parts before their functions, as the *mind* before thought, or *sensibility* before sensation; and so for other faculties and functions. If it be expedient to commence the inquiry with functions, it may be a question whether it would not be better here also to study first their opposites; as the object of perception before that which perceives, and thought

before that which thinks. Now, the knowledge of any thing in itself seems to be useful towards a right conception of the causes of the accidents in substances; as, in mathematics, the knowledge of straight and curve, line and surface, is requisite for perceiving to how many right angles the angles of the triangle are equal. But the knowledge of the accidents contributes, largely, in its turn, towards knowing what the thing, essentially, is; for whenever we may be able, from the appearance of any substance, to recount the whole or the greater number of its accidents, we are then best prepared to say what its essence is. Thus, the essence is the proper beginning for every demonstration, so that all the definitions, which do not make known, or make it easy to conjecture what may be the accidents of any substance, are to be regarded as dialectic and unprofitable subtleties.

It is difficult to determine whether all the emotions of Vital Principle are common to it and its recipient, or whether some one emotion belongs to it exclusively; and this is a question, which, although not easily settled, it is necessary to entertain. There is scarcely one of the many emotions which are derived from the Vital Principle, (as anger, or courage, desire, or feeling,) in the manifestation of which the Vital Principle can be said to be affected, actively or passively, without the body; the faculty of thought seems to be the peculiar property of the Vital Prin-

principle, but whether thought be imagination of some kind, or never unaccompanied by imagination, still we must admit that it cannot be exercised without the body. If, then, there is any one function or emotion which is peculiar to the Vital Principle, we should admit that it might be isolated from the body; but, if no one belongs to it, exclusively, then we say that it cannot be separate from one. But, just as many accidents concur in the quality straightness, in so far as straightness (as, for instance, among others, to touch a brazen sphere at a point, which, were it apart from some kind of body, it could not do), so straightness is inseparable from a body, since it is ever found together with one. In the same way all the emotions of the Vital Principle (such as courage, gentleness, fear, pity, daring, joy, love and hatred,) seem to be manifested together with the body; for the body is affected, simultaneously, by them. As evidence of which, there are times when we are neither excited nor alarmed, although misfortunes may be trying and palpable, while, at other times, when the body is plethoric, or in a state akin to that of anger, we are moved by incidents which are trivial and unimportant. And what makes this yet more apparent is, that, at times, without the occurrence of aught to occasion alarm, we are thrown into the state of persons under terror; and if this be true, it is clear that all such emotions are material conditions. So

that the definition of any one of them, as that of anger for example, may be said to be the *motion of a body of particular nature, or part or function of a body, by such a cause, and for such an end.*

Thus, for these reasons, it is for the physiologist to study the Vital Principle, either as a whole, or under some particular manifestation. But the physiologist and the metaphysician would differ widely in their definition of any one of those emotions, as that of anger, for example; which, while the latter would hold to be desire for retaliation, or some such motive, the former would maintain to be ebullition of blood, or excess of heat about the heart. The one of these, in fact, accounts for the passion by the matter, and the other by the form and cause; for the form is the cause of the thing, which, if it is to be, must, of necessity, be in a special matter. Thus, the cause of a house, for instance, is such as this—"to be a shelter to avert injury from rain, wind, and heat;" and here the physiologist will speak of stones, bricks, and rafters, while the metaphysician will, in these materials, only behold the form to be adopted for those purposes. Which, then, of these is the physiologist? Is it he who studies only the matter without reference to the cause, or he who is occupied with the cause only? Or is it rather he who judges both from cause and matter; and which of the two is he? May we not however rather say that there is one who is

engaged upon the properties which are inseparable and only in so far as they are inseparable from matter, while to the physiologist it belongs to judge of such emotions and functions as emanate from particular bodies and peculiar matter? Properties different from these belong to another; and some of them to an artisan, a physician or builder, as the case may be, while the mathematician has to do with properties which are not inseparable from matter, but which, as they do not belong to any particular body, admit of being treated as abstractions; and abstract qualities, as abstractions, belong to the transcendental philosopher.

Let us, however, return to the point where our discussion broke off, and repeat that the emotions of Vital Principle, such as anger and fear, for instance, in so far as they are innate, are inseparable from the material frame-work of animals; and that they are not to be regarded as a *line* or a *surface*.

PRELUDE TO CHAPTER II.

THIS chapter is a review of the opinions of earlier and contemporaneous writers upon the Vital Principle, and as Aristotle has never failed at the outset of each subject of inquiry to record the principal writers upon it, he may be regarded as the founder of tradition in science. The writers here cited may be divided into those who made motion, and those who supposed feeling to be the essential characteristic of that which imparts life to matter ; although there were some who attributed to it both motion and feeling.

CHAPTER II.

AS we are now entering upon the study of Vital Principle, and are encompassed with doubts which ought to be resolved, it will be incumbent upon us to gather the opinions of such of the earlier writers as have suggested any thing concerning it, in order that we may be able as well to adopt their happier conceptions as to be on our guard against their errors.

The suitable opening for this inquiry into the Vital Principle is to lay down the properties which appear, most especially, to belong to it. The animated being, then, seems to be especially distinguished from whatever is inanimate by the two properties of motion and feeling; and these two are almost the only distinctions which have been transmitted to us by the earlier writers upon the subject. Thus, some of them maintain that the Vital Principle is in the largest, fullest sense a motor power; and as they believed that nothing can impart motion unless it be self-motive, they assumed that the Vital Principle must be among beings which are self-moved. Hence Democritus says that it is a kind of fire and heat, and as forms and atoms are, according to him, infinite, he speaks of those which are spherical and apparent in the sun's beams, while passing through chinks in doors, as fire and Vital Principle; and further says, that those atoms, collectively, are the elements of universal nature. Leucippus, in like manner, is disposed to regard the spherical atoms as Vital Principle, both on account of those forms being best adapted for penetrating every where, and best able, from being self-motive, to give motion to other things; and thus they both assume that it is Vital Principle which imparts motion to living beings. Hence, too, they make breathing to be the boundary of life—for they maintain that the envelopment of animal bodies

crushes by its contraction those forms of atoms which, from never being at rest, give motion, and that compensation is afforded for their exit by the entrance of other like forms, during inspiration; and that these forms, while entering, resist the contracting and solidifying power, and preclude the expulsion of all the atoms which are essential to life. They further maintain that animals can live only so long as they can support this process. The opinion adopted by the Pythagoreans seems to be to the same purport—for some of them have maintained that Vital Principle is the motes in the air, and others that it is that which gives motion to the motes; and it has thus been said of those corpuscles, because of their appearing to be constantly moving, although the air may be quite still.

To the same point do they also come who say that the Vital Principle is self-motive; for all these philosophers seem to have assumed that motion is the most characteristic property of the Vital Principle; and that, while all other things are moved by it, it is self-moved, and the more so, as they do not see any motor which is not self-moved.

Anaxagoras, in like manner, says that the Vital Principle is a motive force, and the same opinion may be attributed to any one who, with him, may have maintained that the mind has given motion to the universe; and yet his opinion is not altogether in

accordance with that of Democritus. Democritus, in fact, maintains that *Vital Principle* and *mind* are absolutely identical; that the *apparent is the true*; and that Homer, therefore, has done well in representing Hector as "changing his mind while he lay." Thus he does not employ the term *mind* as a faculty for the attainment of truth, but makes mind to be identical with the Vital Principle. Anaxagoras is less explicit upon these points; for, in many places, he speaks of *mind* as the source of the beautiful and the true, while, elsewhere, he says that it is identical with the Vital Principle, and innate in all creatures, larger or smaller, higher or lower, in the scale of being; but it is manifest that mind, in the sense of intellect, is not equally allotted to all animals, nor even to all men.

Thus they who have looked upon living beings with respect to motion, have assumed that the Vital Principle is the most motive of entities, and so many as have looked upon them with respect to knowledge and sentient perception, have said that the Vital Principle comprises all first causes; of which, while some admit of several, others maintain that there is only this one. Empedocles, for instance, seems to maintain that the Vital Principle is derived from all the elements, and that each element is Vital Principle, as he says that "*by earth we perceive earth, by water water, by air air, by fire destructive*

fire, by attraction attraction, and by repulsion dire repulsion."

Plato, in a like manner, in the *Timæus*, derives the Vital Principle from the elements—for *like*, therein, is known by *like*, and things are derived from first causes; and so, likewise, have things been defined by him in the treatises "upon philosophy." According to them, animal, in itself, is derived from the abstract idea of unity, and primal length, and breadth, and depth; and other things in a somewhat similar manner. It is besides maintained, but in a different sense, that the mind is unity, and knowledge duality, although, as one branch, it is unity; and that the number of the surface is opinion, that of the solid sensation, for numbers were spoken of by him as forms and first causes, and as derivatives from the elements. Thus, some things are discriminated by mind, some by knowledge, some by opinion, and others by sensation; as the numbers which represent those faculties are the *forms of things*.

Since the Vital Principle has to some appeared to be both motive and capable of knowing, there are writers who have combined motion and intelligence, and then represented the Vital Principle as a number endowed with self-motion.

Philosophers differ with respect to first causes, both as to their nature and number; but they who make them corporeal differ most from those who hold

them to be incorporeal; and from these again they differ who make them to be a combination both of corporeal and incorporeal molecules. They differ also with respect to the number of such causes, as some adopt only one while others admit of several; and, in accordance with these conclusions, they form their estimate of the Vital Principle; but yet they have all assumed, and not unreasonably, that it is of the nature of *first* causes to be motive. Hence, the Vital Principle has to some appeared to be fire, as fire, besides being the most attenuated and most incorporeal of the elements, is both self-motive and a primal cause of motion in other things.

Democritus has expressed himself more clearly than any other writer in specifying the causes of each of those properties: for he says that the Vital Principle is identical with the mind, and to be placed among primal and indivisible bodies; that it is motive, owing to the tenuity of its parts and its form; that of forms the spherical is the most mobile, and that this is the form both of *mind* and *fire*.

Anaxagoras seems, as we have already said, to distinguish the mind from the Vital Principle, although he employs both terms as if synonymous; excepting that he sets down the mind as being, in the fullest sense, the origin of all things. Thus he says that the mind alone of all entities is homogeneous, unmixed, and pure; and to the same principle he attributes

the properties both of knowing and imparting motion, as he maintains that it is the mind which has given motion to the universe.

Thales, too, from what has been recorded of him, seems to have assumed that the Vital Principle is something motive, since he said that the loadstone must have a Vital Principle because it gives motion to iron.

Diogenes, together with some other writers, held the Vital Principle to be air, because air was believed to be the most attenuated of the elements, as well as an originating cause; and that, through these properties, the vital principle is able both to recognise things and to impart motion to them. They argued that Vital Principle, as being a first cause and the origin of other things, is able to recognise them; and that, as being the most attenuated of entities, it is motive.

Heraclitus also maintains that the Vital Principle is a *first cause*, since, in his system, it is the exhalation out of which he constitutes every thing else; he regards it too as the most incorporeal of entities, and as being "in a constant state of flux;" and further says, that the moved must be known to the motor. He agreed, in fact, with most others in believing all things to be in motion.

The opinions of Alcmaeon upon the Vital Principle seem to be very like those just cited—for he says that it is immortal, on account of its resemblance to the

immortals, and that this resemblance is manifested by its being continuously in motion; for all divine bodies, he argues, the moon, sun, stars, and heavens, are continuously moving.

Some writers of smaller pretension—and Hippo was one of them—have ventured to represent the Vital Principle as water; and they seem to have been led to this persuasion by the nature of semen, which, in all creatures, is *fluid*. Hippo, indeed, reproves those who assert that the Vital Principle is blood, because blood is not semen; and semen is, according to him, the first principle of life.

Others have maintained, as did Critias, that the Vital Principle is blood, from their assuming that the most peculiar property of blood is feeling, and that feeling is imparted to us through the nature of blood. All the elements, in fact, have had their partisans, excepting *earth*; and no one has adopted it, unless such an opinion may be attributed to those who have *derived* the Vital Principle from all, *or made it to be all the elements*.

Thus, all these philosophers define Vital Principle by the three properties, motion, feeling, and incorporeity, each of which is referrible to first causes. Such of them, therefore, as define it by the faculty of knowing, make it to be an element or a derivative from the elements, and, with one exception, their opinions coincide;—for they all maintain that like is

known to like, and, since the Vital Principle recognises all things, they constitute it out of all *first causes*. But such as admit of only one cause and one element, set down Vital Principle as being that one, be it fire or air; and such as admit of several *first causes*, set down Vital Principle as being multiple also. Anaxagoras stands alone in maintaining that mind is impassive and without anything in common with aught else; but, even were it so, he has not explained, nor is it easy from what he has said to explain, how or for what purpose it is to recognise anything. So many writers as admit *contraries* among *first causes*, constitute the Vital Principle out of contraries, and so many as admit only one contrary, whether hot or cold, or other analogous contrast, make the Vital Principle to be that one. Hence, led by the terms, some maintain that Vital Principle is *heat*, because from *heat* the term *life* has been adopted; and others affirm that it is *cold*, because from *cold*, through respiration, the term Vital Principle has been derived.

Such, then, the opinions which have been transmitted to us upon Vital Principle, and such the reasons upon which those opinions have been grounded.

PRELUDE TO CHAPTER III.

THIS chapter is upon motion, and its purport is to learn whether the Vital Principle is in motion or at rest, and if in motion, whether self-moved or in motion imparted to it ; its object is also to inquire whether motion proceeds directly from Vital Principle, whether, that is, it impels to move while it is itself at rest, or whether it imparts to the body the motions which it first communicates to itself. Aristotle¹ admits of the six following modes of motion : generation, corruption, growth, decay, change and locomotion, which are all vital processes ; but as, in a succeeding passage of this chapter, he speaks of only four modes, he may have supposed that the two first are included in the *four* last. There is an incidental allusion to movement by conveyance, to movement, that is, without progression. The inquiry proceeds to the question whether Vital Principle is self-motive, and, if so, whether it is or not still

¹ *Metaphys.* III. 7.

subject to motion by impulse from without, which seems to be answered in the negative; for it can scarcely be admitted that this Principle can be subject to external impulse, since its movements, if it do move, must result from sensual impressions.

CHAPTER III.

BEFORE proceeding further, let us consider the nature of motion; for it may not only be untrue that Vital Principle is, as some affirm, essentially self-motive or capable of producing motion; but it may be one of those entities to which motion cannot possibly belong; and it has already been said that the motor is not necessarily itself in motion.

Everything moved admits of being moved in two ways: either by itself or by something else; and by something else we mean whatever is moved from being in something which is moving, as sailors for instance,—for they are not moved as is the vessel, since it is moved by itself, but they are moved from being in that which is moved. This is clear by reference to their limbs—a particular movement of the feet is walking, and walking is man's progression; but the sailors do not at that time move by walking. Since then motion may be spoken of in this two-fold

sense, let us consider whether the Vital Principle moves by itself, and whether it partakes also of motion communicated to it. As there are four kinds of movement, *translation, change, growth, decay*, it follows that the Vital Principle should move according to one, or more than one, or all of them; and if it do not move by chance, then motion must be natural to it; and if so, then locality, for all the movements above alluded to are local.

But if Vital Principle be essentially self-motive, then accidental movement will not belong to it as to a white colour or a length of three cubits; for these properties do move, but then it is by accident, and owing to the bodies to which they belong happening to be in motion. Thus, there cannot be for them any locality as there will be for the Vital Principle, if it partakes of motion by its own nature. Although, however, it may be in motion by its own nature, it may still be moved by *force*, and if by force, still by nature; and the same holds good for the state of rest. Thus, the point towards which anything is by its nature moved, serves also by nature for its point of rest, as equally the point to which anything is moved by *force* serves also, by force, for its point of *rest*. It is not easy, however, even conjecturally to determine what will be the forced movements and forced states of rest of the Vital Principle—if its motion be upwards it will be *fire*, if downwards, *earth*, for such

are the tendencies of those elements; and this conclusion applies equally to the intermediate movements. Since the Vital Principle besides appears to give motion to the body, it is probable that it communicates to the body the motions which it imparts to itself, and, if so, the converse may be true that it communicates to itself the motions which it imparts to the body. Now, the body is moved by translation, so that the Vital Principle should change with the body and be set free from it, either wholly or in its parts; and if this is admitted, it should follow that the Vital Principle, having gone forth from the body, might re-enter, and the consequence of this would be that the dead bodies of animals rise again. Could the Vital Principle be subject to casual motion communicated by some other power than its own, then an animal might be impelled to move by impulse from without; but it is noway necessary that that which is essentially self-motive should be moved by something else, unless by mere chance, any more than that which is good, in and for itself, should be so by or for the sake of something else. It may be confidently affirmed besides, that the Vital Principle, if it do move, is moved by objects which act upon the senses. Although, however, Vital Principle should be self-motive, it would still be in motion, and thus, as all motion is displacement of that which moved, as being moved, the Vital Principle might

be displaced from its essence, unless its self-motion were a casual property; but self-motion is of its very essence.

Some philosophers maintain that the Vital Principle moves the body in which it is, as it is itself moving,—and this is the opinion of Democritus, who expresses himself almost in the words of the comic poet Philippus, who charges “Dædalus with having made a wooden Venus to become movable, when quicksilver was poured into it.” Democritus, in fact, says much the same thing when he maintains that indivisible spheres are in motion, from their having been by nature constituted never to remain at rest, and that these spheres drag along with them and give motion to all things. But we will ask Democritus whether it is those self-same spheres which produce the state of rest, and it will be difficult or rather impossible for him to explain how they are to do so. It is not thus, besides, that the Vital Principle appears to give motion to an animal, as it acts, generally speaking, by some kind of election and thought.

It is in this same manner, however, that Timæus physiologically explains how the body is moved by the Vital Principle—that, from its being in motion, the body, with which it has been interwoven, is moved also; and having constituted it out of the elements, and divided it according to *harmonic numbers*, in order that it may have an innate sense of harmony,

and that the universe may move in accordant orbits, he bent the straight line into a circle, and dividing that circle into two united in two parts, he again divided the single circle into seven others, as if to indicate that the orbits of the sky are the movements of the Vital Principle.

But, in the first place, it is not correct to say that the Vital Principle is magnitude, for Timæus evidently means that this Principle of the universe is such as is the so-called mind; and, then, that Principle of the universe can resemble neither the sentient nor the concupiscent faculty, as neither of these moves in a circle. The mind is one and continuous as is *cogitation*, and *cogitation* as are *thoughts*, and *thoughts* are, by concatenation, one, in the sense, not of *magnitude*, but of number; and, therefore, the mind is not continuous in the sense of magnitude, but either it is without parts, or, at all events, not continuous as magnitude. How, indeed, were it magnitude, is it to think—as a whole, or by some one of its parts? But parts must be regarded either as *magnitude*, or as *points*, if, indeed, a point may be regarded as a part; and, if parts be considered as points, then, as points are innumerable, the mind, clearly, will never be able to recount them all, and if, as magnitude, the mind will have to dwell very often, or rather continuously, upon the same subject. But it is manifest that thinking may be exercised once for all. If, besides, it

suffice for thinking, that there should be contact by some one of its parts, why should it move in a circle, or why be magnitude? And if necessary for thinking that there should be contact by the whole circle, then what means contact by its parts? How, besides, shall that which has parts think by that which is without parts, or that which is without by that which has parts? Thus, it follows that the mind must be that circle: for thinking is the movement of the mind, as the periphery is the movement of the circle; and, if thinking be the periphery of the mind, the mind may be regarded as the circle, of which thinking is the periphery. But then the mind will be ever thinking, and necessarily so, since the peripheral movement is unceasing. Now, there are limits to practical thoughts, (as all such are for the sake of something else,) and so equally there are to speculative thoughts, in their reasons; and every reason is either a definition or a demonstration. Thus, demonstrations set out from a principle, and are, in some way, terminated by a syllogism or a conclusion; and even though not concluded, they do not revert to their principle, but, taking up another mean and extreme, they proceed onward; but the periphery, on the contrary, does revert to its point of departure. Definitions, however, are always limited. If, moreover, the same periphery recur often, the mind will be driven to think often upon the same subject, and

thinking, besides, seems rather to be a kind of rest and a halt than motion; and this applies equally to the syllogism. As every condition, besides, which is compulsory and ungenial must be unhappy, so unless movement be an essential property of that mind, it must be moving against its nature, and it cannot but be painful for it to have been so connected with the body as to be unable to free itself from it; nay more, it is a lot to have been avoided, since it is better for the mind, as is commonly said, and to many seems reasonable, not to have been connected with a body at all. The cause too, of the circular movement of the sky is obscurely stated—for the essence of the Vital Principle is not the cause of that movement, as it never does, excepting it be by chance, so move, nor can the body be the cause, as it is the Vital Principle rather which gives motion to it; neither is it explained how it is better for the Vital Principle to be so circumstanced, and yet it ought to have been shewn that God had caused it to have a circular movement, as better for it to be in motion than at rest, and to move in that rather than in any other direction. But as this is an inquiry which belongs rather to other studies, it may, for the present, be laid aside.

The same incongruity which occurs in most of the theories upon Vital Principle is met with here, in that writers join Vital Principle to and place it in a

body without having first settled for what purpose the body is to receive it, or how it is fitted for the office. It would seem, however, to be necessary that this should be settled, as it is through this connexion that the one acts and the other is acted upon, that the one moves and the other is moved; and these are relations which cannot be attributed to casual associations. There are writers who content themselves with saying what Vital Principle is, without determining any thing about the body its recipient, as if it were admissible, according to Pythagorean legends, that any kind of Vital Principle might clothe itself with any kind of body; but every thing, on the contrary, seems to have its own particular character and form. Such opinions are, in fact, very much like maintaining that the builder's art may be undertaken with musical instruments; but we affirm that as each art must employ its own instruments, so each Vital Principle must employ its own body.

PRELUDE TO CHAPTER IV.

THIS chapter opens with a definition of harmony, and proceeds to shew that the then prevailing opinion concerning the Vital Principle, as related to harmony, is not maintainable; it is not quite agreed upon whether the popular disquisitions here alluded to are Aristotle's commentary upon the Phædo; or his dialogue of Endemus; or a digest of his own oral teachings. The words in the original (λόγους δ' ὡσπερ εὐθύνας, κ.τ.λ.), which are rendered "found to be wanting" (Gallicè, dont nous avons déjà fait justice), signify strictly the scrutiny or passing of the accounts of magistrates at the close of their period of service, and while the result was yet on the balance; but, to judge by the context, they seem here to imply rather an unfavourable issue, and this is the purport of other versions—"alia quædam opinio de anima tradita reprobata tamen, et his rationibus quæ in communibus sermonibus fiunt." The chapter closes with a confutation of the opinion of Xenocrates, that the Vital Principle is a number with self-motion.

CHAPTER IV.

ANOTHER opinion upon the Vital Principle has been handed down, which to many is not less acceptable than any one of those already alluded to, but which, having been scrutinized in our popular disquisitions, has been found to be wanting. The supporters of this opinion say, that the Vital Principle is *some kind of harmony*; that harmony is a mixture and compound of contraries, and that the body is constituted of contraries. But although harmony is a certain proportion or compound of particles mixed together, it is not possible that the Vital Principle should be the one or the other; for it forms no part of harmony to produce motion, but all writers agree in assigning motive power to the Vital Principle as its most characteristic property. The term harmony, besides, is applicable rather to health and the corporeal powers in general, than to the Vital Principle, as would be very manifest to any one who should undertake to account, by any harmony, for the emotions and functions of the Vital Principle; for it would be scarcely possible to reconcile them to one another. If harmony, besides, may

be spoken of with reference to two points—as applicable, most especially, to the composition of particles in masses which have motion and proportion, whenever they may so coalesce as not to admit of any which are homogeneous, and then as applicable to the proportion of the commingled particles, yet in neither sense can it be reasonable to regard Vital Principle as harmony, nor can the Vital Principle be the composition of the parts of the body: for the composition of the parts (and many and various are the compositions of the parts) is quite open to examination—but of what can we suppose that the mind, or the sentient, or the appetitive faculty is a composition? or how is any one of them to be composed? It is equally absurd to think that the Vital Principle can be the *proportion* of the mixture, since the mixture of the elements which forms flesh is differently proportioned from that which forms bone. It will happen, too, from this theory, that there are many Vital Principles, and many in every body, if all bodies are from the elements in combination, and if the proportion of the combination is harmony and Vital Principle. We might inquire too of Empedocles, who maintains that each of those bodies exists in a certain proportion, whether Vital Principle is the proportion? or whether rather is it present in the members, as something different from proportion? Is affinity, besides, the cause of a fortuitous or a definite combination of

parts? And then, again, is affinity the proportion, or something besides the proportion?

Such are the difficulties which present themselves; but if the Vital Principle is something different from the composition, what is that which is simultaneously destroyed with the life, in the flesh, and other parts of an animal? Besides these questions, since each of the parts of the body has not Vital Principle, unless the Vital Principle is the proportion of the composition in the parts, what is that which is destroyed when the Vital Principle has forsaken the body? It is then clear, from what has been adduced, that Vital Principle can neither be any kind of harmony, nor be moving in a circle.

But to maintain that the Vital Principle is moved by accident is to maintain, as we have said, that it moves itself as it is moved in that in which it is, and which is moved by it; and that it cannot possibly have locomotion in any other way. It might, however, with greater probability be doubted, and for the following considerations, whether it moves at all—for we are accustomed to say that the Vital Principle is daring or afraid, is angry too, and both feels and thinks, and as all these seem to be motions, it might be supposed that the Vital Principle does move. But yet this is no necessary consequence—for if to grieve, to rejoice or think are motions, in the fullest sense, then each of them is motion, and motion may be said

to emanate from the Vital Principle, as anger or fear is produced by the heart being moved in this or that manner, and thinking may be some analogous or different kind of motion ; but some of these phænomena are produced by the displacement of certain particles in motion, and others by change, the explanation of the quality and manner of which is foreign to the present inquiry.

Now to maintain that the Vital Principle is angry is very much like saying that it weaves or builds, and thus it would, perhaps, be better to say, not that Vital Principle pities, learns or thinks, but that the man, by his Vital Principle, is so affected or so engaged. It is not, however, hereby implied that motion is in the Vital Principle, but, on the contrary, that sometimes it proceeds to, and sometimes comes from it; as sentient impression is from external objects, and recollection comes from it to the movements or impressions abiding in the sentient organs. The mind seems to be a peculiar innate essence, and to be indestructible ; were it destructible, however, it would, in an especial sense, be so by the dulness attendant upon age, when probably that happens to the mind which takes place in the sentient organs ; for if an aged person could take an eye of a certain character, he would see as well as a young man. Thus, the infirmities of age are attributable, not to the Vital Principle having been in aught affected, but to its

recipient suffering, as it does from drunkenness or maladies. Thus, too, thought and reflexion languish when any thing within the body has been destroyed, but that which thinks is impassive. The properties, therefore, of thought, love and hatred belong, not to it, but to that which contains it, and as it contains it; so that when this recipient is destroyed, it can neither recollect nor love, as those emotions emanate not from it, but from that which was in common with it, and which has perished. But the mind is probably something more divine, and it is impassive.

It is, then, manifest from what has been adduced, that Vital Principle cannot be in motion; and if altogether without motion, it cannot clearly be self-moved.

The most unreasonable by far of all the opinions upon Vital Principle is that which holds it to be a number with self-motion, for it is beset with insuperable objections; those, in the first place, which result from the idea of motion, and then those more particular objections to speaking of it as a number. How, indeed, is it possible to think of an unit in motion? by what or how, being indivisible and homogeneous, is it to be moved? If said to be both motor and moved, it must have distinction of some kind. Since, besides, they say that a line in motion forms a surface, and a point in line, then units in motion will form lines, as the point is distinguished from the unit

only by *position*; and thus the number of Vital Principle has already *locality* and *position*. If, again, from any number there be subtracted a number or an unit, there remains a different number; but plants and many creatures, after having been divided, live on, and appear still, in a specific sense, to possess the same Vital Principle. It might also be supposed to make no difference whether we speak of the Vital Principle as formed of units or corpuscles; for if points are substituted for the spherules of Democritus and quantity alone remains, there will still be in that quantity, as in all continuity, a motor and a moved; for the theory takes account neither of greatness or smallness, but only of quantity. Thus, there must of necessity be something to impart motion to the units. But if the Vital Principle is the motor in an animal, so must it be in the number, and thus the Vital Principle, being no longer motor and moved, is the motor only. Even admitting that the Vital Principle may, in some way, be an unit, there must still be some distinction between it and other units; but what distinction, save that of position, can there be between one unit and another? If then the units and points which are in the body are different, the units will be on the same spot as the points, for the unit will occupy the place of the point; but what then is there to prevent them from being infinite in number on the same spot, even if there be

only two, as things are indivisible of which the locality is indivisible? But if the points in the body are the number of the Vital Principle, or if the number formed from the points in the body is the Vital Principle, why have not all bodies Vital Principle? Now there seem to be points in all bodies, and those infinite in number. How besides is it possible for the Vital Principles to be separated and set free from bodies, since lines are not divisible into points?

PRELUDE TO CHAPTER V.

THE argument against the opinion of Xenocrates that the Vital Principle is "a number with self-motion" is continued, and Aristotle, having already objected to it as *number*, proceeds here, after a brief allusion to what had been advanced, to object to it as being *motive*. If the Vital Principle be some kind of body, then however attenuated its parts, there must be two bodies in one ; if it be a number, then as the *unit* is a *point*, unless that number be innate and peculiar, every kind of body must have Vital Principle, and this cannot be admitted. With respect to its motion, it had been shewn that the unit, being homogeneous, that is without parts, cannot be so acted upon as to move ; if it be motor and moved, it must, as entity, have some distinction, and then it is no longer to be regarded as an unit. The resemblance between this theory and that of Democritus is again alluded to, as the same objection is applicable to both ; for it matters not whether the motor be a monad, or point, or

corpuscle in motion, since their motion is the cause of motion in other things ; thus, both systems maintain a blind force, and ignore the influences of sensibility and will. It will probably be said that the topic has been too long dwelt upon, but it should be recollected what an important part was assigned by the Pythagoreans¹ to number, which they derived from the monad or unit, and regarded as the origin, the matter, and the essential properties of beings, and as constitutive of the heavens. It has already been said how, as numbers were the first entities in nature, they perceived resemblances to beings and qualities in them rather than in the elements fire, &c. ; and hence made one combination to be justice, another mind, and so on.

¹ *Metaphys.* I. 4, 5.

CHAPTER V.

THE peculiar incongruity to which we have alluded, belongs as well to those who suppose Vital Principle to be some kind of body with tenuity of parts, as it does to those who with Democritus maintain that the body is moved by the Vital Principle; for if the Vital Principle is in the whole sentient body, then, being some kind of body, there must necessarily be two bodies in one and the same body. And it may be objected to those who speak of it as a number, that if so, there must be many *points* in a *single point*, or every kind of body must have Vital Principle, unless it is a number innate and different as well from other numbers, as from the points which are in the body. It results too from this theory, that an animal is moved by a number much in the same way that Democritus, as we have said, gives motion to it; for what matters it whether we speak of spherules, or large units, or units simply in motion? In either case, the animal is compelled to move from their being in motion.

Such and many other such objections may be urged against those who represent Vital Principle as an intimate combination of *motion* and *number*; as it is not only impossible therefrom to give any definition of Vital Principle, but we affirm that it cannot even account for one of its accidents. And this would be evident to any one who should attempt, by this theory, to explain the affections and functions of the Vital Principle,—its reasonings, sensations, pleasures, pains, and other such manifestations; for it would be difficult, as we have already said, to form even a conjecture concerning them from it.

Now three modes of defining Vital Principle have been transmitted to us: some have represented it as the most mobile of entities from being self-motive; some as the most attenuated, and others again as the most incorporeal of entities; but we have already reviewed those opinions, and shewn how very questionable and contradictory they are. There remains for us then only to consider in what sense Vital Principle can be said to be derived from the elements. This opinion has been adopted in order to explain how the Vital Principle can perceive and recognise all beings and things; but it necessarily involves many and weighty objections. The supporters of this opinion lay it down as a fact that *like* recognises *like*, which is very much like assuming that Vital Principle is, in some way, the things themselves;

but things are never homogeneous, as they contain many other particles besides their own; and many or rather infinite in number are their mutual combinations. Thus even if it be conceded that the Vital Principle may recognise and perceive the elements of which anything is constituted, by what is it to perceive or recognise the thing as a whole, whether it be a man, or flesh or bone? The same question may be put for any other compound body; as the elements, constitutive of every such body unite, not in any fortuitous manner, but in a certain proportion and combination, just as Empedocles expresses himself with respect to bone—"The bounteous earth, in her vast furnaces, out of eight parts has had allotted to her *two* of *liquid light*, of fire *four*, and bones were made white." It would be to no purpose then, that the elements should be in Vital Principle, unless proportion and combination were there also; for although each element may recognise its like, there will still be nothing whereby to recognise a bone or a man, unless such things be present with it also. But it is scarcely necessary to say that this cannot be; for who can have a doubt whether a stone or a man is or is not present in Vital Principle? or good or ill, or any other quality? As the term *being*, besides, admits of several significations (for it signifies sometimes a particular object, sometimes quantity or quality, or other one of the specified categories), shall it or

not be said that Vital Principle is derived from them all? Now, there do not appear to be any elements which are common to all the *categories*. Shall it then be formed only from such elements as pertain to the essence? How, in that case, is it to recognise each of the others? Shall it be said that there are, for each genus, elements and peculiar principles wherewith the Vital Principle may be formed? If so, it will be quantity, and quality and essence; but it is impossible that from the elements of quantity there should be eliminated essence without quantity.

Such and other such difficulties concur to oppose the opinion of those who say that the Vital Principle is formed from all the elements.

It is absurd to maintain that *like* is unimpressionable by *like*, and yet assert that *like* is able to perceive and recognise like by like; and the more so, as these writers set down feeling as they do thinking and recognising, as some kind of impression and motion. But to shew how many doubts and difficulties beset the opinion adopted by Empedocles, that "objects are recognised by the corporeal elements in the relation of *like*;" we have only to observe that all those parts in animal bodies, which are simply of *earth*, as bones, sinews and hairs, seem to be altogether without feeling, and consequently without any feeling of *like*, and yet, according to the theory, they

ought to be perceptive. There will be a larger amount of unconsciousness than perception, besides, allotted to each principle, as each will recognise its own individuals, but be unconscious of the many others—all the others, in fact, which are unlike. It follows, too, from this theory, that the god must be the most senseless of beings, as he alone cannot recognise the element “repulsion,” of which all mortal beings cannot but be conscious, since each of them is derived from all the elements.

But wherefore, let us ask, have not all beings a Vital Principle, since every thing is either an element, or derived from one or from more than one, or from all the elements? Thus, it is necessary to every being that it should recognise some one thing, or more than one, or all things. But we are at a loss to know what that is which individualizes things: the elements are like *matter*; but that, whatever it be which binds the others together, must of all be the most influential. Now, it is scarcely possible that any thing should be more influential and dominant than the Vital Principle, and quite impossible that any thing should be more so than the *mind*; for it is probable that the mind was the first-born and sovereign in nature, while these philosophers maintain that the elements were the first of entities.

None of these philosophers, however, neither they who maintain that the Vital Principle is derived from

the elements, on account of its recognising and perceiving things, nor they who regard it as the most motive of beings, can be said to speak of every Vital Principle; for all sentient creatures are not motive, as there are animals which appear to be fixed abidingly to the same spot, and yet locomotion seems, according to these philosophers, to be the only motion imparted to animals by the Vital Principle. They, too, equally err who form mind and sensibility out of the elements—for plants appear to be alive, without partaking either of locomotion or sensibility; and many animals have no understanding. But even if we may pass over these objections, and admit that the mind as well as the sensibility may be a part of the Vital Principle, still no general theory could be framed for every Vital Principle, or for it as a whole, or for it individually. Thus, the reasoning in the so-called Orphic verses has been stamped with this same error, for the poet says that “the Vital Principle, borne by the winds, enters from the universe into animals during respiration.” But this cannot possibly be applicable to plants or to some animals, since there are some which do not breathe. This fact, however, had escaped the attention of those who first adopted the hypothesis.

But even if it be well to form the Vital Principle out of the elements, it by no means follows that it should be out of them all, as one or other part of the

contraries is able to judge both itself and its opposite. Thus, by the *straight* we know both the straight and the curve, as the ruler is the judge of both, while the curve is the judge neither of itself nor the straight.

There are writers who maintain that the Vital Principle has been diffused through the universe, whence probably Thales was led to think that all things are full of gods. But the opinion is not without its difficulties. Why, it may be asked, does not the Vital Principle, when in the air or fire, form an animal rather than when in the elements in combination, although seemingly more generally situated in either of those elements alone? It might also be inquired why the Vital Principle, which is in the air, is more exalted and more enduring than that which is in animals. On either side, in fact, we are met by absurdity and contradiction; for it is very unreasonable to speak of air and fire as animals, and absurd to say that they are not so when Vital Principle is conceded to them. Those philosophers, in fact, seem to have assumed that Vital Principle is in those elements, because the whole ought to be specifically as its parts; and so it was forced upon them to admit that Vital Principle must be, specifically, the same as its parts, if creatures become living creatures by taking in something from that which surrounds them. But if the air, however subdivided, is still homogeneous,

and the Vital Principle heterogeneous, it is clear that some one of its parts will, and some other will not be, in the air; and thus either the Vital Principle must be homogeneous, or else it cannot be present in every part of the universe. It is manifest, then, from what has been adduced, that the faculty of recognising does not belong to Vital Principle by virtue of its being derived from the elements; as also that it cannot with accuracy or truth be said to be self-motive.

Since the faculties of knowing, feeling and thinking, together with desiring, willing and the appetites generally, as also locomotion, growth, maturity and decay, are properties of the Vital Principle, let us inquire whether or not each of those properties is imparted to us by the Vital Principle as a whole—that is, does each of those faculties emanate from the Vital Principle as a whole? do we think, feel, act and suffer by it as a whole, or are different offices assigned to different parts? Is life in one, or more than one, or in all the parts, or is there some other cause for life than the Vital Principle?

Some writers maintain that Vital Principle is divisible, and that by one part it thinks, and by another feels desire; but what then, if it be naturally divisible, holds its parts together? Not the body certainly, we answer; for the Vital Principle, on the contrary, appears to hold it together, as from the moment of its departure the body expires and decays.

If there be a something which makes it one, that something is, in the strictest sense, Vital Principle; and it will be necessary again to inquire whether that something is indivisible or with parts; if it be indivisible, then why not at once conclude that it must be Vital Principle? If it be divisible, reason will again seek to learn what that is which holds its parts together; and thus may the inquiry be continued interminably. With respect to the parts of the Vital Principle, it is difficult to determine what is the part which has been assigned to each of them in the body; for if it is the whole Vital Principle which sustains the whole body, it is probable that each of its parts sustains some one part of the body. But this is very like an impossibility; for it would be difficult even to conjecture what part the *mind* could connect with others, or in what way it could do so at all. Thus, plants, when divided, appear to live, and so do some species of insects, as if possessing still the same Vital Principle in a specific, although not in a numerical sense; for each of the parts has sensation and locomotion for a time, and there is no room for surprise at their not continuing to manifest those properties, seeing that they are without the organs necessary for the preservation of their nature. Nevertheless, in each of those parts coexist all parts of the Vital Principle, and those parts are, specifically, the same with each other, and with the whole—with each other, as

being inseparable, and with the whole as being separable. But the living principle in plants seems to be a kind of Vital Principle, for animals and plants alike partake of it; and it is separable from the sentient principle, but yet without it no creature can possess sensibility.

PRELUDE TO CHAPTER I.

AFTER having delineated his subject and quoted and commented on the leading opinions concerning it, Aristotle here reverts to the definition of Vital Principle, which was given partially at the commencement of the inquiry, with the intent of giving to it a signification comprehensive enough to include all living beings; for he had guarded us against limiting the inquiry to the human family. The argument commences as usual with Aristotle, *ab ovo*,—he attempts, that is, to fix the meaning of *essence*, *matter* and *form*, those primordial entities or conditions, which make up and serve to distinguish all the beings and things of the external world. These very abstruse questions have been alluded to in a former note, and passages were then cited from the *Metaphysics* and other works for the purpose of obtaining, if possible, precise notions concerning them; but these abstractions are so shadowy, and words so fluctuating, that they seem to elude even the perspicacity of Aristotle,

and the ductility of his language. *Essence* is said to be a genus, to be constitutive, that is, with *matter*, which, in itself, is no particular thing, of each genus of beings or things; but then it is *form*, which realises, so to say, that combination by conferring upon it a specific character. For form harmonises with all the organisation of an animal; and every organised body, Cuvier observes, over and above the common qualities of its tissues, has a peculiar *form*, not only generally and exteriorly, but even down to its minutest details; and it is "this form which determines the direction of each particular movement, which supports the complicity of its life, constitutes its species, and makes it what it is¹."

¹ Blainville, 1^{me} leçon.

BOOK THE SECOND.

CHAPTER I.

THUS have the opinions handed down by former writers upon Vital Principle been delineated; and now let us retrace our steps, and again, as if at the outset of our inquiry, endeavour to define what it is and what the most general expression for it.

We say, then, that essence is a particular genus of entities, and that of it part is matter, which in itself is not any one particular object, as it is other than form and species from which each object derives its particular denomination; and that, in the third place, there is the derivative from both these. Now matter is *potentiality*, species *reality*, and that in a twofold acceptation, as knowledge and as reflexion; but bodies, and above all natural bodies, seem to be *essences*; for they are, in fact, the origins of other bodies. Among natural bodies some have and some have not *life*; and by life we mean the faculties of self-nourishment, self-growth and self-decay. Thus,

every natural body partaking of life may be regarded as an essence; but then it is an essence in combination, as has been said. And since the body is such a combination, being possessed of life, it cannot be Vital Principle; for as it is itself more truly *subject* and *matter*, it cannot be among the subordinates of a subject. It follows, then, that the Vital Principle must be an essence, as being the form of a natural body holding life *in potentiality*; but *essence* is a *reality*,—the *reality*, that is, of a *body* such as has been described. Now reality is, in the twofold signification, either of knowledge or of reflexion; and that it may be regarded as knowledge is manifest in that sleep and watching co-exist as original properties, in Vital Principle; and equally manifest that watching is analogous to reflexion upon knowledge, as that sleep represents knowledge possessed but not employed. But knowledge pre-exists in the same individual, and the Vital Principle is, therefore, the original reality of a natural body endowed with life *in potentiality*; only this is to be understood of a body which may be organised. Thus, the parts even of plants are organs, but then they are organs which are altogether simple, as the leaf is the covering of the pericarp, and the pericarp of the fruit; and the roots are analogous to the mouth, for both take in food. If, then, there be any general expression for every kind of Vital Principle, it may be set down as “*the*

incipient reality of a natural body which is organised."

It is, therefore, to no purpose to inquire whether Vital Principle and the body are one, any more than whether wax and the impress upon it are one, or whether the matter formative of any object and the object formed are one; for *one* and *being* have many significations, but they are correctly designated as *reality*.

It has thus been explained generally what the Vital Principle is, and shewn that it is an essence, in its abstract signification, which implies the particular mode of being in any particular body, as if any instrument, an axe, for instance, were a natural body, the mode of being in the axe would be, at once, both its essence and its Vital Principle; for, were it once to be withdrawn, then, save in name, it could be an axe no longer. All this, however, relates to an axe, but Vital Principle is the mode and the cause of being, not in any thing like an axe but, in a natural body, having within it a principle of *motion* and of *rest*.

But what has been said may be better understood by reference to the parts of a body. Thus, if the *eye* were an animal, vision would be its Vital Principle, as vision, abstractedly considered, is the *essence* of the eye; but the eye is the *matter* of vision, and if vision be wanting, then, save in name, it is an eye no

longer, any more than is that an eye which is represented in sculpture or painting. All that has here been assumed of a part may be made applicable to the whole living body; for, as there is an analogy between part and part, so is there between the whole sensibility and the whole sentient body, in the ratio of its sensibility; but this must be understood of a body which yet retains its Vital Principle, and is, in potentiality, alive. The seed and the fruit are the representatives of such a body in *potentiality*; and as cutting is the *reality* of an axe, vision that of an eye, so *watching* is the *reality* of Vital Principle; which is to the body what vision is to an eye, and its own property to any instrument; but this is to be understood of a *body in potentiality*. Thus, as an eye is a *pupil* and *vision*, so an animal is a *body* and *Vital Principle*.

It is then obvious that neither Vital Principle nor any of its parts, even granting that it may be divisible, can be separate from the body; for of some of its parts it is the *reality*; and yet there is nothing to preclude the possibility of some others being separate, as there are some which do not contribute to the *reality of any body*. It is doubtful, however, whether the Vital Principle is the *reality* of a body in the sense that a mariner is of his vessel.

Thus far, then, have we proceeded in our attempt to define and delineate Vital Principle.

PRELUDE TO CHAPTER II.

As the purport of this chapter is to determine the essential or characteristic properties of the Vital Principle in order to attain to a solid definition, it commences, very appropriately, with a short disquisition upon that form, and a protest against any deviation from its real purport; and thus the argument of the foregoing chapter is continued. The opening paragraph is necessarily obscure, from the nature of its topic, but it may be practically at least elucidated, by reference to similar topics in the other works. It is observed by Aristotle¹, that the antecedent is, absolutely speaking, more apprehensible than the sequence, as a point e. g. is than a line, a line than a surface, and a surface than a solid; so too an unit is more apprehensible than a number (for the unit is the origin of all number), as a single letter is than a syllable. But sometimes, on the other hand, the reverse of this happens—for as it is the solid,

¹ *Topica*, VI. 4, 5.

especially, which falls under the senses, so the *surface* is more apprehensible than the *line*, and the *line* than the *point*; as the multitude (*οἱ πολλοί*) are already conversant with them, while the sequences are to be acquired only by attention, or some peculiar mental faculty. Thus, to speak generally, it is best to gather knowledge concerning *sequences* through their *antecedents*; for this is by far the most scientific mode of conducting an inquiry. In fine, whatever falls under the senses seems, from being familiar to us, to be more apprehensible than principles or causes, which are more or less abstractions; as, the falling of a stone seems to be more apprehensible than the principle of Gravitation. But as the knowledge of any subject may be also acquired through the study of its accidents, that is, its essential properties, so it is suggested that the knowledge of Vital Principle may be arrived at through the study of its faculties.

CHAPTER II.

SINCE that which is evident and, when abstractedly considered, more apprehensible may be derived from particulars which are by their nature obscure, although to us more apparent, let us again attempt, bearing this in mind, to attain to a comprehensive view of Vital Principle. It is not only correct that the wording of a definition should shew, as do most definitions, what a thing is, but it ought also to embody and make apparent the cause of its being what it is. But the terms usually employed make definitions to be kinds of conclusions; as if, for instance, to the question "what is a quadrature?" it be answered, that it is to find an equilateral rectangular figure equal to another figure with unequal sides, such a definition is the statement of the *conclusion*; if it be said that the quadrature is "the discovery of a mean proportional," this conveys the cause of the thing.

We say, then, resuming our inquiry at its outset, that the *animate* is distinguished from the *inanimate* by having life. Now the term *life* has many accepta-

tions, but if one only of the following properties, viz. mind, sensibility, locomotion, and rest, as well as the motion concerned in nutrition, growth, and decay be manifested in any object, we say that that object is alive. And, therefore, all plants seem to be alive, for they all appear to have within them a faculty and a principle by which they acquire growth and undergo decay in *opposite directions*; for they do not grow *upwards exclusively*, but they grow equally in both these and all other directions, and are alive throughout so long as they are able to imbibe nourishment. It is possible for nutrition to subsist independently of the other functions, but the others cannot possibly, in mortal beings, subsist without it; and this is manifest in plants, since no other than it has been allotted to them. Thus, it is by this faculty of nutrition that life is manifested in living beings, but an animal is characterized above all by sensibility; for we say that creatures endowed with sensibility are not merely living beings but animals, although they may neither be motive nor change their locality. *Touch* is the sense first manifested in all creatures, and, as the nutritive faculty can be manifested independently of Touch and other senses, so the sense of Touch can be manifested independently of any other. We call *nutritive function* that part of Vital Principle of which plants partake; but all animals appear besides

it to have the sense of Touch ; and we shall, hereafter, explain why each of those functions has been allotted. Let it suffice, for the present, to say that Vital Principle is the source of the nutritive, the sentient, cogitative and motive faculties ; and that by them it has been defined.

It is easy, with respect to some of those faculties, to perceive, whether any one of them is the Vital Principle, or a part of Vital Principle, and if a part whether it is distinct from other parts substantively, or in an abstract sense only ; but there are others which seem to elude investigation. Thus, as some plants appear, after having been divided, and after the parts have been separated, still to be alive, as if the living principle, in each plant, were in reality one, in potentiality more than one, so we see the same occurrence in other distinctions of the Vital Principle, as in insects which have been divided ; for each of the parts manifests sensibility and locomotion, and if sensibility, then *imagination* and desire, as wherever there is feeling, there must be sense of pain and pleasure, and wherever these, there must, of necessity, be desire. We have nothing very certain to offer upon the subject of the mind and the reflective faculties ; but the mind seems to be another kind of Vital Principle, and alone to be capable of existing apart from the body, as the everlasting exists apart from the

perishable. Thus, it is manifest, from what has been adduced, that the other parts of the Vital Principle are not, as some say, distinct from the body, although it is clear that, when considered absolutely, they are different from it; for the mode of being in a sentient must differ from that in a cogitative being, since feeling differs from thinking, and this applies equally to other functions and faculties. All those faculties besides belong to some animals, particular ones only to others, and there are others to which one only has been allotted, and this constitutes distinctions among animals, the cause of which shall hereafter be considered. But something very like this has taken place with respect to the senses, for some animals have them all; others have particular ones only, and there are others again which have but one; but that one is *Touch*, which of all is the most necessary.

As that by which we live and feel, like that by which we understand, has a twofold signification, since we speak of that by which we understand sometimes as *Knowledge*, and sometimes as the *Vital Principle*, for we say that we understand by either of them; so equally does this apply to that by which we are in health, and which sometimes refers to a particular part of the body, and sometimes to the whole body. Now, the two faculties alluded to, know-

ledge and health, are a form, a "specific *something*," a "relation," and an action, as it were, of a recipient, capable in the one case of knowing, and in the other of maintaining health (for the action of creative energies seems to be innate in the impressionable and suitably constituted subject), but the Vital Principle is that by which we live, feel and think, from life's outset; so that, although it may be the cause and form, it cannot be *matter* and *subject*. Thus, the essence has a threefold signification, as we have said, in the sense of form, of matter, and the compound of the two; and of these *matter* is *potentiality*, and *form reality*; and since the living being is a compound of the two, the body is not the *reality* of the Vital Principle, but it, on the contrary, is the *reality* of a particular kind of body. On which account it is happily assumed by some that the Vital Principle can neither be without the body, nor be itself a body of any kind; for a body it is not, but yet it is something of the body, and, therefore, present innately in the body, and that peculiarly constituted. It is not, that is, in any kind of body, as the earlier writers have maintained, when they attached it to a body without in the least defining either the nature or quality of the body; although it must be against all probability that any kind of recipient should receive any thing taken by chance. But here all takes place as might

reasonably be expected—for the realising influence exists congenitally in its own subject, while yet *potential*, and constituted of *matter* fitted for its agency. It is then manifest, from what has been adduced, that the *realising influence* and *cause* can act only upon that which is *potentially* capable of becoming such or such a *reality*.

PRELUDE TO CHAPTER III.

THE inquiry into the faculties and functions of living beings is here continued, for the purpose of determining, through them, the source from which life is derived; and the distinction between the animal and vegetable kingdom is, incidentally, alluded to. That distinction is placed in the presence or absence of sentient properties; and so Lamarck¹ distinguishes plants, by their want of irritability, that is sensibility, from animals.

¹ *Hist. Nat.* T. I. p. 77.

CHAPTER III.

ALL the faculties of Vital Principle which have been enumerated belong, as we have said, to some creatures, some only of them belong to others, and there are creatures again which have but one; and we spoke of those faculties as the *nutritive*, *appetitive*, *sentient*, *locomotive* and *cogitative*. Of these, the nutritive alone belongs to plants; but to other beings both it and the sentient have been imparted; and if the sentient, then the appetitive, for appetite is desire, passion and volition; and all animals, without exception, have the sense of Touch. But the creature to which sensibility has been imparted cannot but be sensible of pleasure and pain, of what is grateful and what painful; and if sensible of these, it must have desire, as desire is the appetite for what is grateful. All such creatures, moreover, have the sense for food, as they have Touch, which is that sense; for all animals are nourished by what is dry and moist, warm and cold, and Touch is the sense for judging of these qualities. But it is only by chance that the Touch can judge of other qualities, as neither sound, colour nor odour contribute in aught to nourishment; and

savour is among tangible qualities. Hunger and thirst are desires: the former for what is dry and warm, the latter for what is liquid and cold; and savour is the condiment, as it were, for both. As, however, we shall be more explicit upon those points hereafter, it may, for the present, suffice to say, that all such creatures as have the sense of Touch have appetite; it is uncertain whether or not they have imagination, but this also shall be considered hereafter. There are creatures to which, besides those faculties, locomotion has been imparted; and others again, as man, to which have been allotted both reflexion and mind, together with any other and yet nobler faculty, if such there be, than mind.

It is clear, then, that there can be but one definition for Vital Principle, as there is but one for a geometrical figure; for as in geometry there is no figure but the triangle and its sequences, so neither are there any kinds of Vital Principle save those which have been enumerated. Could there, however, be any such common expression for *figures*, as without being peculiar to any one, should yet be applicable to all, so might there be for the Vital Principles alluded to. It would be idle, however, to seek for any such expression, in the case either of Vital Principles or geometrical figures, as should neither be applicable to any one of them individually, nor, putting aside individuals, be applicable to them as an

individual species. But still there is an analogy between the faculties of Vital Principle and geometrical figures; for as in vital properties, so in geometrical figures, the antecedent is ever present *potentially* in the sequences, and as the triangle is in the square, so the nutritive is in the sentient faculty. Thus, the inquiry must be conducted with reference to *individuals*, in order to learn what is the Vital Principle of each, as of a plant, a man, or a brute; and wherefore beings are thus ranged in a series.

Without the nutritive function there can be no sensibility, but in plants the *nutritive* exists without the sentient; so again without the Touch there can be no other sense, while Touch can exist alone, for many animals have neither sight nor hearing, and are altogether without smell. Among sentient creatures some have and some have not locomotion, and, finally, to a few calculation and judgment have been imparted; and to such among mortal beings as are so endowed all other faculties have been imparted likewise. But to such as possess some one only of the faculties, calculation has not been allotted, as some of them have not even imagination, while others live by it alone; it would be foreign to our present inquiry to enter upon the speculative intellect.

It is, then, clear that the definition which comes closest to each one of those faculties is also the fittest for the elucidation of Vital Principle.

PRELUDE TO CHAPTER IV.

THE opening paragraphs of this chapter are both obscure and apparently contradictory ; for while it is suggested that it might be well, in order to comprehend faculties or functions, first to study the energies or organs from which they emanate, yet the inquiry reverts to nutrition as a fact ; without reference, that is, either to vital processes or to food. We may assume that Aristotle was unacquainted with the rudimentary forms and development of the corporeal organs, and yet, judging from this exordium, he seems to have perceived that every part must advance from a nascent state to its perfected condition ; and thus he has suggested the teaching of developmental anatomy. As the inquiry proceeds, we are reminded of the obscurity or inaccuracy of language, in portraying the impressions upon and the functions, so to say, of the sentient organs—even now the external object is, with us, in common parlance, a *sensible* object ; sensation, besides its own

sense, implies casual *feelings from within* ; sight signifies both faculty and function ; and nourishment is food as well as digestion. It is somewhat, perhaps, objectionable that Aristotle should have bound up, so to say, the generative with the nutritive function, seeing how they differ both in the periods of development and duration ; they are equally necessary, no doubt, to nature's design, but still they are neither contemporaneous nor identical. With respect to *spontaneous generation* here alluded to Aristotle¹ admitted its possibility, and for obvious reasons, in the case of eels ; and, although he denied that *all* mullets (τοὺς κεστρεῖς φύεσθαι πάντας) are so reproduced, yet he believed that some of the species *spring forth* (φύεται) from the mud and sand on the sea-shore ; and thus it is evident, he continues, that some creatures, not being derived from others, may be the product of *spontaneous generation*. This opinion upon reproduction prevailed for many ages, and even yet, perhaps, notwithstanding the advancement of science, it may not be altogether discredited.

¹ *Hist. Ani.* VI. 14. 14. 15. 3.

CHAPTER IV.

IT is necessary, in order well to study those faculties, that we should comprehend what each of them individually is, and then, in like manner, carry our inquiry into their consequences and other conditions. But if it behove us to say what each of them is, as what is the cogitative, sentient, or appetitive faculty, it should previously be settled what that is which thinks and that which feels; for energies and acts are, abstractedly considered, pre-existent to their functions. Granting, however, that it is so, and that we ought, before the faculties or functions, to have considered their opposites, it might be fitting here also, and for the same reason, first to define the opposites of the functions—define, that is, food before nutrition; the object before perception; and the intelligible before thought.

Thus we must first speak upon nutrition and generation, for the nutritive faculty is innate in other beings besides animals; it is the primal and most universal influence of the Vital Principle, and through it life is manifested in all beings. Its functions are to generate and to employ nourishment; for the most

natural of the functions in beings which are perfect, that is, which are neither dwarfed nor spontaneously generated, is to produce another such as itself, an animal an animal, and a plant a plant, in order that they may partake, to the extent which has been allotted to them, of the Everlasting and the Divine. All creatures yearn after this, and, for the sake of it, they do all that they do naturally; but since such beings cannot, in uninterrupted continuity, partake of the *Everlasting* and the *Divine*, because no perishable being can abidingly continue as one and the same; yet each can partake thereof in its own allotted portion, be it larger or smaller, and still continue, if not the same, like the same, and one, if not in number, as species.

The Vital Principle is the *cause* and the *origin* of a living body. Now, cause and origin have several significations; for the Vital Principle is equally a *cause*, according to any one of the three defined modes of causation: as that whence motion proceeds; as that for which motion is produced; and cause, again, as the essence of living bodies. It is evident that it is a cause as an essence, since the essence is in all things the cause of their being what they are; and as life is the mode of being in living beings, so Vital Principle is the *cause* and the *origin* of all such. It is the realizing principle, besides, the cause that is of something which exists in potentiality becoming a

reality. It is manifest, too, that Vital Principle is a *cause*, in the sense of a *final cause*; for as the mind acts for some end, so does nature, and that end is her aim; and such an aim has the Vital Principle, by its nature, in living bodies. Thus, all natural bodies, those of animals as well as those of plants, are its *instruments*, and are what they are for its purposes. The term *final cause* has a twofold signification, as it implies that for which, as well as that by which, any result is obtained; and Vital Principle is a *final cause*, as that whence locomotion is derived, *although this is a property* which does not belong to all living creatures. *Change* and *growth*, moreover, are dependent upon Vital Principle; for sensation seems to be a change of some kind, and whatever is sentient has Vital Principle; and this applies equally to *growth* and *decay*, for nothing grows or decays naturally unless it be nourished, and nothing is nourished which does not partake of life. Empedocles has not expressed himself happily upon this point, as, after other observations, he adds that plants take growth *downwards*, where they strike root, from this being the natural direction of *earth*, and *upwards*, from this being the natural direction of *fire*. Neither has he clearly seized the import of the terms *upwards* and *downwards*, as they are not identical for all creatures, or for the universe; for the head is to animals what the roots are to plants, if we may speak of organs

after their functions, although in other respects different. But, besides these objections, what is that which is to hold *fire* and *earth*, with their opposing tendencies, together? Now, unless there be a restraining force, they must be torn asunder, and if such there be, it ought to be regarded as Vital Principle, and the cause both of nourishment and growth.

The nature of fire seems, to some philosophers, to be the absolute cause of nutrition as well as growth, and that because it alone, among bodies or elements, appears to be nourished and to grow. It might, therefore, be assumed, that it is *fire* which works out those processes in plants and animals; but although fire is possibly a joint cause, it cannot be the exclusive cause, as this must be assigned rather to the Vital Principle. The increase of fire is infinite, so long as there is any thing combustible, but to all the bodies of nature's constitution there is a limit and a relation both as to bulk and increase; and these are conditions, not of fire but of Vital Principle; not of matter but of design.

Since the same faculty of Vital Principle is at once nutritive and generative, it is necessary first to define nutrition; for it is by this, compared with other faculties, that Vital Principle is especially distinguished. Nutrition, then, appears to be a contrary acted upon by a contrary, but this does not imply any kind of contrary by any other contrary; it refers only

to such contraries as can generate from and give growth to one another. Thus, there are many things derived from one another which are not always *quantities*, as the healthy, for instance, is derived from the unhealthy; neither do these contraries appear, in any manner, to be nourishment for one another, as water, for instance, is nourishment for fire, but fire is not nourishment for water. It is in homogeneous bodies especially, that the *contraries* seem to be in the relations of nourishment and nourished. But here there is a difficulty; for while some maintain that *like* is nourished as it is increased by *like*, there are others who maintain, as we have said, that it is contrary which is nourished by contrary; that like is unimpressionable by like; that food undergoes change and is digested, and that all change implies conversion to an opposite or an intermediate state. Nourishment, besides, is affected by the body which is nourished, although the body is not affected by the nourishment, just as the material is affected by the artisan, although he is not affected by the material; for it is the artisan alone who converts the material from a raw state into one of usefulness. There is, however, a distinction to be observed in nourishment, between its last and adventitious or its first state; if both states are nourishment, distinguished only by the one being undigested, and the other digested, then it may be correct to admit of both explanations for nutrition; for in so

far as food is undigested, it is contrary nourished by contrary, and in so far as it is digested, it is like nourished by like. Thus, it is manifest that both these opinions are in one sense right, and in another wrong. But as nothing can be nourished which does not partake of life, so a living body may be regarded as a body which is nourished from *having life*; and thus nutrition is not in a casual, but a positive relation to a *living body*. There is an obvious distinction between nourishment and growth: in so far as a living body is *quantity*, it is capable of *growth*, and in so far as a *something* is matter and *essence*, it is *nourishment*; for it preserves the *essence* of the body, which exists so long as it can be nourished. Nourishment, however, does not generate that which is nourished, as it is the same as it; for it is already itself the essence, and nothing can generate, although it may preserve itself. Thus, it is the same faculty of Vital Principle which is able to preserve that, such as it may be, which contains it, and it is nourishment which renders it fit for its office; and, therefore, when deprived of nourishment, it can exist no longer.

Now, there are here three things or conditions—something to be nourished, something by which nourished, and something which nourishes. That which nourishes is the primal or nutritive faculty; that which is nourished is the body; and that by which nourished is food. And as things are correctly

designated after the object to which they tend, and as the object here is to generate another like itself, so the primal faculty may be set down as being *generative of another like itself*. That "by which nourished" has a twofold signification, as has that by which a vessel is steered, and which implies hand and rudder, of which the one only moves, while the latter both moves and is moved. It is necessary to nutrition that food should admit of being digested, and as it is *heat* which works out digestion, so all living creatures have *heat*.

It has thus then be shewn, although but superficially, what nutrition is; but the subject shall be further elucidated in other treatises upon the subject.

PRELUDE TO CHAPTER V.

ARISTOTLE, having fully inquired into the process of nutrition, here enters upon the investigation of the sensibility or sentient system, which is, as he said, the line of separation between animal and vegetable existence ; the inquiry includes, of course, the senses and their organs, as well as allusions to those external forces or qualities which by their action produce simultaneous perception, that is, sensation. Sensibility is one of the great mysteries of our mortal nature, but its investigation was, in that age, additionally complicated and abstruse, as the brain as well as its relation to the spinal cord and connexion with the organs of the senses were unknown. But, although anatomy has detected the links between the brain and sentient organs, and thus shewn that the senses are emanations, so to say, from it, yet this knowledge, however otherwise valuable, does not explain how matter has been constituted thus to produce sensation, and, by reflexion, consciousness.

CHAPTER V.

LET us now proceed, as those subjects have been scrutinized, to speak upon sensation in its widest acceptation.

Sensation is the combined result, as has been said, of a motion and an impression, for it seems to be some kind of change; and some writers maintain that it is only like which is impressionable by like, but we have already, in our treatises “upon *action and impression*,” shewn how far the opinion is or is not tenable. But it is difficult to understand why there is no sensation from the senses of themselves, that is, why, without the presence of external objects, the senses do not give out sensation, although *fire, earth*, and the other elements, from which or the accidents of which sensation is derived, are present in them. It is evident that it is because the sensibility is not in a state of activity, but is only in potentiality; and, therefore, that it is with it as with a combustible material, which alone, without something on fire, does not burn; for otherwise it might set fire to itself, and would stand in no need of fire, in reality, for the purpose. Since we speak of sentient perception in a two-fold

sense, (for we speak of one who hears and sees, in potentiality, as "one hearing and seeing," although he may happen to be asleep, and we say the same of one who is actually employing those senses,) so may sensation be spoken of in two ways, as subsisting in potentiality and subsisting in activity. Let us, however, before proceeding further, observe that impression, motion, and action are for us equivalent terms—for motion is a kind of action, although an action which is incomplete, as has been elsewhere explained. Now, all things which are impressed and set in motion are so affected by something capable of making impression and existing in activity; so that impression is in one sense by like, and in another sense by unlike, as we have said—for the unlike is subject to impression, but, having been impressed, it is converted into like. A distinction, however, must be drawn between the terms potentiality and reality, for we are now going to employ them in an absolute sense—any individual whatever, then, may be learned, as we might speak of any man as learned, because man is among beings capable of learning and being learned; and so we speak of a man as learned, from his actually professing, at the time, grammatical or other knowledge.

Thus, each of these individuals is learned in potentiality, although in a different manner—the one is so because he is of a *certain genus* and *peculiar*

matter; and the other, because he can when he will reflect upon his knowledge, provided there is no external impediment to his doing so. It is this one only, however, when actually reflecting upon his knowledge, being in *activity*, and fully acquainted with some one subject, as A. for instance, who is to be accounted learned in reality. Both those first men, in fact, are learned in potentiality; but the one is so from having been modified by learning, and undergone frequent changes from one habit to an opposite one; and the other is so from possessing sensibility or rudimentary learning, and being able, although in a different manner, to pass from inertia to activity.

But the term impression is not absolute in signification, as sometimes it implies a kind of destruction by a contrary, and sometimes it signifies rather preservation of something being in *potentiality* by something which is in *reality* and *like*, in the relation that *potentiality* bears to *reality*. Thus, the possession of knowledge implies the power of reflecting upon it, and this either is not *change*, being but an increase of knowledge and a step towards its completion, or it is change of a different kind. It is not correct, therefore, to say that an individual, when thinking, is *undergoing change*, any more than that a builder, when employed in building, is *undergoing change*; so that the process by which an individual passes, as to his thinking and reflecting faculties, from *potentiality* to

reality, ought to have some other appellation than that of *instruction*. We may not then, as has been observed, say of the individual who, from being in potentiality, learns and receives knowledge from one who is in *reality* and able to teach, that he suffers impression, or else it must be admitted that there are two modes of change, one in privative dispositions, and another over habits and nature. The first change, however, of this kind in the sentient being comes from the parent at the moment of conception; as from that moment the being has, as it were, learning and sensibility. There is an analogy between the state of activity and reflexion just alluded to, but with this difference, that the impressions productive of activity, as the audible, the visible, and others, are all derived from without; and the cause of this is that sensation, in activity, is employed upon particulars, knowledge upon universals; and universals are, in some way, in the Vital Principle itself. The act of thinking, therefore, is dependant only upon the will of the individual, which is not the case with sentient perception, as for it there must of necessity be objects to be perceived; and this holds good, and for the same reason, with respect to the sciences which are engaged upon external objects, because all such objects are among particulars, and are external to the percipient. But an opportunity may hereafter present itself for the further elucidation of the subject.

Let it, for the present, suffice to say, that the expression being *in potentiality* has not an absolute signification, for it may be understood of a boy as being qualified potentially to be a General, and also of an individual of suitable age for the office; and the term sensibility is subject to like modifications of meaning. But as the distinction between these two states of sensibility is without any special appellation, although it has been shewn that there is a distinction between them and what the distinction is, it has been found necessary to employ the terms *impression* and *change*, as if their signification were unequivocal; but, as has been said, the sentient principle is, when in potentiality, analogous to the external object when in *reality*.

The sentient principle, in fact, suffers impression when unlike; but, having been impressed, it is converted into like, and becomes the same as that by which the impression is made.

PRELUDE TO CHAPTER VI.

THIS chapter, adopting a former suggestion, commences with the nature and influences of the objects and properties which act upon the senses. As those properties or influences, however, whatever their denomination, light, sound, odour, savour, motion, number &c., are considered in their relation to the senses, respectively, they here are merely characterized under the terms, which are defined, of peculiar and common. Casual or chance perception is exemplified by a figure which is far from being apparent.

CHAPTER VI.

LET us, before proceeding further, speak upon the objects of perception in relation to each of the senses. The object of perception is spoken of in a three-fold manner, as there are two ways in which we speak of perceiving objects distinctly, and one in which we speak of perceiving them accidentally; and of those two ways one signifies the property which is peculiar to each sense, and the other the property which is common to all the senses. I mean by peculiar property that which cannot be perceived by any other than its own sense, and concerning which that sense cannot be deceived—as colour for sight, sound for hearing, and savour for taste. The touch, indeed, discriminates several differences of quality, but every other sense distinguishes only its own subjects; and thus sight or hearing is never deceived as to whether it is colour or sound which is seen or heard, although it may be deceived as to what or where the coloured, what or where the sonorous body may be.

Such then the properties which are said to be peculiar and to belong to particular senses; but there

are properties, such as motion, rest, number, form and magnitude, which are termed common, as they belong not to any one sense, but to all in common. Thus, there is a movement which is perceptible both by Touch and Sight. An object is said to be perceived accidentally when, for example, something white may be the Son of Diaries—for the percipient is sensible of the individual accidentally, because of his being an *accident* of that which is perceived; and, therefore, no impression is made by that which is perceived, as a special object, upon the percipient.

The properties of bodies, which are in themselves perceptible, are, strictly speaking, peculiar properties; and to such each particular sense is naturally and essentially related.

PRELUDE TO CHAPTER VII.

THE treatise commences the examination of the senses with the Sight, and closes with the Touch, which is somewhat contrary to Aristotle's estimate of their relative importance ; for he has shewn that the Touch is the first, as it is the most universal of all the senses, as well as essential to animal existence. Thus, this sense is to sentient creatures what nutrition is to other beings ; for as without Touch there can be no animal, so without nutrition there can be no life. Descartes, more in accordance with Aristotle's teaching, begins with the Touch, and then proceeds to the Taste, Smell, Hearing and Sight ; and so Grant¹ makes "all the other senses to be but modifications of the Touch." Cuvier, however, reverses this it may be general order, and treats of the special senses before the Touch. It may be well to observe, that the senses as well as their modes of excitation, had been

¹ *Outlines of Comp. Anat.* s. VI.

treated of in a distinct work¹, which may be regarded as supplementary to the present treatise; and this will explain why the eye and vision are here very briefly alluded to, while particular attention has there been given to the ear and hearing.

CHAPTER VII.

THE visible is that for which vision is the sense, and the visible is both colour and something which is describable by words, although it happens to be without a name; but our meaning will become clear to those who accompany us in the inquiry. The visible is colour, and colour is that which is upon something visible in itself; and this something is visible, not only after its appellation but, because it has in itself the cause of being visible. All colour is motive of the diaphanous, *in activity*, and to be so motive is the nature of colour. On which account nothing is visible without light, but the colour of each object is visible in the light; and we must, therefore, first say what light is. There is a something diaphanous, and I call *diaphanous* what is visible, and yet not visible,

¹ *De Sensu et Sens.* I. 10.

strictly speaking, in itself, but made visible by colour, which is *foreign to it*. Such is air, and water, and many solid bodies; yet neither air nor water, as air or water, is diaphanous, but the same nature is present in both those elements, which is in the eternal supernal body. Light is the *active state* of that *same diaphanous*, in so far as it is diaphanous, and darkness is the *same* in its state of *potentiality*. But light is the colour, as it were, of the diaphanous, when made diaphanous in *reality* by fire, or other such element as the supernal body; for to it belongs a something which is identical with fire. We have thus said what is the diaphanous and what light, and have shewn that neither of them is fire, nor a body, strictly speaking, nor an emanation from a body, (as, in that case, they would be corporeal), but that they are the presence in the diaphanous of fire or something analogous to fire, since two bodies cannot possibly coexist in one and the same body.

Light seems to be the opposite to darkness; and as darkness is the absence of a particular state of the *diaphanous*, it is evident that the presence of that state must be light.

Thus Empedocles, or whoever else may have held the same opinion, was wrong in supposing that light was transported and manifested, without our consciousness, between the Earth and surrounding space; for the opinion is opposed as well to sound conclusion

as to observation of the phenomenon. If the interval were small, the fact might, indeed, escape us; but, extended as it is from the East to the West, the postulate is too extravagant to be admitted.

Now that which is without colour is receptive of colour, as that which is without sound is receptive of sound; and that which is without colour is the *diaphanous* and the invisible or scarcely visible, such as darkness seems to be. Such too is the diaphanous; but then it is the diaphanous, not in potentiality but, in reality; for the same nature is sometimes darkness and sometimes light. But all objects are not visible in light, as there are some of which the peculiar colour only of each is visible; for some, not visible in light, produce sensation in the dark, as certain fiery brilliant appearances (which have no special appellation,) which emanate from fungi, horn, scales and eyes of fishes, but the peculiar colour is not seen of any one of those objects. It is foreign to our present purpose to explain how such objects become visible; but this much is manifest, that it is colour which is visible in light. Therefore, without light colour is not visible; for it is an essential property of colour to be motive of the diaphanous in activity, and the *reality* of the diaphanous is light. As proof of this, if any coloured object be placed over the sight, the object will not be seen, and yet there is colour, which is motive of the diaphanous, the air, that is, and, by

its being continuous between the object and the sense, it is able to give motion to the visual organ. Thus, Democritus was wrong in thinking that if the medium were a void, vision would be so accurate as to render an ant visible in the sky. The opinion, in fact, involves an impossibility; for vision is produced by some kind of impression upon the visual organ, and as this cannot possibly be effected by the colour which is visible, there remains only that it must be by the medium, and thus a medium there must be; so that if there were a void, vision would be, not to say inaccurate but, altogether precluded.

It has thus then been said why colour must be visible in the light; but fire is visible both in darkness and in light, and necessarily so, since it is by fire that the *diaphanous* becomes *diaphanous*. The same reasoning holds good for sound and for odour, as nothing sonorous or odorous can produce sensation when in immediate contact with the sentient organ; but by odour or sound the medium is set in motion, and by it the organ is moved. Thus, when any thing sonorous or odorous is placed immediately upon the sentient organ, no sensation is given out; and this is the case with the sense of Touch, although less evidently so; but the cause of this shall be explained hereafter. The *air* is the medium for sounds, while that for odour has no special appellation, for there is a particular impression common to air and water; and

what the diaphanous is to colour that which is in those elements is to odorous bodies, as aquatic animals appear to be sensible of odours. But neither man nor animals which breathe can smell without inspiring; and the cause of this shall be spoken of hereafter.

PRELUDE TO CHAPTER VIII.

THIS chapter is upon sound and hearing ; and as these subjects had been but desultorily alluded to in the other works, they are treated of at some length on this occasion. It opens with the distinction of bodies into sonorous and insonorous, and after tracing the analogy between the acute and grave, and the sharp and blunt (of touch), it passes by a rapid transition to the voice, which is dwelt upon at some length. The term *ἐνέργεια*, which had been used in place of *ἐντελεχεία*, to express the *active* as opposed to the potential or negative state of the diaphaneity, is again employed here to signify the analogous and contrasting quality of sound. The distinction between the terms is not very apparent *now*, although this may not have been the case then ; for the *ἐνέργεια* may have conveyed the idea of *action* in the transition from potentiality, and so have been more expressive of actual, as opposed to virtual light or sound. Thus, if sound be a quality or condition, it

may be active, and it may be only virtual or faint ; but although to us inaudible, it is not to be supposed that silence any more than darkness is ever absolute ; so that the text has limited the range of sound too absolutely by the activity of the sense. Aristotle¹ assigned, as has been said, a high privilege to this sense, because through it instruction is orally conveyed, and thus the blind from birth are more intelligent (*φρονιμώτεροι*), he observes, than “the deaf and dumb ;” but the argument would have been more correct had the second term been omitted, as individuals are of necessity dumb when hearing is quite shut out. The phraseology, however, is still sanctioned in common parlance.

¹ *De Sensu et sensili* I. 11.

CHAPTER VIII.

LET us now proceed to determine the nature of sound and hearing. Sound is double—one actual and another potential; for we say that some substances, such as sponge and wool, are without sound; and that others, as brass, and bodies which are hard and smooth, have sound, because such objects are able to sound; are able, that is, to create *actual* sound by the action of the medium between the object and the hearing. Sound of the *actual* kind is the invariable result of something in relation to something and in something; for its producing cause is percussion. It is impossible, therefore, that sound should be produced when there is only one substance, as that which percusses must be distinct from that which is percussed; so that the sonorous object sounds by its relation to another object. But there can be no percussion without movement, and sound is not produced by the percussion of any kind of substance, as we have said, (since wool, however percussed, does not, while brass and smooth and hollow bodies—brass because it is smooth—do give out sound,) and hollow bodies create, by reflexion, many percussions after the

first, owing to the medium within them having been set in motion and being unable to make its escape. Sound is audible in air, and so it is in water, although less distinctly; but neither air nor water is the *efficient cause* of sound, as for it there must be percussion of solid bodies against each other and against the air, and this is effected whenever the air, having been percussed, remains, is not, that is, dispersed. Thus, if the air be struck sharply and forcibly it gives out sound; for the motion of that which percusses should anticipate the dispersion of the air, as if any one were striking a rapidly moving heap or cloud of sand.

An echo is produced whenever the external air has been more than *once* repelled by the air contained within a vessel, by the sides of which that air is precluded from being dispersed, just as a ball rebounds. It seems as though an echo ought to be a constant occurrence, although it may not be audible, since that happens to sound which happens to light, and light is continually undergoing reflexion (for, otherwise, as light could not be everywhere, darkness would prevail beyond the spot illumined by the sun), but yet it is not everywhere reflected, as it is from water or brass or any other smooth body, so as to form a shadow whereby we are able to distinguish the light itself.

A Void is rightly said to be the sovereign *cause* of hearing;—for the air seems to be a void, and the

air, when moving continuously and as one body, is creative of hearing. But, owing to its being very diffi-
cult, it gives out no sound, unless that which is
percussed be smooth; when this, however, is the case,
the air becomes simultaneously *one* over the surface,
as the surface of every smooth body *is one*. Every
sonorous body is so constituted as to set in motion the
air which, by continuity, is one up to the hearing,
and the hearing is naturally connected with the air;
and owing to sound being in the air, the air which is
without sets in motion that which is within. An ani-
mal, therefore, does not hear everywhere, neither does
the air penetrate everywhere; for the part to be set
in motion is a living part, and does not everywhere
contain air. The air itself, owing to its ready diffusi-
bility, is without sound; but, when precluded from
being dispersed, its motion is productive of sound.
The air which is within the ears has been so immured
as to be immovable; and this in order that the sense
may perceive accurately all variations of its move-
ment. It is for these reasons that we are able to hear
when in the water, as the water cannot gain access to
the congenital air, or pass into the ear through the
convolutions; when, however, this does happen, there
is no hearing, any more than there is when the mem-
brane of the ear, which is to it what the skin over the
pupil is to the eye, is diseased. But proof is afforded
whether the hearing is perfect or not, in that the ear

is constantly giving out sound, just as a horn does ; for the air within the ears is continually moving in some peculiar manner, and yet sound is foreign to that air and forms no part of its properties. It is on this account, however, that we speak of hearing by a void and something resonant, because we hear by the part which contains the air confined within it.

But is it that which percusses, or that which is percussed, which gives out sound? Or do both contribute to its production, each in its own way? Now, sound is the motion of something which admits of being moved after the manner of bodies rebounding from smooth surfaces, whereon they may have been impelled. But every kind of body, whether percussing or percussed, does not, as has been said, give out sound ; as when a sharp point, for example, strikes a sharp point, there is no sound ; but in order to produce sound, that which is percussed must be so smooth, that the mass of air upon its surface may rebound from, and be agitated over it. The distinctions among sonorous bodies are revealed in the actual sounds which they give forth ; for as without light colours are not visible, so without sound the *acute* and *grave* are not audible. These terms (*acute* and *grave*) are derived from tangible properties, and employed, in a metaphorical sense, for sounds ; for the *acute* moves the hearing quickly and sharply, the *grave* moves it slowly and dully ; not, however, that

the *acute* is quick or the *grave* slow ; but that such is the motion of the one from the celerity, and such the motion of the other from the tardiness of its operation upon the sense. And there does seem to be an analogy between those sounds and the sharp and blunt, as perceived by the Touch ; for the sharp pricks, and the blunt pushes, as it were, because the motion exerted by the one is rapid, by the other tardy ; and it is in this manner that the terms in question have originated. Let us here, however, close our observations upon the nature of sound.

The voice is a sound produced by a living creature ; for nothing inanimate *speaks*, although there are objects, such as the flute, lyre, and others, which, having range of note, harmony, and expression, are said, from a resemblance between their tones and the voice, to do so ; and the voice does seem to have all the variations of note possessed by those instruments. Many creatures have no voice (as all the insanguineous, for instance, and some of the sanguineous, as fishes), which is very understandable, seeing that sound is a certain motion of the air ; and with respect to those fishes which are found in the Achelous and said to speak, they produce sound by their gills, or other such part. But although the voice is a sound emanating from a living creature, it does not imply any kind of sound, or a sound produced by any kind of part ; and as all sound is produced by the

conditions of something which percusses, something percussed, and a something, that is the air, in which percussion can be made, it might reasonably be assumed, that such creatures only as take in air can have a voice. Now, nature employs simultaneously the air respired for two functions, just as she employs the tongue for taste and for speech; and of these the former is necessary (and therefore imparted to most creatures), and the latter, as an organ for interpretation, is for their higher good; so too does she employ the breath both as necessary for tempering the heat within (as shall be explained elsewhere), and for the production of voice, which is for the welfare of the individual. The pharynx is the organ of respiration, for the sake of which is another part, the lung, and it is owing to this part that quadrupeds have more heat than other creatures.

It is the place about the heart which first needs respiration; and, therefore, it is necessary that the air, during inspiration, should pass inwards; and thus the percussion of the air respired by the living principle in those parts, against the so-called trachea, constitutes the voice. But every sound produced by an animal is not *voice*, as we have said (for it is possible to produce sound by the tongue, as in coughing), but in order to constitute the *voice*, there must be a percussing *living force*, and the *sound produced must be expressive of something*. The voice is, in fact, a

sound expressive of something—it is not, that is, as in coughing, a mere sound of the air inspired; and speech is the percussion, by the living principle, of the air in the trachea, against the trachea itself. As proof of which, we are unable to speak when holding the breath, that is, when we neither inspire nor expire; for the act of holding the breath sets in motion the air which is inspired. It is now manifest why fishes, having no pharynx, are without a voice; and they have no pharynx, because they neither admit the air nor breathe. It is foreign to our present purpose, however, to inquire into the cause of their having been thus constituted.

PRELUDE TO CHAPTER IX.

MODERN science confirms Aristotle's judgment concerning the nature of odour, for it is said "to be a curious and interesting problem, requiring much more investigation than it has hitherto received ;" and, according to Cuvier¹, "of all the substances which act upon our senses, those which produce the sensation of smell are the least known, although their impression has the liveliest and deepest influence upon our economy." But the reason assigned in the text for this relative imperfection of our smell is indefinite and questionable ; for "although man's nostrils are less complicated than those of any animals save the quadrumana, he is the only creature whose smell is fine enough to be affected by *unpleasant odours*." It may be doubted, besides, whether any sensation can be, as is implied in the text, so pure as to be freed from all mental or corporeal association ; but when man's smell is

¹ *Règne Animal*, T. I. 73.

compared with that of birds and beasts of prey, it may be granted that, within a certain range of impressions, it is relatively duller and coarser than with them. It is, however, assumed, that sight and smell, when perfect, have the faculty of perceiving colours, and odours purely, unassociated, that is, with any impression grateful or otherwise ; and thus, as man's smell was held to be imperfect, he was supposed to be sensible of odours as creatures with hard, that is, compound eyes are of colours. For such creatures¹ (crustacea, insects and others), having their eyes uncovered, being without lids that is, see objects which are at a distance "indistinctly, and as if they were looking through congenitally attached eye-lids."

¹ *Hist. An.* I. 15. 16.

CHAPTER IX.

IT is less easy to define smell and the odorous object, than the subjects which have just been treated of, as the nature of odour is not so clear to us as is that of either sound or colour ; and the reason of this is, that our sense of smell is inaccurate, is less delicate, in fact, than it is in many animals. Thus, man has but a coarse smell, and is never sensible of any thing odorous without associating therewith an impression of something painful or grateful ; and this seems to indicate an organ imperfectly constituted. It is probable that colours are perceived by creatures which have *hard eyes* in this same manner, and that shades of colour invariably make upon them an impression of something to be afraid of or otherwise. The human race is circumstanced in a like manner with respect to odours ; and there seems to be an analogy between taste and kinds of savours, and smell and kinds of odours, but as taste is a kind of touch, and touch of all man's senses the most perfect, his taste is more delicate than his smell. With respect to other senses, man is far behind many animals, but he is especially

distinguished from them all by the accuracy of his Touch; and to this he is indebted for being of all the most intelligent. As proof of which, individuals of the human race are according to the constitution of this sense and nothing else, clever or dull—for those with hard flesh are slow, and those, on the contrary, with soft flesh are quick of understanding.

As one savour is sweet and another bitter, so it is with odours; but some bodies impart an analogous savour and odour, impart, I mean, a sweet odour and a sweet savour, while other bodies give out their contraries. Some odours equally with savours are termed pungent, sour, and oily, but, as we have already explained, owing to their not being so distinguishable by us as savours, odours have derived their appellations from these, on account of the similarity of the objects from which they both proceed. Thus, the odour from saffron and honey is called sweet, that from thyme and other herbs of the kind pungent, and so for other bodies and odours.

There is a close analogy between the other senses and the hearing: for as it is sensible of the audible and the inaudible, so is vision of the visible and invisible, and smell of the odorous and the inodorous, and by inodorous is meant whatever is either altogether without odour, or has but a very faint odour; and a sense analogous to this is attached to the term *insapid*.

The smell is perceptive through a medium, such as air or water, for aquatic animals seem to be sensible of odour; and so, likewise, are sanguineous and insanguineous creatures, as well as those which wing the air. Thus, some of these are to be seen proceeding from a distance towards food, of which they have been made sensible by the odour emanating from it. And hence the difficulty of determining why, if other creatures are sensible of odours in a like manner, man alone can smell neither when expiring nor when holding his breath but, only when inspiring; and this whether the odorous object be at a distance from or close to him, or placed immediately within the nostrils. It is common, it is true, to all the sentient organs to be insensible to impressions when objects are placed immediately upon them; but it is peculiar to man (as may be proved experimentally), to be unable to perceive odours without inspiring. So that as insanguineous creatures do not breathe, they ought to have some other sense besides those spoken of, but yet this cannot be, since they do perceive odour; for the perception of odour, whether agreeable or disagreeable, is smell; and as these appear to be destroyed by the same powerful odours as those which destroy man (odours, for instance, from pitch, sulphur, and other like substances), we must conclude that they have smell, although they do not breathe.

The olfactory organ in man appears to differ from that in other animals as his eyes differ from those of creatures in which they are hard ; for man's eyes are furnished with a rampart, and a kind of sheath in lids, without the elevation and drawing asunder of which he cannot see, while hard eyes, having no such provision, are instantly sensible of whatever may be present in the diaphanous medium. In accordance with this, the olfactory organ is, in such creatures, like the eye, uncovered ; but, in such as breathe, it is furnished with a cover, which during inspiration is lifted up, as the veins and pores are then dilated. On which account, creatures which breathe cannot smell while in the water, as in order to smell they must inspire, and while in the water they cannot possibly inspire.

In fine, odour is derived from what is dry, as savour is from what is moist ; and the olfactory organ, when in potentiality, is analogous to that from which odour is derived.

PRELUDE TO CHAPTER X.

THIS theory of taste and savour is adopted substantively by modern physiology. Cuvier¹ says that "Taste is only a more delicate kind of Touch;" and Müller² considers fluid essential to its manifestations. There are three conditions essential to Taste, he observes, the specific nerve, the excitation of that nerve through savour, and the solution of the savour in the moisture of the sapid organ; for sapid matter to be tasted, must either be moistened, or else be solvable in the tongue's moisture. All which implies that, if an object is very arid, or if the organs of Taste are incapable of supplying moisture, the percipient will be sensible, not of sapid but, of tangible qualities only, such as hot and cold, hard and soft.

¹ *Règne Animal*, I. 31.

² *Handbuch der Physiologie*, Lib. II. 489.

CHAPTER X.

THE sapid object is a kind of tangible object, and this is the reason why it does not require, in order to be perceived, any other medium than the body, for the Touch requires no other. The body in which is savour, is the gustable body, and the matter of savour is in fluid, and fluid is something tangible. Thus, were we in the water, and were any thing sweet cast into the water, we should be sensible of the sweetness, not through the water as a medium but, from its having been mixed with the water as with a potable fluid. Colour, however, is not thus made visible from having been mixed with anything, nor is it made visible by emanations; and as the medium, in the case of colours, plays no part and colour is the visible, so is savour the gustable. No object, however, without humidity can impart the sense of savour; and, therefore, every sapid object contains humidity, in an *active* or a *potential* state, as does salt; for salt is readily moistened and liquefied by contact with the tongue.

Now, vision is perceptive of the visible and the invisible (for darkness, although invisible, is still

judged of by vision), and a very bright light (which is also invisible, although in a manner different from darkness), and so hearing is equally perceptive of sound and silence, of which that is audible and this inaudible, as well as a very loud sound, just as vision is of a very bright light; for as a very low sound is, in a certain sense, inaudible, so is a very loud and crashing sound. On the other hand, the term invisible, used absolutely, is analogous to the term *impossible* upon other subjects, and which may be significant of something generated without parts or with parts ill formed for their office, as an animal without feet, or a fruit without a kernel. So, too, the taste in its turn is perceptive both of what is sapid and insapid; and the insapid implies whatever has a faint or nauseous savour, or a savour altogether perverse of taste. The potable and the impotable seem alike to be the origin of taste, for they both are sapid; but then the first has a nauseous savour, and is perverse of taste, while the last is genial to the sense; the potable is common, besides, to the touch and taste. Since whatever is sapid is humid, it follows that the organ of taste may neither be humid *really*, nor yet be incapable of becoming humid; for the taste suffers impression by the sapid body, in so far as it is sapid. It is, therefore, necessary that the sentient organ, if not moist, should, for its function, be capable of becoming so: and, as proof of this, the tongue, when

very dry or very moist, is not sensible of sapid impressions—as in the former instance, it is a tangible rather than a sapid impression which is made by a fluid when first tasted; and when very moist, it is sensible only of the fluid already present, just as it happens when, after tasting something pungent, we proceed to taste a different fluid. It is thus that all savours appear to the sick to be bitter, because the tongue, with which they taste, is charged with a moisture having that savour.

Kinds of savour are, like shades of colour, simple when in broad contrast—as the sweet and bitter with their sequences, of the former the oily and of the latter the brackish; and intermediate to these are the pungent, rough, astringent, and sour, which seem to include almost all the varieties of savour.

In fine, the sapid sense, when in potentiality, is such as is the sapid object; and the sapid object, when in *reality*, is productive, in the sense, of its own savour.

PRELUDE TO CHAPTER XI.

COMMENTATORS have differed widely in their interpretation of Aristotle's meaning in the opening passage upon the Touch. But it may, with some confidence, be assumed that, from being unacquainted with the nervous system, and observing the wide-spread and varying delicacy of the sense, he was led to suppose that it might either be diffused, so to speak, as several organs, over the body, or be somehow identified with or included in the flesh which covers the body. ¹The flesh is the muscular substance, and as it envelopes, so to say, the body, it was probably supposed to be the seat or cause of the sense, as every part is sensible to Touch; and the analogue of flesh is the colourless substance of the Insanguinea—insects, &c. ²And there is a close analogy between the two substances, “as the muscles of the highest class of animals, during their development pass through the soft, colourless,

¹ *De Partib. Anl.* 2. 8. 1. 3.

² *Grant's Outlines of Comp. Anat.*

homogeneous and gelatinous condition of the Invertebrata, before assuming the *red* colour." As the Touch, besides, was regarded as the first in order of the senses and characteristic of animals, so the flesh was said to be the origin of all other parts of animal bodies, bone and skin, sinews, veins, hair and nails; and this hypothesis may have confirmed the opinion that it is either the sense or the seat of the sense of Touch.

CHAPTER XI.

THE same reasoning holds good for the tangible quality as for the Touch; for if the Touch be not a single but a manifold sense, it follows that tangible qualities must be manifold also. Now, it is difficult to determine whether the Touch is a manifold or a single sense, and difficult also to say what the organ may be which is percipient of tangible qualities; that is, whether or not it is the flesh, and that which, in other creatures, is analogous to flesh; but yet the flesh is only the medium, and the essential organ, therefore, must be something different from flesh, and situated internally.

Each sense seems to be perceptive of only one contrary, as Sight of white and black, Hearing of

acute and grave, and Taste of bitter and sweet; but several contraries belong to the sense of Touch, as hot and cold, wet and dry, hard and soft, with others. There is, it is true, a kind of solution for this difficulty, in that the other senses also admit of several contraries; as in the voice there are not only the acute and grave but also the strong and weak, the rough and smooth, with yet other contrasts; and there are many and varied shades of colour. Still it is not clear what that subjacent something is, which is to the tangible impression what the Hearing is to Sound.

Is then the sentient organ placed or not within the flesh, or is it the flesh itself which is immediately perceptive? It does not appear that any indication can be obtained upon this point from sensation being simultaneous with the tangible impression; for, situated as we are, were any one to extend a membrane-like substance over his flesh, the party would be equally sensible when touched, and sensible at the moment of contact; and yet, clearly, the sentient organ cannot be in that membrane. It may be, however, that if the membrane were a congenital part of the body, sensation would pass through it more rapidly. Thus, this part of the body appears to be disposed towards us as air would be, had air been diffused around us; for it would seem to us as though by some one sense we perceive sound, colour, and

odour, and as though sight, hearing, and smell, are one and the same sense. But now, as the motions emanating from external objects are distinguishable by the medium through which they are conveyed, the sentient organs alluded to must manifestly be different also. With respect to the Touch, however, this is still obscure, for it is impossible that a living body should be constituted out of air or water, as it must have some solidity; and there remains only this conclusion, that it must be a mixture of earth, and such other particles as have affinity with flesh, and the analogue of flesh. Thus, the body has, of necessity, been adapted for being the medium for the tangible sense, through which the several tangible impressions are to be conveyed; and that the impressions are manifold is shewn in the tongue being perceptive of tangible as well as sapid qualities. We are sensible, in fact, by this organ of all tangible as well as sapid qualities; and were the rest of the flesh, like the tongue, sensible of savour, then "*Taste*" and "*Touch*" would seem to be one and the same sense; but now we perceive, since they are not convertible, that they must be distinct senses.

It may be a question whether, as all bodies have depth, that is the third magnitude, any two bodies, which have between them another body, can be in contact; for neither the humid nor the liquid is incorporeal, as each must, of necessity, be water or hold

water; and thus, it follows that, as the extreme parts of bodies in the water are not dry, the water, with which their extremities are covered, must be interposed between them. If this be true, then it is impossible that one body, when in the water, should be in immediate contact with another; and this holds good for bodies in the air; for the air is in the same relation to bodies in air which water is to bodies in water; but owing to our being in the air, the fact as readily escapes us, as it does aquatic animals, from their being in water, that water is in immediate contact with water. It may then be asked whether there is but one mode of impression for all the senses, or whether it is different for different senses, seeing that taste and touch are acted upon by contact, and the other senses from a distance? But yet this is a seeming difference only, for we perceive the hard and the soft, as we do the odorous, the sonorous, and the visible, through media; with this difference, that the former impressions are made by objects close to, and the latter by objects at a distance from us. On which account, as we perceive all things through a medium, the medium, in the case of bodies close to us, escapes our attention; but if, as we have already said, we could be sensible of all tangible impressions through a membranous substance, without our being conscious of their having been so transmitted, we should then be situated as we now are, when in water or air;

for so situated, we seem to touch bodies directly, and to have no impression from them through a medium.

But tangible differ from visible and sonorous impressions, in that the latter are perceived by the medium acting in some way upon us, while the former are perceived, not by, but together with, the medium, like a man who is struck through his shield;—for it is not the shield which, having been struck, strikes him, but the shield and he are simultaneously struck together. To use a general expression, the flesh and the tongue seem to be in the same relation to the touch which air and water are to sight, hearing, and smell;—are disposed towards that organ, that is, as each of those elements is to each of those senses. When the sentient organ itself is touched, no sensation can there or then be produced, any more than a white object can be seen when placed immediately over the surface of the eye; and thus it is evident that the part perceptive of tangible impressions must be *within*. Thus, it should be with the touch, as with the other senses; and if objects, when placed upon an organ, are not perceived, but, when placed upon the flesh, they are perceived, we must conclude that the flesh is only the medium for tangible impressions.

The distinctions of the body, as body, are tangible distinctions, and by these I mean distinctions such as distinguish the elements, as hot, cold, dry and moist, upon which we have heretofore spoken in our *treatise*

upon the Elements. The organ which perceives those distinctions is that of Touch; and the part in which resides, primarily, the so-called sense of Touch is, in *potentiality*, what tangible impressions are in *reality*; for all sensation is a kind of impression. So that whatever, by *its agency*, makes something else to be as itself, can do so only from that something being already, as itself, in *potentiality*. Hence, we are not sensible of hot and cold, hard and soft, when manifested in the same degree as in ourselves, but perceive them only when in excess, as if the sensibility were some kind of mean between the contraries of sentient impressions, and able, as such, to judge of sentient perceptions. The mean, in fact, is critical—for it is either of the extremes in its relation to the other; and as that which is to perceive white and black may be neither one nor the other *actually*, and yet both *potentially*, so it is with the other senses, and with touch, which may be neither *hot* nor *cold*.

As vision was said to be, in some sense, perceptive of the visible and the invisible, and the other senses equally of their opposites, so Touch may be said to be perceptive of the tangible and the intangible; and by intangible is meant as well what differs but slightly from what is tangible, as air for instance, as what is in such excess as to be destructive of all sensation.

We have thus then spoken, although but superficially, upon each of the senses.

PRELUDE TO CHAP. XII.

HAVING treated of each of the senses, Aristotle here proceeds to consider the source of sensation, the sensibility, that is, which is typified as plastic wax, from its capability of receiving the form of an object without its matter. This comparison is indeed a happy one; and it has been often employed by writers in modern times, and "among others by Bossuet¹." The chapter shews that for perception there must be a due relation between impression and sense, and that plants are insentient because they have no faculty for the reception of the forms of objects; and it concludes by shewing that the agency of some properties, as light, sound, &c., is confined to the sentient organs.

¹ *Connoissance de Dieu.*

CHAPTER XII.

IT must be admitted, for the senses in general, that each one is receptive of the perceptible forms of things without the matter, as wax takes the impress from a seal-ring, without the iron or gold of which the ring is made;—takes the device, that is, without the metal on which the device is inscribed. In like manner, the sense is impressed by each object having colour, or savour, or sound; not, however, after the appellation of the object but, according as it is of a certain quality, and in a given relation to the sense. It is the *primal organ* in which this faculty exists; and it is identical with the object perceived, although different from it in mode of being; for, otherwise, the percipient would be some kind of magnitude. But it cannot belong either to that percipient or to sensation to be *magnitude*, as they are rather a relation to, and a faculty for the perception of the qualities of each object. Thus, it is, from these reasons, made manifest why sentient impressions in excess destroy the sentient organs; for if the motion of the impression be stronger than that of the organ, then the relation

which constitutes sensation is dissolved, as harmony and tone become discordant, when the chords are struck too forcibly.

But why do not plants feel, seeing that they also possess a living part, and are impressionable by tangible qualities? And that they are so impressionable is shewn in their being both cooled and heated; but the cause is that they have not that mediate faculty, nor any such principle as admits of their receiving only the forms of things; that along with forms they are affected by the matter also.

It may be questioned whether impressions can be made by odour upon what may be without smell, or by colour upon what may be without vision, and so for other qualities and senses. But if that which is smelt be odour, then odour, if it produce anything, must produce smell, and thus nothing without smell can be affected by odour, and the same holds good for the other senses; neither can beings which are sentient be affected, save in so far as they are sentient. All which is made evident in that neither light nor darkness, sound nor odour, can act upon bodies, although that which is present with them may, as air with thunder splits wood. But yet tangible and sapid qualities do act upon bodies; for, otherwise, by what could inanimate things be acted upon and changed? Shall it then be said that those other qualities also act upon bodies? But all bodies

are not impressionable by odour and sound, and those which are so are indefinite and mobile, such as is the air; for the air gives out odour, as if it had been subject to impression. What then is smell but impression of some kind? But smelling is a sentient perception; and the air having been impressed by odour, becomes quickly sensible to us.

PRELUDE TO CHAPTER I.

¹THIS book has been by one commentator held to be spurious, even while admitting that all the opinions are genuine, because of imputed solecisms in the style and phraseology, which seem to indicate a foreign hand. But were any one capable, as Trendellenburg observes, of adopting, with so much perspicacity, the reasoning of Aristotle, he would be much rather inclined to put forth an original work, than thus to shelter his productions under another's name. The opening passages involve great, it may be, insuperable difficulties, owing rather to the argument than to the wording, although this is obscure, for it seems to be assumed that a sense would be felt to be wanting, although it might never have been possessed; and that the consciousness of its privation would prove whether or not a sense were wanting. According to this theory, in fact, if the Touch were a sense for every impression of which we now are

¹ Vide Trendell. *Comment.*

sensible, and if there were any property not perceptible by us, we should perceive that another sentient organ was required ; but it has not been shewn that such a want, had it not previously been satisfied, could be made sensible to us. And even for the Touch itself, were there any one property, of which we are sensible, say that of hardness, which had never been perceived, we could hardly be conscious of the want ; and there may be, probably are properties in the bodies around and above us of which we are unconscious, and yet remain without the feeling of a want. Each of the senses seems to be an ultimate fact ; for we are satisfied that we see by the eye and hear by the ear, and that with so little attention or will that the sentient organs perform their part almost irrespectively of the percipient. In the succeeding passages, which relate to media and the elementary constitution of the senses, there is ambiguity or confusion, occasioned by the then prevailing dogmata of *elements and like by like*, and perhaps, it may be added, by unacquaintance with the structure of the sentient organs.

BOOK THE THIRD.

CHAPTER I.

WE may be satisfied, from the observations which follow, that there is no sense besides the five—besides, that is, Sight, Hearing, Smell, Taste, and Touch ; for if Touch be the sense for every impression of which we are sensible, and if we have this sense, then, as all the conditions of whatever is tangible, in so far as tangible, are made perceptible to us by the Touch, it follows that, if any sensation be wanting, some sentient organ must be wanting to us also. Now, all the bodies which are perceived by touching are made sensible to us by the Touch which has been allotted to us ; and all those which are perceived, not by touching but, through media, are made sensible to us by simple bodies—that is, by air and water. We are so constituted, in fact, that, if several objects, differing generically from one another, could be perceived through one medium, an individual, having a sentient organ such as that medium, would, neces-

sarily, be sensible of impressions through both media—as if the sentient organ should be of air, then, as air is the medium for sound and colour, the individual would be sensible of both impressions through the same organ. Should there, however, be more than one medium for the transmission of the same impression, as air as well as water (since both are diaphanous,) serves for the transmission of colour, then an individual, having an organ constituted of either of those elements, would perceive impressions transmitted through them both. The sentient organs, however, are constituted of those two simple bodies, air and water, exclusively—for the pupil is of water, the hearing of air, and the smell either of one or other; but fire forms no part of any organ, or rather it is an element common to all, as there is nothing sentient without heat; and earth either does not enter at all into any sentient part, or it has been in some especial and peculiar manner combined with the Touch. Thus, there can remain only this conclusion, that, were there no air or water, there could be no sentient organ; and organs so constituted are actually possessed by animals now living. All the senses, in fact, are possessed by animals which are neither imperfect nor mutilated; for the mole appears to have eyes beneath its skin. So that, unless there is some kind of body hitherto unknown and some kind of impression unsuited to bodies here on earth, it may be affirmed

that no sense can be wanting to us. But neither is it possible that there should be any special organ for the perception of common properties, (such as motion, rest, magnitude, form, number and unity), of which we are made sensible, by each special sense, accidentally; for we perceive all such by motion as we do magnitude, and as we do form, as form is a kind of magnitude; the state of rest we are sensible of by the absence of motion, and number we perceive by the want of continuity and by particular senses, for each sense is perceptive of *unity*. So that, evidently, there cannot be a peculiar sense for the perception of any one of those properties, as motion, for instance; with respect to which we shall be ever situated as we now are, when, by sight, we judge of something sweet. And this we are able to do from our happening to possess a sense which is perceptive of double impressions, and by the way in which those impressions coincide, we recognise what the thing is; were this not the case, then, in no wise, except by chance, could we perceive that the thing was sweet, any more than we could tell that an individual is the son of Cleon, not because he is really so, but because he is fair; and fairness is an accident pertaining to the son of Cleon. And yet we have a common sense for the perception of common properties and that not casually, although it is not a peculiar sense; for, were it so, then in no otherwise could we perceive those

properties than, as has just been said, we see that an individual is the son of Cleon. The senses, however, do perceive, casually, the special qualities of each other; but then they do so, not as distinct senses but, as becoming one sense, as when double impressions may be made simultaneously upon the same organ, as by bile, which is bitter and yellow. But as it belongs not to either sense to say that both qualities belong to one substance, we are exposed to error, and led to think that if a fluid be yellow it must be bile.

Should any one inquire why we have been furnished with several senses in place of having only one, it might be answered, "that we have so been constituted in order that the sequences and common properties of bodies, as motion, magnitude, and number, may the less readily escape our notice." If vision, in fact, were our only sense and it perceptive only of whiteness, then all other qualities would more readily escape our notice and seem to be identical, on account of colour and magnitude being in an invariable sequence to one another. But as here common properties are manifested in different bodies, it is evident that each of those properties (colour and magnitude) must also be different.

PRELUDE TO CHAPTER II.

THIS chapter opens with a continuation of the discussion upon the senses, and, assuming sensation to be an ultimate fact, it argues that vision (taken as an example), must be the office of the eye, or some other sense; if the office of some other sense, then it, unlike every other, will have had assigned to it two different modes of impression. Add to this, that like the visual sense, which perceives colour only, it must be imbued with colour, and this would interfere with its own peculiar office. The further objection to another than its own sense for vision, in its requiring an infinite series of perceptions, is neither clear nor apposite; for, had a sense been made perceptive of double impressions, that faculty would be, as much as a single sense, an ultimate fact. The passage has been a fruitful topic for commentators, as might be supposed, but it still remains the subject of conjecture.

CHAPTER II.

SINCE we are sensible that we see and hear, we cannot but be sensible that we see by sight or by some other sense; but, if we see by some other sense, then it will be perceptive of sight and colour, the subject of sight; and thus there will be either two senses for the same office, or the sight itself will be the percipient. If, besides, there is some other than the visual sense for sight, we shall have to admit an infinite series of perceptions, or else this other sense, whatever it may be, will be the visual percipient; and this might as well have been conceded to the first sense. But here there is a difficulty—if to perceive by sight is seeing, and if that which is seen is colour or something having colour, then, if any sense is to see that which sees, that sense must first have colour. It is then manifest that perception by sight is not a single perception; for even when we may not see, it is still by sight that we judge both of darkness and light, although not in the same manner. That, moreover, which sees, must have been already imbued with colour, since each sentient organ must be receptive of the object of

perception without its matter; and this accounts for *impressions* and *images* being still present in the *sentient organs*, after objects have been withdrawn.

The action of the object of perception is one and the same with that of the sense, although they differ in mode of being—I mean, for example, sound in action and hearing in action; for it may be that an individual, endowed with hearing, does not hear, as that a sonorous body does not give out sound. But when an individual, capable of hearing, listens, and when that which is sonorous gives out sound, then hearing in action coincides with sound in action, and the one may strictly be termed hearing, the other sound. If motion, production, and impression, are in the product, it follows that sound and hearing, in an *active state*, must pre-exist in hearing in a *potential state*; for the action of the creative and the motive exists, naturally, in that which is to be acted upon. It is, therefore, no way necessary that the motor should be itself in motion. The action, then, of the sonorous body is sound or sounding, that of the auditory sense is hearing or audition; for hearing is double as sound is double, and the same applies to other senses and perceptions. Since production and impression are, not in that which acts but, in that which is impressed, so the action of the object of perception and the sensibility is in the sentient being. But, while for some senses these two states have

been specially distinguished by names, as sound and hearing, there are others for which one or other state is without appellation—the action of vision, for instance, is called sight, but the action of colour is unnamed; the action of the sapid sense is called *taste*, while that of *savour* is without appellation.

Since the action of the object of perception and that of the sentient being is one and the same, although different in mode of acting, it follows that hearing and sound, in this sense, must together be lost, or together be preserved; and this is true of taste and savour, and other senses and functions; but yet it does not hold good of those relations in *potentiality*.

The earlier physiologists have expressed themselves ill upon the subject, as they thought that there can be neither *black* nor *white* without *sight*, nor *savour* without *Taste*. And yet what they said was in part right and in part wrong; for as senses and sentient impressions have a twofold acceptation, according to their state of *potentiality* or *activity*, so what was advanced by them may be applicable to the one state, and inapplicable to the other. The fact is, those writers reasoned absolutely upon conditions, which do not admit of being so dealt with. If a voice of any kind is harmony, and if voice and hearing are, in one sense, the same, and, in another sense, not the same, then, as harmony is proportion, it follows that hearing must be proportion also. And hence it comes

that every sound in excess, whether acute or grave, perverts the hearing, as every savour in excess does the taste; and every colour over-bright or dark dulls the sight, as every odour excessively pungent, whether grateful or offensive, does the smell, as if shewing that sensibility is a kind of proportion. Thus, qualities, as acid or sweet or saline, are agreeable whenever they are reduced, pure and unmixed, to a due proportion; for it is this only which renders them grateful. To speak generally, harmony is a combination of tones rather than the acute or the grave singly, as for the Touch, the *warmed* or cooled is genial, rather than the hot or cold, simply; for, as sensibility is proportion, so qualities, in excess, pain or pervert the senses.

Each sense is perceptive of its own appointed subjects, is innate in its own organ, *as a special organ*, and judges of the distinctions of qualities, as sight judges of white and black; taste of bitter and sweet, and so as to other senses and qualities. But since we judge of white, sweet, and each other quality by its relation to each sense, by what do we perceive that qualities differ? Now, it is evident that it must be by some sense, as the impressions are all sentient; and equally so that the flesh cannot be that *final organism*, as in order to judge of qualities it must, of necessity, first touch bodies. Neither is it admissible that, by different senses, we judge sweet

to be different from white, as both qualities must be apparent to some single faculty; for, otherwise, it would be as if I should perceive one quality and *you* perceive another, and thus make it evident that they are different from one another. But it is here required that the same individual should perceive that they are different, for the sweet is different from the white, and what he perceives that he says; and thus, what he says that he thinks and perceives. It is then evident that we cannot, by different senses, judge of different qualities, as also, from what follows, that we cannot judge of them in a separate portion of time. Neither can an opinion be in a separate portion of time; for just as it is the same individual who says that *good* is other than *bad*, so when he says that the one is different from the other, he implies that the other is equally so, and does not employ the term *when* loosely—he does not use it, I mean, in the sense of *now*, in the phrase, “*now* I say that the object is different,” without implying *that it is different now*. But, here, it is the same individual who employs the term *now*, and says that objects are different *now* and because *now*; for the impressions are coincident, as they are inseparable, and as the time is indivisible. It cannot, however, be, that the same individual, in so far as indivisible, should be subject to contrary impulses in time which is indivisible; yet if sweetness move sensation or thought in one way, bitterness

must move them in an opposite, and whiteness in some other direction. Can, then, that which judges be, numerically, indivisible and inseparable, yet separable in its mode of being? If so, then, in some way, as divisible, it may perceive divisible, and, in some way, as indivisible, it may perceive indivisible qualities; for in its mode of being it is separable, but, *locally* and *numerically*, it is inseparable. But is not this impossible? The same may, in potentiality, be indivisible and divisible and be the contraries; but not so in mode of being, as it is divisible in action, and cannot possibly be at once white and black, nor be simultaneously impressed by the forms of those colours, provided sensation and thought are such as we have said they are. But it is with this, as with that which some call a point, and which, in so far as it is one or dual, is indivisible or divisible. Thus, in so far as that which judges is one, it is indivisible, and its perceptions are simultaneous; and in so far as it is divisible, it employs the same point twice, simultaneously. In so far, then, as it employs the boundary as two, it judges of two things by it and perceives that they are distinct, as the boundaries of the line are distinct; but in so far as it is one, it judges by one act, and judges simultaneously.

Let what has been said then suffice for the definition of that principle, by which we maintain that an animal is made a sentient being.

PRELUDE TO CHAPTER III.

THIS chapter may be regarded as a metaphysical disquisition, since its purport is to distinguish mental faculties from corporeal sensations as well as to examine the opinions of earlier writers who had maintained that cogitation is some kind of sensation ; and, finally, the nature of imagination, as lying intermediately between faculties and sensations, is investigated and defined. It treats, too, although but incidentally, of the understanding, knowledge, opinion, and other topics which border on abstractions ; and closes with etymology to shew the sentient origin of imagination.

CHAPTER III.

As writers, for the most part, define Vital Principle by two different faculties, by locomotion and thought, judgment and sensibility, it would seem as though thought and reflexion are by them considered to be some kind of sensation; for, in both cases, the Vital Principle both discerns and recognises something. Thus, the ancients affirm that reflexion is identical with feeling; and Empedocles has said, "man's intelligence is enlarged by what is present," and, elsewhere, "hence, *man derives his power of reflecting upon different subjects;*" so Homer's words, "*such is the mind,*" do but express the same idea. All these writers assume, in fact, that *thinking*, like *feeling*, is *corporeal*, and that *Like* is perceived and comprehended by *Like*, as was explained in our opening chapters. But yet it was incumbent upon them to have spoken, at the same time, upon the liability to error through the senses; for this belongs, more peculiarly, to animals, and Vital Principle remains subject to it during the greater portion of existence. On which account, either all appearances are, as some of

those writers maintain, necessarily, true, or else error is caused by contact of the *unlike*, which is the opposite of the opinion, that *like* is recognised by *like*; and the error from *contraries* seems to be identical with the knowledge of *contraries*. It is manifest that feeling is not identical with reflexion; for, while the former belongs to all creatures, the latter has been imparted only to a few. Neither is thinking, that faculty to which belongs the sense of right and wrong, (the right comprehending judgment, knowledge, and sound opinion, the wrong comprehending their contraries,) to be confounded with feeling—for sensation, being derived from particulars, is ever true, and belongs to all animals; but the judgment may be wrong, and is imparted only to such as have reason. Imagination, in fact, is neither sensation nor judgment, and yet it is not called up without sensation, just as, without sensation, there can be no conception; but it is manifest that imagination is not conception. Imagination depends, in fact, but upon ourselves, as we can, at will, call it up (since it is in our own power to place images before the eyes, as do they who, for mnemonic aids, by laying down objects, form symbols); but to form an opinion does not depend upon ourselves, and then every opinion is, of necessity, either true or false. Whenever, besides, we may have an opinion upon any terrible and fearful incident, we are straightway affected as if it were a reality, just as

we are when we think upon any desperate deed ; but, under imagination, we become simple spectators, as it were, of a pictorial representation of terrible or daring achievements. There are, in conception itself, the distinctions of knowledge, opinion, reflexion, and their contraries, of which we shall speak elsewhere. With respect to thinking, since it is different from feeling, and feeling seems, in part, to be imagination and, in part, conception, let us here define imagination, and then proceed to the consideration of the other faculty.

If imagination be a faculty by which we say that an image of some kind, and that not merely in the sense of a metaphor, is called up within us, then it is to be ranged among those faculties or powers, such as feeling, opinion, knowledge, mind, by which we form judgments and determine what may be true or false.

It is clear from what follows, that imagination is not sensation; for sensation is either a *faculty* or an *act*, such as *sight*, and *seeing*, but an image is sometimes apparent to us without either faculty or act, as phantoms in dreams for instance; and then sensation is ever present, which is not the case with the imagination. If, moreover, imagination were in act identical with sensation, we should have to admit that it must belong to all *irrational creatures*, but this does not seem to be the case with the *ant*, *bee*, or *worm*; and then sensations are always true, but imaginings are for the most part false. Hence, we do not say, when accurately

examining any object, that we imagine to be so or so, a man for instance, but we so express ourselves rather when we do not clearly perceive what the object is, and when the perception may be true or false; when, to use a former expression, the object appears to us as *landscapes do to the purblind*.

Neither can imagination be regarded as one of those faculties, such as knowledge and mind, which are always true, for it admits of being false as well; and it remains for us to consider whether it is opinion, since opinion may be both true and false. But belief follows upon opinion, (as it is not admissible that an individual should not believe in that upon which he has an opinion,) and belief belongs to no irrational creature although imagination is imparted to many. Belief, besides, is an attendant upon every opinion, as persuasion is upon belief, and reason alone can persuade; but although imagination belongs to some irrational creatures, reason has been given to none. It is manifest, then, that imagination can neither be opinion with or through sensation, nor a combination of opinion with sensation; and for the same reasons evident, that opinion is from nothing else but that from which sensation is derived. By which I mean, if imagination be the combination of an opinion of *whiteness* and a sensation of *whiteness*, and not of an opinion of *goodness* with a sensation of *whiteness*, then to imagine is to think upon what has been sensually

perceived, and that not accidentally. But there are appearances which are fallacious, although our conception of them at the time may be true, as the sun, for instance, appears to be a foot in diameter, and yet we are satisfied that it is larger than the earth; and in such a case it happens either that the true opinion of the sun's dimension must have been cast aside, or else, while the sun remains as it was and the true opinion has neither been forgotten nor changed, that the opinion is at once both true and false. But the opinion is simply false when it escapes us that the thing seen is altered. It is evident, then, that imagination can neither be any one, nor be derived from any one of those faculties.

Since one object having been set in motion can communicate motion to another, and since imagination seems to be a kind of motion, and never to be produced without sensation, or in other than sentient creatures, or without the objects of sentient perception, and since, on the other hand, motion can be produced by the act of sensation, and this motion must of necessity be equal to the impression, it may be admitted that the motion of imagination can neither be produced without sensation, nor in other than sentient beings; that beings endowed with it act and are acted upon in many ways, and that its manifestations are both true and false. This latter alternative happens thus: the sensation which is derived from the objects peculiar

to each sense is true, or it involves the smallest amount of error; but when, in the second place, such objects are perceived in their accidents, there is room for fallacy; when for instance, something is said to be white, there is no fallacy, but when that object is particularised and said to be this or that, the perception may be fallacious. There is, in the third place, liability to error in our perception of common properties, and sequences in the *accidents* referrible to particular bodies—accidents, I mean, such as *motion* and *magnitude*, which are referrible to all bodies, and from which there is peculiar liability to error through the senses. But the motion produced by the act of sensation will differ from the sensation derived from these three modes of sensation—the first, while sensation is yet present, must be true; but the others, whether sensation be present or not, may be fallacious, and more especially, when the objects causative of sensation may have been withdrawn. If, then, imagination alone fulfil all the conditions indicated, and if it be all that has been said, it may be defined as *motion produced by sensation in action*. And since vision is a sense above all others, imagination has derived its appellation from light, because without light there is no vision; and owing to its being an abiding faculty and like *sensations*, animals perform many of their *actions* through it. Some animals are so influenced from being irrational; and others, as man, from having

their understanding eclipsed, at times, by passion, disorder, or sleep.

Let this much, however, suffice for the inquiry into imagination, for shewing what it is, and for what purposes it has been imparted.

PRELUDE TO CHAPTER IV.

THIS chapter is upon the mind (*ὁ νοῦς*) and Aristotle's inquiry is, whether it is part of that principle which gives life to the body, or altogether distinct from corporeal relations. It seems to be at once determined that there is no affinity between the mind and sensibility, the ministrations of which trench so closely upon cogitation; and that the mind, therefore, existing independently of the body, is related to subjects of thought, abstractions that is, as is sensibility to sensism and sensation. Anaxagoras regarded all things as combinations save mind, which alone he held to be homogeneous and pure. Aristotle¹ makes the mind to be receptive of the subject and the essence of the subject of thought; to be something divine, and to confer upon us *contemplation*, which is our sweetest, best enjoyment. "If this faculty, in its occasional exercise, as by ourselves, is happiness, it is, as the eternal attribute of the Deity,

¹ *Metaphys.* I. 8, 13; XI. 7, 8; I. 3, 10; III. 5, 12.

wonderful, and more wonderful in proportion as more enduring." But yet Aristotle quotes, without objection, that the mind is innate in animals, and the cause, in nature, of the world and its order ; and he cites the verses of Parmenides, which seem to imply that the mind is present in the limbs of man as if it were a corporeal agent. To judge, however, from observations in the course of this treatise, he may be said, although, perhaps, not always consistently, to have considered this great principle as impassive, indiscerptible, and freed from all corporeal ties ; and as being itself, only when withdrawn from matter and its influences. Thus, as matter must tend to preclude its offices, its existence, while associated with mortal beings, can be only that of potentiality.

CHAPTER IV.

WITH respect to the part of Vital Principle by which it both knows and reflects, whether that part be separate, or separate, not substantively but, in an abstract sense only, let us now consider in what it is distinguished from other parts, and how thinking is at any time exercised. If thinking be such as is feeling, then it may be some kind of impression by the subject of thought, or other analogous agency. But then that which thinks must be impassive, receptive of the form of objects, and, in potentiality, the same as the object, without actually being so. The mind, in fine, must be related to subjects of thought as the sensibility is to objects of perception. It is, then, necessary since the mind thinks upon all subjects, that it should be homogeneous, in order, as Anaxagoras expresses himself, that it should domine, that is, recognise things; and as whatever is foreign to it precludes and eclipses its inward light, so it can have no other nature than that of *potentiality*. Thus, the so-called *mind* of Vital Principle (and by *mind* I mean that part by which Vital Principle judges and compares), is not actually any one of the subjects of thought before

thinking upon it. It is very improbable, therefore, that the mind should have been commingled with the body; for were this the case, it would be a *quality* of some kind, as hot or cold, or it would have some kind of organ as there is for the sensibility, but no such organ is to be found. It is well said by some that Vital Principle is the place of forms, only this is to be understood of Vital Principle, not as a whole but as a cogitative faculty, and of forms, not in reality but, in potentiality.

It is manifest, from the nature of the sentient organs and sensation, that the quiescent state of the sentient is not the same as that of the cogitative part. For the sensibility is unable to distinguish impressions in excess, as a sound amid loud sounds, or a colour or odour among brilliant colours or pungent odours, but the mind, on the contrary, when thinking intensely upon any subject, can still think and with increased rather than diminished intensity upon the subordinate details; the sensibility, besides, cannot be without a body, but the mind is separable. When thus situated, the mind can become each of the subjects of thought, as an individual is said to be learned actually (and this may be said when he is able at will to employ his learning,) because he is at the same time equally learned in potentiality, although not as he was before he had learned or invented something; for when so learned he is able to reflect upon his learning.

There is a distinction between positive magnitude and ideal magnitude, water and ideal water, and so between many but yet not all substances, as with some the two states are identical, but the mind judges of flesh and ideal flesh either by some different faculty or by being itself differently disposed; for flesh cannot be without matter, but, as is a snub nose, it is something in something. Now, it is by the sensibility that we judge of hot and cold and other properties of which flesh is the standard; but it is either by some distinct faculty or as a curved is to an extended line, that we judge of ideal flesh. Straightness, on the other hand, as well as the snub nose we place among abstractions, for each is associated with continuity; but the difference, if there be a difference, between positive straightness and ideal straightness, the mind judges of by some other, perhaps a dual faculty; by some other faculty, at least, or by being itself differently disposed. To use a general expression, as are things abstracted from matter so are subjects of thought with respect to the mind.

It is difficult to determine how the mind, if it be as Anaxagoras supposes, homogeneous, impassive and without any thing in common with aught else, is to think, if thinking be some kind of impression; for it is only in so far as there is something in common between two substances, that the one seems to act and the other to be acted upon. And there is

the same difficulty if the mind itself is intelligible; for it will be present in other things, unless it is itself, intelligible in some other way than they are, and unless the subject of thought is some one specific subject; or else the mind will be some kind of combination, and this reduces thought to the nature of other things. But to suffer impression according to some common relation implies, as has been just explained, that the mind, in potentiality, is as the subjects thought upon, and yet that, in reality, it is no one of them before thinking upon it; and thus the mind is to be regarded as a tablet on which nothing may have been actually inscribed. The mind is a subject of thought to itself as is any other topic, since that which thinks and the subject of thought are among immaterialities; for speculative knowledge is the same as the subject which is so known. But we have to consider why the mind is not always thinking, as each subject of thought, in potentiality, is among materialities; so that the mind will not be present in any one of them (for the mind is the *immaterial* faculty which judges of them), although each of them will be subject to the mind.

PRELUDE TO CHAPTER V.

THIS chapter assumes the existence of a generic matter, as well as something which is to give to it reality, and thus it seems to admit of formative conditions other than those assigned to Vital Principle; the mind too, although said to be immaterial, is likened to a material agent. Aristotle¹ elsewhere, somewhat in conformity with this, says, "even granting that all things may be from one, or more than one primal element, and that the self-same matter may be the source of all beings, yet there is a peculiar matter for each genus, as pituita is the primal matter for sweet and oily, as the matter of bile is for bitter and analogous qualities." An early commentator observes, "matter is the receptacle and subject of forms, without having in itself either figure, quality, magnitude, or place; nevertheless, it is not a mere name, but truly exists as the basis of qualities. Matter

¹ *Metaphys.* VII. 4. 1.

exists potentially, bodies actually, with their peculiar character; and matter cannot be separated from form and real existence."

CHAPTER V.

SINCE, throughout all nature, there is a matter for each genus of entities (that which all belonging to that genus are in potentiality), and a something which is causative and constitutive from its making things what they are, as art impresses its forms upon matter, so those same distinctions must, of necessity, co-exist in the vital principle. Such also is the mind, from its faculty, on the one hand, of becoming all things, and, on the other, of creating all things, as if it were a virtuality like light; for light, in a certain sense, makes colours, being in potentiality, to become colours in reality; and the mind here meant is separate, impassive and homogeneous, being essentially an energizing influence.

That which acts is ever, in fact, more influential than that which is acted upon, as the causative principle is than the matter. Now, knowledge in *activity* is identical with the subject; but knowledge in *potentiality* pre-exists in the individual; and yet, strictly

speaking, it does not pre-exist, as that cannot be said to pre-exist which sometimes is, and sometimes is not reflected on. But that alone, whatever it be, which thinks, is separate from all else, immortal and eternal; and, because it is impassive, we derive from it no memory. But the impressionable mind, on the contrary, is perishable; and without it there can be no cogitation.

PRELUDE TO CHAPTER VI.

THIS chapter does but repeat what has already been insisted upon, that the mind or the sensibility, when engaged upon *indivisibles*, that is, single ideas or simple sensations, is not subject to error; and that the liability to error commences when ideas or sensations are either generalized, or judged of in their relations. It may be added, that the want of a sensorium or faculty for the generalization of particular sensations, and for affording to the mind, thereby, terms for comparison, is felt so much throughout, that the brain alone can, for some passages, fully explain all that the words may seem to imply.

CHAPTER VI.

WHENEVER cogitation is employed upon what may be indivisible it is not subject to error, but when engaged upon topics which involve both error and truth, there is a simultaneous combination of thoughts, whereby they are, so to say, individualized; in the way that Empedocles expressed himself, "Now the heads of many creatures budded forth without necks, and then, heads and necks were by affinity made one." It is thus that thoughts, however disconnected, as the incommensurable and the diameter, are by the intelligence joined together. If the question relate to things past or future, the mind, thinking upon time besides, adds it to the other conditions; for error lies ever in the combination, as when the white is said not to be white, the error is in the addition of the negative. Now, it is always in our power to speak of things individually; but then, it is not only true or false that Clem is fair, but equally so that he ever was or ever will be fair. It is the mind which individualizes each subject. But since the indivisible is in the twofold state either of *potentiality* or

actuality, there is nothing to preclude the mind when thinking upon extension, from thinking upon it as indivisible, for it is indivisible, *actually*, and *in time which is indivisible*; as time, like extension, is both divisible and indivisible. It may not then be said that the mind thinks upon any subject in each half; for extension exists only in *potentiality*, unless it have been divided. But the mind, when thinking upon each of the halves separately, divides the time simultaneously, and then time becomes such as the two extensions; and if the mind make a whole of the two halves, it does the same with time in its relation to them. The mind, however, thinks upon the indivisible as species and not as quantity, in an indivisible portion of time and by an *indivisible part* of Vital Principle; and this neither by accident, nor in so far as the subjects thought upon, or the part by which, or the time in which, it thinks, are divisible, but as they are indivisible. There is, in fact, in such cases a something indivisible, although it may not be separate, which makes time and extension to be one; and which holds good for all continuity, whether of time or extension. Now, the *point* and every analogous division, and whatever is as the point indivisible, are made known as being privation of something. The reasoning upon other subjects is like this, for were it asked how the mind is to recognise bad or black, it may be answered, that it recognises them in some way by their contraries;

but that which recognises them must, *in potentiality*, be the thing recognised, and be present also in it. If to any one of the senses there is no contrary, then that sense recognises itself, is in activity and separate from all else. An affirmation, like a negation, is something in relation to something, and is always either true or false; but not so with the mind, as it is true when it judges of any thing after its essence, and may not be true when it judges of something in its relation to something else. Thus, the visual perception of any particular object is true, but whether a something white which is seen be or be not a man is not invariably true; and this holds good for abstractions.

PRELUDE TO CHAPTER VII.

COMMENTATORS are generally agreed in regarding this chapter as a series of ill-connected repetitions of former statements and doctrines ; but, although repetitions, they will be found to illustrate or tend to the completion of some preceding opinions. It maintains, in fact, the same dogmata, adopts the same illustrations, and assumes a faculty, the representative of a sensorium, which physiology could not then supply ; and thus, although the wording may differ, the purport is the same. The term *ἐνέργεια* (which was before alluded to) is employed, in a more especial manner in this chapter, and as neither its meaning is obvious nor its equivalent easily selected, it may be well to offer a few words in explanation of it. Although it is opposed, like the *ἐντελέχεια*, to *δύναμις*, still the two terms are not synonymous ; for the former (the *ἐνέργεια*) seems to relate to action in some form, and the latter to completion or development of something out of an imperfect or nascent

condition. Action must be implied, it is true, in completion or development, and, therefore, the ἐνέργεια may be contained in the ἐντελέχεια, although this may not hold good reciprocally. But the first paragraph may be cited as an example of what apparently needs elucidation—"knowledge, is, it is said, *when active*, (latinè, in actu,) (ἡ κατ' ἐνέργειαν ἐπιστήμη), identical with," &c.—"la science *en acte* est identique," &c.—"scientia autem, ea quæ est actu, est idem quod res" and knowledge or science here, by metonymy, may, probably, mean the faculty by which knowledge is acquired or exercised; but what means this peculiar state which identifies the knowledge with the reason? All function presupposes activity and inertia; but the last as much implies identification as the first, so that the distinction between *activity* and *completeness*, although present, probably, to Aristotle, is not obvious to a modern student. The definition¹ of the term, although dwelt upon at length, fails, it may be from the difficulty inseparable from abstract speculations, to shew either what is strictly implied by it, or how it differs from the ἐντελέχεια; it is evident that motion, in some modified sense, in the process of completion, is to be understood; but beyond this,

¹ *Metaphysica*, VIII. 6. 1.

vague as it may be, explanation cannot be carried. Potentiality is related to it as to the ἐντελέχεια, but the relation is too dependent upon verbal distinctions, which cannot be transferred, to admit of being made evident even to the student of the original; and thus it may be asked, what is meant by knowledge is, "when active" identical &c. or the same words where they recur?

CHAPTER VII.

KNOWLEDGE is, when active, identical with that which is known; but knowledge, in potentiality, pre-exists in the individual, and yet, strictly speaking, it does not pre-exist, as all products are from a being in reality. Now, it is the object of perception, which appears, by its agency, to create sensation from the sensibility which is in potentiality; for it suffers neither impression nor change. So that this is a different kind of motion; for motion was said to be the act of something *incomplete*; but an act in an absolute sense is different, as it is the act of something complete. Thus, a simple sensation is like to a simple affirmation or a single idea; and as the impression may be grateful or painful, it is, as it were, affirmative or negative, and it bids

to flee from or pursue after something; and perceptions of *pain* and *pleasure* emanate from the sentient medium in its relation to *good* or *evil*, in so far as things may be one or other. So actual flight from something is identical with actual appetite, as the fugitive impulse does not differ from the appetitive stimulus, for they differ neither from one another nor from the sentient medium; and yet they do differ in mode of being. Images belong, naturally, to the thinking, as sensations do to the sentient principle; and as it may affirm or deny that anything is good or bad, it bids to flee from or pursue after it. The Vital Principle, therefore, never thinks without an image; as the air has made the pupil what it is, the pupil something else, and so with the hearing; but the last term is one, as the mean, to which belong several modes of being, is one.

It has already been said by what faculty the mind discerns that sweet differs from hot, but yet it may be spoken of again here. It is then an unit of some kind; and an unit in the sense of a limit, for it is as an unit and a limit in the relation, considered analogically and numerically, which the unit bears to the limit. What matters it, besides, whether our doubt is as to how the faculty judges of things, generically, the same, or opposite, as white and black?

Let $A = \text{white}$ be in relation to $B = \text{black}$, and let C be to D as A is to B , and so reciprocally; if C, D be

properties of some one body they will be as the properties *A*, *B*, and the body will be one and the same with the other, although not the same in the mode of being; and the same reasoning will hold good, of course, though *A* be = sweet and *B* = white. Thus, the cogitative faculty dwells upon ideas in images, and by images, independently of sensation, it in some way determines what ought to be pursued after or fled from; but, when acted upon by images, it is moved to think, and, perceiving the beacon to be on fire and moving, it comprehends, by that common property (motion), that an enemy is at hand. Sometimes, too, by images or thoughts present in Vital Principle, that faculty, as if seeing, calculates and orders things future in their relation to things present; and when it suggests that something is grateful or hurtful, it bids to pursue after or flee from it, as its biddings always tend to action. And with respect to all which pertains to inaction, the true and the false are in the same genus with the *good* and *bad*; but with this difference, that the former have an absolute, and the latter only a relative signification. The mind dwells upon abstractions, so termed, as it thinks upon a snub nose: in so far as it is a nose of that character it cannot be thought upon abstractedly, but in so far as it is concave the mind can, by thinking intensely upon the form, realise to itself the nose without the flesh in which the form is embodied. Thus, too, the mind

thinks upon mathematical questions as abstractions, although they are not really so, when they are thought upon.

In fine, the mind when thinking, is, *in act*, the thing thought upon. It shall hereafter be considered whether or not it can be admitted that the mind, without being itself apart from magnitude, can comprehend abstractions.

PRELUDE TO CHAPTER VIII.

THIS chapter is a brief summary of the principal theories and arguments which have been alluded to, and it adds but little for comment. The opening paragraphs are rendered less definite than might be wished for, by the recurring particle *πως* and by the substitution of *ὄντα* for *πράγματα*, although the distinction between them is not very apparent. It had just been said that "knowledge, in act, is *identical* with what is known," and here the same is predicated of Vital Principle, although *with a qualifying addition*; and the meaning, in either case, is dependent upon Aristotle's two sovereign conditions. It may be understood how the intellect as well as the sentient faculty can be regarded as identical with their subjects, in the way that a sentient organ, by reception of the form without the matter, may be said to be identified with the coloured or sonorous object; but it is not obvious how this can apply to faculty or sense in poten-

tiality, unless, indeed, as they are in abeyance, without perception that is, so objects, not being perceived, are without properties.

CHAPTER VIII.

HAVING thus summarily recounted whatever has been said upon the Vital Principle, let us repeat that it is, in some sense, all things which are; for things are the subjects either of sentient perception or of thought, and knowledge is, in some sense, things known, as sensation is things sensually perceived. But let us inquire how this is to be understood—Knowledge, then, like sensation is divided, when *in potentiality*, into things *in potentiality*, when *in reality*, into things *in reality*; and the sentient and the cogitative faculties of Vital Principle are, when in potentiality, identical with thoughts and objects of perception, in potentiality. But the question here must necessarily refer either to things or the forms of things; but the things themselves they cannot be, as it is not a stone but the form of a stone which is in the Vital Principle. Thus, the Vital Principle is, as it were, a hand, for as a hand is the instrument of instruments, so the mind is the form of forms, and sensation the form of things sensually perceived. Since there is, seemingly, nothing

separate from perceptible magnitude, it must be admitted that all subjects of cogitation are in perceptible forms, as well those termed abstractions as those which relate to the conditions and changes of the objects of perception. And, therefore, if a being were without sentient perception, he could neither learn nor understand; as for reflexion the individual must be able to call up an image of some sort, and images are kinds of sensations, excepting that they are immaterial. Imagination, on the other hand, is something different from affirmation and negation, for the true or the false is but a complication of thoughts. But by what are *primal thoughts* to be distinguished from such as are derived from images? Other thoughts, however, are not images, and yet without images they could not be produced.

PRELUDE TO CHAPTER IX.

THIS and the two following chapters are upon the parts or powers rather, which give to animals locomotion; but, as the nervous even the muscular system had not then been made out, the text is encumbered, occasionally, as might be expected, with speculations which may now seem idle, and distinctions which are almost futile. Aristotle¹ makes "animals to move and be moved for the sake of something, which is the limit of all their movements; and the moving powers of an animal are, perceptibly, he adds, thought and imagination, election, will and desire, which are all referrible to mind and appetite, *εἰς νοῦν καὶ ὄρεξιν*. Thus, as imagination and perception are alike able to direct an animal, they are in one and the same relation to the mind. The argument, in fact, dwells upon the motive as well as the object for progression, without a word concerning the agency by which it is to be effected, as if the muscular power of the body were unknown, or

¹ *De Gen. Animalm.* v. 16; II. 6. 46.

regarded only as the seat or source of the touch; and yet the flesh *was said to be the origin¹ and very body of an animal*. The strength² of all animals is, he adds, in the tendons (*ἡ ἰσχυρὸς ἐν τοῖς νεύροις*), and, therefore, strength is greatest when they are full grown; for the young have weak joints and deficient sinews.

CHAPTER IX.

SINCE the Vital Principle of animals has been defined by the two faculties of judgment (which is the office of thought with sentient perception), and of locomotion, let us now, having dwelt sufficiently upon sensation and mind, proceed to consider, with respect to the motor power, what part of the Vital Principle it may be. Let us consider, that is, whether it is a part of Vital Principle and separate from it, substantively or abstractedly, or whether it is Vital Principle as a whole; and if it be a part, whether it is something peculiar and exclusive of those usually attributed to Vital Principle, and which have been alluded to, or whether it is to be considered as one of them.

But a difficulty at once presents itself, both in

¹ *De Part. Animalm.* II. 8. 1.

² *De Gen. Animalm.* v. 7. 16.

determining the sense in which we are to speak of the parts of Vital Principle, and in settling how many of them there may be. In one point of view, in fact, the parts appear to be infinite in number and to comprise, not only those which some speak of as the reasoning, passionate and appetitive, and others as the rational and the irrational, but other parts also, which by the distinctions employed in those classifications, are brought into notice, and are more broadly distinguished from one another than are any of those to which we have alluded. *Those other parts* are the *nutritive*, which belongs to all plants and *animals*, and the *sentient*, which cannot readily be placed among either *rational* or *irrational* parts; there is the imaginative, besides, which differs in mode of being from all the others, and yet it would be difficult to determine, amid the several parts of Vital Principle, with which of them it is identical, or from which it differs. Besides these, there is the appetitive part, which, whether considered abstractedly or functionally, would seem to differ from all others, and yet it would be absurd to separate it from them; for volition is present in the rational, as desire and passion are in the irrational part, and if the Vital Principle be made up of these three, appetite must be present in each of them.

But, to resume the more especial topic of this chapter, what is that, let us ask, which confers upon

an animal locomotive power? Now, it may be supposed that the generative and the nutritive functions, which are innate in all living beings, originate the motion concerned in the processes of growth and decay, which equally belong to them all; and with respect to breathing and expiration, sleep and watching, which are subjects of much difficulty, we shall enter upon the consideration of them hereafter. Let us, however, consider what confers upon an animal the power of progression.

Now, it clearly is not the nutritive faculty—for the movement of progression is ever for some end, and is associated either with imagination or appetite; and then no being moves unless urged to it by desire or fear, excepting, indeed, there be impulse from without; plants, besides, were nutrition the cause, should be locomotive, and possess some organ to fit them for that kind of movement.

Neither can it be the sentient faculty—for there are many creatures which are sentient, and yet stationary throughout their existence; and if nature do nothing in vain, and never, except in the case of beings dwarfed or deformed, omits anything necessary to existence, the creatures alluded to are perfect creatures; and as proof of this they are reproductive, are capable of development and subject to decay, so that they also ought to have organs to fit them for progression.

Neither can the rational faculty or the so-called mind be the motor power, for the speculative intellect never thinks upon what is to be done, or suggests aught concerning what should be fled from or pursued after; but this motion is the act of one fleeing from or pursuing after something. Nor does that faculty, even when reflecting upon any such object, at once bid to flee from or to follow after it, as it often dwells upon something terrible, or agreeable, without suggesting alarm, although the heart may be set in motion or some other part of the impression be agreeable. Add to this, that although the mind may bid, and the reason suggest that something should be fled from or pursued after, the individual does not necessarily move, but acts as does an intemperate person, according to the dictates of passion. It is thus, occasionally, we see that a physician, although versed in medical science, does not cure, as if there were something other than the science which had the power of acting according to the precepts of the science.

It may be affirmed that the appetite cannot be the positive cause of this motion; for the temperate, even while desiring and yearning after something, do not act in order to secure that for which they feel appetite, but follow their understanding.

PRELUDE TO CHAPTER X.

THE subject of locomotion is continued, and the motor principles are said to be appetite and mind; but mind in the sense rather of a perceptive or sentient than a purely intellectual faculty; and yet it is neither the centre of sensibility nor imagination, although it partakes of the nature of each of them. The imagination, which many are said to follow against judgment, is evidently the voluntary species of which man alone partakes; and the other, which is allotted to the lower animals, may be regarded as *instinct*. The mind, as a practical faculty, is to be distinguished from the theoretical or speculative intellect, which has for its object the discovery of truth, as the other has the preservation of the body. The argument is complicated, and made less apprehensible by the technicality and great precision of its wording: thus, τὸ ὀρεχτόν, or object desired, is *food*, and appetite is the stimulus or feeling of hunger which compels to move; the practical

mind (*διάνοια πρακτική*) is the sentient faculty, and the beginning of the action, which is the satisfaction of the appetite, completes or is the last of the series. Thus, these two, the appetite and practical thought (which is sentient perception) are motors, as being both stimulus and desire, and the object desired (food, that is), acting upon the sentient perception, urges to locomotion for the attainment of it; the imagination, as an instinctive power, is said never to impel to move, save for the satisfaction of necessary wants.

CHAPTER X.

THOSE two faculties, the appetite and the mind, appear to be the motor principles in animals—the mind, if the imagination might be set down as being a kind of thought; for many against knowledge follow their imaginings, and other animals are moved neither by thought nor calculation, but by imagination. Thus, those two faculties, mind and appetite, are locomotive powers; but, then, it is *mind* in the sense of a calculating and a practical faculty, and which differs from the speculative mind by the object to which it tends.

Now, every appetite tends to some object, for the appetite, which is the beginning of the practical mind, has ever some object in view, and that object is the beginning of the action. So that these two, appetite and practical thought, may reasonably be regarded as motor powers—for the object longed for impels to move, and then, through it, the practical intelligence impels, because its origin is the object longed for; and when imagination may incite to move, it never does set in motion without appetite. Thus, it is the object longed for alone which produces motion; for if there were two motives, mind and appetite, they would produce motion according to some common formula. But as the case is, the mind does not appear to produce motion without appetite, for volition is appetite; and even when a creature may move by calculation, it still moves by volition; the appetite, on the contrary, impels to move against calculation, for desire is a kind of appetite.

The mind then is always right; but appetite as well as imagination may be right and may be wrong. It is, therefore, the object desired which always excites to move, but then that object is a good or an apparent good; not however, a good in every sense, but a *practical good*, and a practical good admits of being otherwise than good.

It is manifest then, that it is that faculty of Vital Principle, the so-called *appetite* which excites to

move. But when Vital Principle is divided into parts, and parts are distinguished by their faculties, very many are made apparent, as the nutritive, the sentient, the cogitative, the deliberative, and the appetitive, and these differ from one another more than do the desiring and the passionate.

The appetites admit of being opposed to one another, and this occurs when reason may be opposed to desire, but the opposition can be manifested only in beings with a sense of time; for the mind commands to resist on account of the *future*, while desire urges to *immediate* compliance, as that which is good appears, as the *future* is unseen, to be *absolutely good* and *absolutely grateful*. Thus, the appetitive faculty, in so far as appetitive, may, in a specific sense, be the motor, but it is the object desired by appetite which is the first to set in motion; for without having been itself moved, it incites to move from having been thought upon or imagined; and there are several such motors. There are three terms here: the motor; then that by which it moves; and thirdly, that which is moved. But the motor is in the two-fold sense of *unmoved*, and both *motor*, and moved—the unmoved is the practical good; the motor and moved is the appetitive stimulus or appetition (for that which is moved moves only in so far as it desires, and appetite is a motion or an act of some kind); and the moved is the animal. As the organism by which appetite

effects motion is obviously corporeal, its nature must be studied together with those functions which are common to the body and the Vital Principle. But to speak summarily, the organism whereby motion is effected, is as a hinge in which coexist the beginning and the end of motion—for herein are the convex and the concave, of which that is the beginning, and this the end of motion; and therefore the one is at rest while the other is in motion, as although, rationally considered, the two pieces are distinct, yet, substantively, they are inseparable.

In fine, then, as has been said, an animal is endowed with self-motion to the extent of its appetition; but it cannot be susceptible of appetite without imagination, and all imagination is either rational or sentient, and of this latter kind other animals partake also.

PRELUDE TO CHAPTER XI.

It is by no means obvious what may have been meant by "imperfect creatures," or in what sense *desire*, unless it be as instinct, can be assigned to them; for there is no trace throughout the zoology of Aristotle, extensive as it is, of any such species of being. One commentator has suggested *polypi* and *mollusca*; but the former, in their present acceptation, (improperly termed zoophytes), had not then been observed, and the latter¹ could not, from the description, have been regarded as "imperfect animals." The "*polypus*" was the generic term for the highest forms of the Cephalopoda, or "cuttle fish."

¹ *De Part. Animalm*, IV. 7. 4.

CHAPTER XI.

LET us now consider the motor power in such imperfect creatures as have only the sense of Touch; and learn whether or not it is admissible that imagination and desire can be present with them. Now, they do appear to be sensible of pain and pleasure, and if so far sensible, they must of necessity have desire. But how can imagination be present in them? It may, perhaps, be answered that, as their movements are indeterminate, so those sensations are present, but present in some indeterminate manner.

The sentient imagination belongs, as has been said, to other animals, but that which is voluntary is found only in such as are rational; for it is matter of calculation whether this or that shall be done, and as the individual is to pursue what is larger and better, he must be guided by a rule of some kind, and thereby be enabled to individualize several different images. The reason why these creatures do not seem to be capable of forming opinions is, that they are without the faculty for drawing inferences, and this includes opinion. But the appetite has no deli-

berative will, as appetite sometimes overcomes and impels the will, and sometimes the will overcomes and impels the appetite, as a ball is bandied to and fro; or appetite rules and impels appetite, when intemperance has the ascendancy. But that which is superior is ever naturally more dominant, and productive of motion in three different directions; but the intelligent faculty has no motion—it remains at rest. Although the conception of the *universal* is to be distinguished from the conception of the *particular*, (for while the former says that *such an one* ought to perform *such an act*, the latter says that *such an one*, and that *I am he*, ought *now* to perform *this particular act*;) yet it is this latter opinion rather than the former which impels to move; and although both may be motive, the one, at least, is rather at rest, and the other is rather in motion.

PRELUDE TO CHAPTER XII.

As the treatise is drawing to a close, this chapter again alludes to the distinction between the life in plants and animals from the presence or absence of sensibility—thus, animals are distinguished from plants by being sentient, as plants are from inanimate bodies by nutrition and growth. Aristotle¹ placed plants immediately after inanimate substances, and says that they are distinguished, generically, by degrees of vitality; that compared with other bodies they appear to be almost alive (*σχεδὸν ὡσπερ εὐψυχον*); compared with animals, to be inanimate; and that the transition from the one to the other is in an unbroken series. Thus, there are “marine creatures,” he says, “which cannot with certainty be ranged among either animals or plants; and sponge has altogether the appearance of a plant.” Lamarck² has substantively adopted this, as he, too,

¹ *Hist. Animalm*, VIII. 1. 6.

² Introduction, 77. 96.

commences with inanimate things (which, whatever their character, he distinguishes broadly from whatever has life) and then passes to plants, which he distinguishes from animal bodies, by being non-irritable—incapable, that is, of contracting any of their solids, suddenly and repeatedly, while animal bodies are, on the contrary, endowed with contractile power. Cuvier¹ observes, that “living and organised beings have, from the earliest times, been subdivided into *animated* beings—beings, that is, which are sentient and moveable, and beings which are inanimate; and as these are neither sentient nor moveable, they are reduced to the common faculty of vegetation or nutrition.” It is not necessary, then, as Aristotle remarks, that all living beings should be sentient.

¹ *Règne Animal*, C. I. 18.

CHAPTER XII.

IT is necessary to every living creature that it should have a nutritive principle in order that it may live and continue to live, from birth to death; for it is necessary to every thing generated that it should be capable of *growth, development* and *decay*, and as these cannot be carried on without nourishment, it is necessary to all reproductive and perishing beings that they should have a congenital nutritive function. But it is not necessary to all living beings that they should be sentient, nor can it be admitted that such as have simple or homogeneous bodies can have Touch, or that there can be an animal without Touch; neither can any beings be sentient but such as are receptive of form without the matter. It is necessary to an animal, however, that it should be sentient, if nature do nothing in vain—for all things in nature are for some end, or else they are accidents of things for some end; so that if there were any animal body fitted for progression without being sentient, it would perish, and could not attain to the end which is nature's design. How, in fact, is such a body to be nourished?

As to creatures which are fixed, they obtain their nourishment on the spot where they have been produced. It is not possible then, that a body which is not fixed to one spot and which has been generated, should have living principle and judging faculties without being sentient. Nor can a creature spontaneously generated be sentient; Why, let us ask, should it be so? The sensibility is for the greater good either of the Vital Principle or the body; but neither of these can, in the case supposed, be effected by it, as the one will not through it think the better, nor the other be better fitted for its offices. Thus, there is no living body free to move which is not sentient. But if a body be sentient, it must necessarily be either homogeneous or compound—Now, homogeneous it cannot be, as in that case it would be without Touch, and Touch it must of necessity have. All which is proved thus—Since an animal is a living body, and all bodies are tangible, and tangible implies whatever is perceptible to Touch, it follows that the body of an animal must be sensible to Touch, if the animal is to preserve its existence. The other senses, as the sight, smell, hearing, perceive through other media; but if an animal when touching were without sensation, it could have no guide for avoiding some things or seizing others, and so circumstanced, it would not be possible for it to preserve its existence. The taste, therefore, is a kind of Touch, for taste is the

sense for food and food is a tangible body; but sound, colour and odour neither nourish nor contribute to growth or decay. Thus, taste must of necessity be a kind of Touch from its being the sense which is perceptive both of what is tangible and nutritive; and, as these two senses are necessary to animals, it is manifest that there can be no animal without *Touch*.

The other senses, being for the higher good of animals, are allotted, not to all but, only to particular genera, as they are necessary to none but such as have the power of progression. If, indeed, such a creature is to preserve its existence, it must not only be sensible of objects when touching them, but be able also to perceive them when at a distance; and this can be effected if it be sensible through a medium, which, having been impressed and set in motion by the objects of perception reacts upon the percipient. And it is thus that the locomotive impulse acts until it cease in rest—that which impels something else communicates along with impulsion impelling power, and the motion is in a midspace; and as the first motor impels without having been impelled, so the last is impelled without impelling, and the intermediate links, of which there are several, both impel and are impelled. So is it too with respect to changes wrought in bodies, excepting that they are effected without change of locality—as if any one were to tinge a portion of wax, it would be in motion until

it should be saturated; nothing like this, however, can happen to a stone, but it can to water, and that to a distance. The air is mobile in the highest degree, and, provided it be still and in one mass, it both acts and is acted upon. It is better, therefore, in the case of refraction, to assume that the air, in so far as it is one mass, (and it is so over every smooth surface,) is impressed by form and colour, rather than that visual rays issuing from the eye are refracted. Thus, the air, in the case of vision, gives motion to the sense, as if the impress upon wax had been transmitted to its extremity.

PRELUDE TO CHAPTER XIII.

THERE were four admitted elements, fire and air, earth and water, from which all things were supposed to be formed; and the object here is to shew that an animal cannot be homogeneous, cannot be formed, that is, of only one element. Now, earth was supposed to give solidity, fire to be diffused through all living bodies, and thus there remained only air and water from which to constitute sentient organs; the earth was assigned, however, more particularly to the Touch, but, as Touch is perceptive of other qualities (as hot and cold) besides those of mere Touch, it could not be constituted of that element alone. The organs of relation, sight and hearing, were formed, principally, of water and air, which are the media for the transmission of visual and sonorous impressions; and the smell partook more of fire, as the Touch did of earth, yet not exclusively. The theory is superseded by the increase of our knowledge of external nature, but, in assuming

elements, combination and proportion, it seems to typify, as it were, an atomic theory. Hippocrates¹, also, taught that the human body cannot be exclusively, either of air or fire, water or earth, or any single element; although, he adds, "I do not quarrel with such as think otherwise." Plato², likewise, "derived all things, so to say, from these four elements, in due proportion and relation to one another; so that what fire is to air, that air is to water, and water to earth, and each is, by affinity, united with others, to form whatever is visible and tangible."

¹ *De Natura Hominis.*

² *Timæus*, 32, B.

CHAPTER XIII.

IT is manifest that an animal body cannot be simple, cannot, I mean, be only fire or air; for an animal cannot have any other sense without having *Touch*, and every living body is sensible to *Touch*, as has been said. But all the elements, except *earth*, may constitute sentient organs, as these all receive impressions through something foreign to themselves and through media; but the *Touch* is made sensible by touching bodies, and hence its name. And yet the other sentient organs do perceive by *Touch*, but then it is through something foreign to themselves; while *Touch* alone seems to perceive directly, through itself. So that an animal body cannot be constituted of any one of the other *elements* exclusively, nor can it be formed only of *earth*; for the *Touch* is the medium, as it were, for tangible impressions, and the organ is perceptive not only of the distinctions which pertain to *earth*, but of *hot*, *cold*, and all other tangible qualities. Hence it is that we have no feeling in bones, hair, or other analogous parts because they are of *earth*; and plants for the same reason, being of

earth have no feeling. It is impossible then that there should be any other sense without that of Touch; and its organ is neither of *earth* nor any other *element* exclusively. Thus, it is manifest that the Touch is the only sense of which animals cannot be deprived without dying; that animals only can possess it; and that it alone of the senses is necessary to animal existence. On which account, other sentient impressions in excess (as those of colour, sound and odour) may injure the organs but do not destroy the animal, excepting it be by chance, as when with sound there is an impulse and a blow, or as when, by visual or odorous impressions, other influences are set in motion, which destroy the animal through the Touch; and when savour destroys life it does so by communicating simultaneously a tangible impression. But the excess of tangible impression, whether hot, cold or hard, destroys the animal, because as every impression in excess destroys the sentient organ, so the tangible destroys that of Touch, and it is by the Touch that animal life has been defined; and it has been shewn that an animal cannot possibly exist without the Touch. Thus, the excess of tangible impressions destroys not the organ only but the animal, as that sense alone is necessary to its existence. Animals, in fact, possess, as has been said, the other senses, not merely for existence but, for higher enjoyment: they have sight, in order that, as they live

in air and water, in a transparent medium in short, they may see; taste, that by discerning what is grateful or nauseous in food they may have desire for and move to obtain it; hearing, that others may signify something to them, and a tongue that they may signify something to others.

NOTES.

NOTES

NOTES.

BOOK THE FIRST.

CHAPTER I.

Note 1, p. 11. *Truth in relation to nature, &c.*] Aristotle¹ says that some beings exist by nature, and some by other causes; those by nature include animals and their parts, plants and elementary bodies, as fire and air, earth and water, for all such, evidently, exist, and exist by nature. The objects, in fact, of nature's constitution are broadly distinguished from whatever does not emanate from her—"for all her productions appear to have within them a principle of motion, and of rest; some for locomotion, and some for the motions of growth, decay, and change. But neither a bed, a garment, nor any other similar object, whether formed of stone, earth, or composition, has any such innate tendency to change; and thus nature is to be regarded as the source and first cause of motion and rest in something which has, not casually but, innately, in itself, from its origin, the capability of being so acted upon." The term nature², besides, is applied to any substance which, however rude and unchangeable, admits, by its own properties, of being converted into something, as

¹ *Nat. Auscult.* II. 1.

² *Metaphys.* IV. 4. 3. 5.

bronze is said to be the nature of a statue or of bronze utensils, wood of wooden articles, and so of other materials and products. There were some who spoke of the essence of natural bodies as nature, and as they made the primal combination of particles, that is affinity, to be essence, Empedocles maintained that "the nature spoken of by men is only the combination of and change among particles." So that Aristotle confined the term nature to existing beings and the processes by which they are supported and perpetuated, to living and organised matter that is, while others widened its acceptation, and made it applicable to the changes continually going on through and by elementary substances. With him, in fact, it was a living principle; with others, a property or force, whereby change is a law.

"The term nature," says Cuvier¹, "in our own and most other tongues, signifies, sometimes the properties which a being derives from its birth (hereditarily) in contradistinction to those which it may derive from adventitious circumstances; sometimes the whole of the beings which compose the universe, and sometimes, again, the laws to which those beings are subjected. It is in this last sense that we are accustomed to personify nature, and out of respect to employ its name for that of its author."

Note 2, p. 11. *Its essence as well as its accidents.*] Aristotle² observes that essence seems, most manifestly,

¹ *Règne Animal*, Introduction.

² *Metaphys.* VI. 2. 1.

to be an innate property in bodies; and, therefore, animals and plants, and parts of animals and plants, as well as natural bodies, as fire and water, air and earth, the elements, in fact, are essences; to which may be added the bodies which are derived from the elements, as the heavens, stars, sun, and moon. Some, however, regarded the boundaries of bodies, as surface, line, point, and unit, as essences, rather than bodies or solids themselves. Thus, essence, according to the first definition, seems to be scarcely distinguishable from nature. Aristotle¹, however, in another passage, considers it under four heads: as *mode of being*, as *universal*, *genus*, and *subject*; and subject he held to be essence in a fuller sense than the others. Plato admitted of essence in forms, mathematical abstractions, as also in sentient bodies; and the Pythagoreans first, and Plato later, adopted *unity* as essence. Aristotle, in fact, seems to confine his definitions of these abstract powers or entities to the outer world; and others to comprehend, under the term, the abstractions of pure science, and the immediate operations of general laws.

The term "accident" was with Aristotle², as it is with us, significant of *chance* or *possibility*, as well as what is *necessary* and *constant*. The former is exemplified by an individual, when digging, finding a treasure, as this is an occurrence neither necessary nor constant; and thus there can be no assignable cause, save chance, which itself is undefinable, he adds, for an incident so purely casual.

¹ *Metaphys.* VI. 3. 1; IX. 2.

² *Ibid.* IV. 30.

But it also implies properties which, although not essential, are, still, inherent, inalienable from, and distinctive of particular bodies, as it is a property of the triangle to contain two right angles; these properties only are regarded as accidents in modern science, and such are implied in the passage alluded to.

Note 3, p. 12. *Concerning the thing itself, &c.*] This stands first in the enumeration of the *categories*¹, which comprize the *ten* following—thing itself; (*τί ἐστί*); quantity; quality; relation; when; where; position; reciprocity; action; and impression. They are so designated, Aristotle says, because there must ever be, in some one of them, accident and genus, individual, and definition; for it is through them that premisses signify either individual, or quantity, or quality, or other one of those enumerated. It is made evident, thus—when it is said of a man lying down that it is a man or an animal, the party both says what it is, and points out its *essence*; when it is something white which is lying down, then the party designates its *quality*, as well. But these two exemplifications seem to shew that the terms essence, accidents, category, like the abstractions of which they are the representatives, cannot be clearly distinguished from one another; so that they may almost be regarded as derivatives from one comprehensive idea. Essence is, in the first of those instances, almost confounded with the categories, although it is the object² of a special inquiry;

¹ *Topica*, I. 9. 1.

² *Categ.* 5. 1.

and this seeming incongruity may have led some scholars to set it down among them.

Note 4, p. 12. *Some kind of demonstration or division, &c.*] Demonstration is, according to Aristotle¹, a scientific syllogism, and by scientific is meant, he says, the method, through which we learn, *with certainty*, what a subject may be ; and, if the knowledge be such, it follows that demonstrative knowledge must be derived from conditions which are original, immediate, and more apprehensible and causative, than the conclusion sought for. Those conditions are, in fact, the suitable principles for ascertaining that which is to be demonstrated ; as, without them, the result will be, not *demonstration* but, *a syllogism*, which cannot, with certainty, eliminate truth. Thus, while demonstration² is a kind of syllogism, every syllogism is not demonstration. *Division* is said by Aristotle³ to be an imperfect syllogism, for it assumes what ought to be demonstrated, and draws conclusions from *à priori* reasonings. In this allusion to division, Aristotle may be supposed to have had Plato in view, "as it was by a process of dividing and subdividing that that eminent man conducted his inquiries after truth ;" as, however, this method was considered by him to be a faulty or imperfect syllogism, it may be that he alluded to it as one which might be adopted, without altogether approving of it as a mental process.

¹ *Analytic.* b. I. 2. 2.

² *Ibid.* a. I. 4. 1.

³ *Ibid.* a. I. 31.

Note 5, p. 12. *As those of number are not those of plane surfaces, &c.]* That is, the science of number differs, generically, from that of Geometry. The nature, so to say, of numbers had been a subject of deep and curious speculation long before and during the age of Aristotle, and there lie scattered through his works notices of writers and systems which, although in themselves interesting to scholars, would, even were it possible to give a clear summary of them, be foreign to the present inquiry. Aristotle¹, before entering upon number, defined "quantity" as being, partly definite, and partly continuous—and the former he constituted of parts which have no mutual local relation to each other; the latter of parts which have that relation. The "definite" quantity is represented "by number and by a word; the continuous by line, surface, solid, and time and place, besides." In order to shew that *number* is definite or discontinuous, he observes, "there is no common boundary whereon the parts of any number conjoin; as if, for instance, five or three be parts of ten, there is no common boundary whereon five or seven can conjoin to make the whole number, but each part is, for ever, a distinct number, and thus number is among definite quantities." "Words are, in like manner, among definite quantities; and it is manifest that words, uttered by the voice, are quantity, in that they are measurable by long and short syllables, and manifest too that there is no common boundary

¹ *Categ.* 6. 1.

whereon the parts of a word, that is syllables, conjoin to make the whole sound, and thus that each is for ever a distinct sound. But a *line*, on the contrary, is *continuous*, as there is no common boundary whereon its parts, that is *points*, conjoin, as lines, to make a *superficies*, whereon all parts of the *solid* conjoin; so too time is continuous, for that which is *present* is conjoined with that which is *past*, as it is with that which is *future*." Aristotle¹, having shewn that there are these opposite conditions of quantity, in a *positive* as in an *abstract* sense, defines an *unit* (*ἡ μόνος*) as being, in *direct opposition to a point*, without position or place; a line as being divisible only in one way; a superficies as divisible in two, and a solid, quantitatively considered, as divisible in three, and, indeed, in all ways. Number is still regarded, of course, as a collection of units; the superficies as that which has only length and breadth; and the solid as that which has length, breadth, and depth.

Note 6, p. 12. *Among entities in potentiality or whether, &c.*] These terms run, like a golden thread, through all the physiological works of Aristotle, and were adopted by him in order to distinguish virtual from actual condition or existence, the *capability*, that is, of becoming, by innate force or power, an *entelechy* or *reality*, which is the purport of the last term. They may be briefly exemplified thus:—an egg, *e. g.* is alive in potentiality—it has within it, that is, a principle, whereby, under genial

¹ *Metaphys.* IV. 5. 24.

circumstances, it can develop into a living being; and so a seed, while alive, is capable of becoming a perfect living plant, as the egg or the caterpillar or the chrysalis is, in potentiality, the future perfect insect or butterfly. The terms comprehend, in fact, all the metamorphic conditions of the animal and vegetable kingdoms, and have a range of application wide enough to include life under all degrees and forms. This was the first great idea in their adoption, and although Aristotle made them to signify an analogous transition in moral or mental faculties, (as when he speaks of a boy as a general, in potentiality,) yet their real purport is to distinguish those two universal conditions of living and sentient beings. Cicero¹ has alluded to these terms or rather to the entelechy, (as was noted in the preface,) but, from not having contrasted it with the potentiality, he seems to have mistaken its general import; and he may thus have been led to suppose that Aristotle's intention, *in this novel term*, was to designate *a special fifth nature*, to be the source of motion and the originating cause of mental faculties and natural emotions. Montaigne², also, in modern times, following Cicero, speaks of the entelechy only, which he regards, erroneously, as the motor power of the body—"ce qui naturellement fait mouvoir le corps." A hot dispute prevailed among scholars, it may be added, before and during the age of Rabelais³, (and which he has alluded to

¹ *Tusc. Disp.* I. 10.

² *Essai*, Lib. II. ch. xii.

³ *La Vie de Gargantua*, Lib. v. ch. xix.

with all his wonted wit and learning,) whether the term should be ἐντελέχεια or ἐνδελέχεια; he was, evidently himself, one of the *entelechists*, as he says that the Lady Quint-essence, who had had Aristotle, "that paragon of all philosophy," for god-father, had been truly and correctly named Entelechy by him.

Note 7, p. 13. *Whether the difference is generic or specific.*] "The term Genus¹ implies a continuous series of individuals having a like species or form, so that genus may be predicated of *man*, so long as there may be a continuous generation of human beings; the *term* again may be applied to the source whence individuals may have descended, and thus some Greeks are of the Hellenic, others of the Ionic genus, on account of their direct descent from Hellenus or from Ion. And this applies so much more to the progenitor than to external conditions, that the descendants from a female constitute a genus. Species² implies the mode of being of the individual, together with the primal essence; and as the matter constitutive of the genus is in the species, so species may be regarded as parts of the genus. In modern classification, genus signifies "a distinct but subordinate group, which gives its name as a prefix to that of all the species of which it is composed." The physical sciences have been so widely developed, however, that, as those terms no longer suffice for grouping the myriads of beings which have been observed since Aristotle's time, naturalists

¹ *Metaphys.* IV. 25. 28.

² *Ibid.* VI. 75.

have, in addition, adopted kingdom or class, order, subgenus, individual, and variety.

Note 8, p. 13. *The term animal, however, in an universal sense, &c.*] This passage, which, in the original, is even more elliptical than its version, has engaged much of the attention of commentators without having been satisfactorily elucidated—some have explained it as a criticism of the ideas or archetypes of Plato; and others as an objection to every universal term, which, although an *abstraction*, is to typify *actual beings*; and this is, probably, the purport of the criticism. Thus¹, “the origin of the controversy, during the middle ages, between the *nominalists* and *realists*, may be traced down to Aristotle and his followers.” Wording so elliptical must, of course, be subject, according to the bias of opinions, to different interpretations; but if it imply objection to every abstract term which is to embody, so to say, *realities*, this version may be accepted as its interpretation. The Latin version², however, is, “Animal autem universale aut nihil est aut posterius est, et quicquid itidem aliud communiter prædicatur;” and the French³, “C’est que l’animal pris en un sens universel ou n’est rien, ou bien n’est que quelque chose de très ultérieur.”

Note 9, p. 13. *The mind before thought, &c.*] Aristotle⁴ says that among the philosophers who were engaged

¹ Trendel. *Comment.*

² *Ed. Acad. Borrissica.*

³ J. P. Saint Hilaire.

⁴ *Metaphys.* I. 3. 16; XIII. 3. 5; XI. 7. 7.

upon first causes, Anaxagoras and his predecessor Hermeticus had maintained that, as in animals there is a motor principle, so in nature there is *mind*, and that it is the cause as well of the universe as of universal order; and thus “they assumed at once that mind is the cause of the beautiful, the origin of being, and the source whence motion is derived for every thing living.” Anaxagoras, in fact, regarded mind as the first cause of things (which Empedocles was rather disposed to assign to the principle of *attraction*, which he designated *φιλία*, and held to be an universal element), and maintained that, while all else is but a combination of particles, it is homogeneous, impassive, isolated, and pure. We are incapable, Aristotle observes, in his comment upon these opinions, of *continuous thought* and reflexion, because these *are recreations too lofty to be continuously maintained*; but, on this account, watching (not being asleep, that is), feeling and thinking are our most genial conditions, because from and through them, we derive our hopes and recollections. Notwithstanding, however, this acknowledgement, so to say, of mind, as a sovereign principle, and its attributes, there is no attempt to define its nature and its relations, or to shew in what it was identified with or different from the vital principle; and this want of critical distinction between them is the more apparent as several epithets (*προγενεστατός—θεωρητικός—πρακτικός—παθητικός*) are introduced in the course of these physiological treatises, which cannot but have modified the parent term.

Note 10, p. 15. *Whether all the emotions of Vital Principle, &c.*] These passages shew clearly the suggestive power and perspicacity of Aristotle's intellect, and they point so clearly to doctrines which had yet to be developed, that they cannot be studied without feelings of surprise as well as admiration. The brain¹ was, in that age, supposed to be merely a supplementary organ to respiration; and, from its not giving out sensation when touched, and from imperfect anatomy, it was supposed to have no relation whatever with the sentient organs or spinal cord. The nerves, as cords of sensation, were unknown; the very term (*νεῦρον*), which has been transferred to them as *nerve*, meant then *tendon* or *sinew*. Hence it is that, in modern languages, a man is said to be *nervous* in the one sense, and a delicate female to be *nervous* in the other. It was thus, from intuition and study, that Aristotle drew this train of suggestive reasoning upon the influences exercised over our passions and emotions by the organs of the body; that he discerned, that is, the seat and source of the temperaments. Bichat², having a far wider range of anatomical knowledge, was able, by assigning to the brain and ganglionic system their proper offices, to distinguish intellectual faculties from passions and emotions, which although human, still are temperamental and functional—to distinguish, that is, the animal from the organic life.

Note 11, p. 15. *In the same way all the emotions, &c.*] These passages are quite in accordance with all that phy-

¹ *De Part. Animalm*, II. 7. 4.

² *Recherches physiologiques*.

siology now teaches ; for although but repetition, it may be said that Aristotle places the passions and emotions in the organic life, and shews "that every individual must be influenced by his particular temperament." Thus, as organs predominate, or may be more or less active, individuals are affected and modified, so to say, in temper as in character. The temperaments ought to be subordinated, of course, to the higher faculties ; but those organs are abiding powers, and they are ever exercising an influence which it is for reason to control or subdue. Plato, in the *Timæus*, has discerned this great truth—a *mortal principle* (ὅτε τὸ θνητὸν ἐπεστέλλε γένος) is there assigned to the body, as the seat of the passions and coarser appetites, while the brain is represented as a soil fit for the divine seed of wisdom ; and this will suffice to shew that this most gifted man, although but imperfectly acquainted with physiology, had perceived the co-existence in the human being of an intellectual and, so to say, a functional existence. Descartes¹ seems to have adopted opinions concerning the "passions of the soul," which have much in common with those of Aristotle ; but although so well acquainted with his writings, he does not appear to have studied this treatise.

Note 12, p. 16. *But the physiologist and the metaphysician would, &c.*] The difference here dwelt upon in the mode of accounting for the same phenomena, according to the bias given by studies or pursuits, will, it may

¹ *Les Passions de l'ame.*

be assumed, be of constant recurrence ; for, as physical science advances, it will become more and more difficult for the same party to attain to a large and solid acquaintance with the attributes of mind (abstractions, that is), and the knowledge of "external nature." The self-same differences, in fact, which were delineated so graphically by Aristotle, are still to be traced in our almost exclusive attention to the physical sciences, and our disinclination to admit, in our inquiries, of any proof but such as can be tested through and by the senses and observation. The terms here rendered physiologist and metaphysician (terms unknown, by the way, to Aristotle) in the Latin version are *naturalis*, and *disserendi artifex* ; that of artisan is *faber* ; builder, *artifex* ; and transcendental philosopher is *primus philosophus*.

CHAPTER II.

Note 1, p. 19. *Hence Democritus, &c.*] None of the works of this eminent man have come down to us ; but notices of his opinions lie scattered through the writings of Aristotle, and these may suffice for the elucidation of this and other allusions to him. Following his master Leucippus, Democritus¹, abandoning metaphysical subtleties, looked into the constitution of the external world for

¹ *Metaphys.* I. 4. 9.

the knowledge of natural causes ; and he was thus led to adopt the hypothesis of indivisible and moving corpuscles, in order to account for the universal law of motion. "Several other philosophers¹ had, before their time, considered matter as divisible into indefinitely small particles, but as they were the first who taught that these particles were originally destitute of all qualities except figure and motion, they may well be regarded as the founders of the atomic system of philosophy." Democritus² maintained that nothing can ever be produced from nothing, and that "indivisible atoms (elementary corpuscles, that is) constitute the essence of bodies." He adopted, as elements, the plenum and vacuum, making the former, in contradistinction to the latter, to be entity, and the two to be, as matter, the causes of things ; he maintained too, that they are equally distributed through all bodies. He agreed with Anaxagoras in believing that throughout all nature there is a principle of combination ; and with his master Leucippus, in regarding form arrangement and position of particles, as causes of elementary distinctions among bodies. But in some of this reasoning he was mistaken, Aristotle observes, from not distinguishing the condition of potentiality from reality, since the same object may simultaneously, when in *potentiality*, be and not be, although this cannot hold good of the same when in *reality*. Democritus also thought that, owing to the difference of sensation

¹ Enfield's *Hist. of Philos.* Vol. I. 422.

² *Metaphys.* VI. 13. 9 ; III. 5. 5 ; I. 4. 9.

produced by the same object upon the same individual, truth either has no existence, or else it can hardly ever be attained to by mortal beings. To return, however, to the doctrine of atoms, Leucippus and Democritus maintained that, as bodies are distinguished by forms, and forms are infinite, elementary bodies must be infinite also ; but then, with the exception of fire, which was said to be spherical, they forgot to specify what the forms are ; and they defined elementary bodies by greatness and smallness as well as form. Thus, form motion and size are, according to them, the constituents of these formative atoms, and, accordingly, the larger atoms which are said to go to the formation of bodies, are distinguished from the smaller ones or motes (held to be visible only in the sun-beams), which, as being endowed with vital properties, are alluded to, in a succeeding passage, as supporting, through respiration, the life of the animal. In fine, this doctrine of atoms varying in form and size, constantly moving, and, through attraction and repulsion, combining with and separating from one another, prevailed in all the schools of antiquity ; and there may perhaps be traced in it a faint outline of the present matured theory of atomic proportion.

Note 2, p. 19. *Hence, too, they make breathing, &c.]* This description conveys, under a rude exterior, so to say, a description of the process of breathing or respiration, as well as the purposes which it has to fulfil in the animal economy—"the contraction of the *chest* (*expiration*)

expels particles rendered effete, and these are supplied by others from without, during *inspiration*; and this alternation continues so long as life endures." It emanates from an early stage of physiology, no doubt, but yet it does clearly intimate that without such an alternation life could not be maintained—that a renewing power from without, and an expulsion of something prejudicial from within, are necessary to animal existence. Democritus (of Abdera), Anaxagoras and Diogenes are cited by Aristotle¹ as believing respiration to be necessary *for all creatures* (in opposition to himself, who limited the process to air-breathing animals), and he has given their account of the process in fishes and oysters (molluscs). "Anaxagoras says that fishes, during respiration, discharge the water through the branchiæ, and that then, as there may not be a vacuum, they draw in air which is in the mouth; and Diogenes maintains that, when fishes discharge the water through the branchiæ, they draw in, by means of the void created in the mouth, the air which is ever present in water and encircling the mouth." Democritus advanced a step nearer to modern teaching, in accounting for fishes dying when out of the water by their then taking *in too much air*; as, when in the water, they can take in only a moderate quantity." But all this was objected to, absolutely, by Aristotle, both because of his own more restricted views of respiration, and of the apparent discrepance of the theories with common sense, and thus was he led, in

¹ *De Respirat.* 2. 1.

this instance, to oppose theories pregnant with suggestion, and advantageous to the progress of science.

Note 3, p. 20. *To the same point do they also come, &c.*] The writers here alluded to are said by Philoponus to be Plato, Xenophanes and Alcmaeon. Aristotle¹ observes that, as nature is the origin of motion and change, it is necessary, in order to comprehend motion, to understand what nature is. Motion seems to be the property only of continuity, and the infinite is displayed, first of all, in what is continuous; and, therefore, in definitions of continuity, there is frequent reference to the infinite, as if all continuity were *infinitely* divisible. Besides these reasons, without place void and time, there cannot be motion. But whatever is in motion, must have been moved by its own or by some other power, and this motor may be the second or third of a series, as the staff, for instance, which moves the stone is moved itself by the hand, which is moved by the man; and although the *last* of these may be spoken of as the motor, yet the term is applicable rather to the man, as being the first link in the chain. Thus, the man who communicates motion by his will is, himself at rest; and, therefore, it by no means follows, Aristotle contends, that the motor should itself be in motion.

Note 4, p. 21. *Homer has well represented, &c.*] The term ἀλλοφρονέων, rendered "changing his mind," occurs but once in the *Iliad*, and there it refers, not to Hector, but to Euryalus vanquished in the funeral games; and

¹ *Nat. Auscult.* III. I. VIII. 5.

signifies stupefaction of the faculties rather than what is here attributed to it. Thus, either Democritus must have misquoted, or the *Iliad*, since Aristotle's time, have suffered, as is commonly believed, more than one mutilation. The purport of the passage, however, is sufficiently obvious.

Note 5, p. 21. *Thus Democritus does not employ the term mind, &c.*] He made mind, that is, to be a sentient principle and identified with those feelings and emotions, which Aristotle held, as has been shewn, to be but emanations from the corporeal organs and functions, to be manifestations, that is, of the temperament. An apology has been offered for this attribution of *mind* to all creatures, in that such a principle may seem to be represented by the consummate order which prevails in their constitution; and thus that Anaxagoras may have meant that, while it may be present, *objectively*, in all beings, it can be present, *subjectively*, (as mind, that is) only, in a few. Plato¹ seems to imply something like this when adopting one essence or faculty which is eternal and unbegotten, and another which has no abiding and is perishable—the one capable, by *intellect* with *cogitation*, of comprehending unchangeable natures; and the latter capable, by opinion with sensual perceptions, of comprehending whatever is casual and ephemeral.

Note 6, p. 21. *Have said that the Vital Principle comprises all first causes, &c.*] Aristotle² observes that, as

¹ *Timæus*, 27. D.

² *Nat. Auscult.* 11. 3.

every investigation is for the purpose of knowing something, and as we cannot be said to know before we can comprehend wherefore a thing is what it is, (comprehend, that is, its *first cause*,) so it is evident that we must thus study the laws of reproduction destruction and change, throughout nature, in order to be enabled to refer, for each subject of investigation, to the *first causes* of the phænomena. This argument seems to confine causation to natural operations in particular, that is, living bodies; but *cause* had then, as it has now, a far wider signification—besides essence, individual being, elements, and other admitted first causes, that of which anything is made, was said to be its cause, as bronze of a statue, silver of a goblet, and, in a general sense the maker is the *cause* of the production, and he who alters, of the *change*, &c. Thus, there was great latitude in the enumeration of first causes. Thales¹, the founder of this branch of philosophy, maintains that water is a first cause, because the earth rose from water. Anaximenes and Democritus contend that, as air was before water, so it is rather to be regarded as the first cause of everything.

Hippasus and Heraclitus set it down as being fire; and Empedocles, adding *earth*, adopted four elementary causes; for he maintained, that these elements are unchangeable and unproduceable, although capable of combining with and separating from one another. He first

¹ *Metaphysica*, 1. 3. 5. 8.

adopted the four elements, in fact, as the *first causes* of all things, although, as he makes fire to be the antagonism of the other three, which he held to be of one nature, he can hardly be said to have regarded them as more than two. This doctrine of elements prevailed, in fact, down to the time of Descartes¹, who admitted, however, only of three, fire, air, and earth; and he maintained that all the forms of inanimate bodies may be accounted for by the motion form size and arrangement of particles, without the aid of any agent, such as heat or cold, moisture or dryness. Thus all elementary particles are, according to him, first causes.

Note 7, p. 21. *By earth we perceive, &c.*] The doctrine of elements prevailed even to the constitution of the sentient organs, for, as sensibility could have no part in the theory of that age, philosophers had adopted the dogma, that *like* recognises and perceives by *like*, that air, that is, perceives by air, water by water, and so for the other elements; and thus the organ of vision was supposed to be of water, that of hearing to be of air, and that of smell to be of fire. As illustration of which, Aristotle² describes "odour as being a vaporous exhalation, and, as such, necessarily derived from fire (heat); and the special organ of smell is said, on this account, to be located about the brain, for the matter of cold (the brain) is, in potentiality, hot," and, therefore, able to perceive

¹ *Du nombre des Elements.*

² *De Sensu et Sen.* II. 11. 20.

what is derived from heat. The visual organ is said to be of water, and to see objects, not as being *water* but, as being *diaphanous*, as this quality belongs to *air* as well as *water*, but then water is more *protective* and *condensed* than air, and, therefore, the pupil and the eye are constituted of *water*. These are rude theories, no doubt, and sorry substitutes for the knowledge of the brain and its system ; but philosophy cannot rest upon a confession of ignorance, and this hypothesis, unsatisfactory as it may now seem, was for ages the admitted theory of sentient perception. But this theory of Empedocles, however otherwise faulty, may well be supposed, without violence to the text, to convey in the terms *στοργή* and *νείχος*, a knowledge, or perception rather, of *attraction* and *repulsion* ; and an assumption of these principles may be traced in most of the systems of that time concerning elementary combinations. This must be maintained with some reserve, however, as some have given a more *literal* version of the terms in *amor* and *discordia*, or *lis*, which, as moral or sentient qualities, seem to be without any relation to elementary combinations. The latin version of the phrase is, *Terram nam terra, lympa cognoscimus undam, ætheraque æthere ; sane ignis dignoscitur igne ; sic et amore amor, ac tristi discordia lite ;* and the French is, “ Par la terre nous voyons la terre ; l'eau par l'eau ; par l'air, l'air divin ; par le feu, le feu qui consume ; par *l'amour*, *l'amour* ; et *la discorde* par la discorde funeste.”

Note 8, p. 22. *In the treatises "upon philosophy," &c.]* These books are said to have been expositions of the teaching of Plato and the Pythagoreans upon *ideas* and the nature of the sovereign *good*, or *philosophy*, and to have been gathered by Aristotle from the oral teaching of his great preceptor. It is generally believed that they have not come down to us; but a more modern commentator seems to have been persuaded that they are still preserved in the *Metaphysics*, (that store-house, where lie scattered the fragments of every system of philosophy that ever had any authority,) and yet there is no passage¹ in that work, in which Aristotle alludes directly to the topics here cited by him. If a digest of Plato's² doctrine of the elements may be offered, he makes fire and earth to have been the first of created elements, because whatever is produced must be *visible* and *tangible* and corporeal, and nothing can be visible without fire, or tangible without solidity, whence the body of the universe was, in the beginning, constituted out of *fire* and *earth*; but since it is scarcely possible for two elements so to coalesce as to form bodies without the intervention of other combining elements, the Creator placed *water* and *air* between *fire* and *earth*, and made them to be in the same relation to the first elements which they are to each other—and thus *fire* is to *air* as *air* is to *water*, and *air* is to *water* as *water* is to *earth*. The Pythagoreans³ were

¹ Vide Trendelen. *Comment.*

² *Timæus*. 31. B. *et seq.*

³ *Metaphysica*, I. 5. 6

the first who devoted themselves to mathematics, and, by exclusive attention to that study, they were led, *at first*, to consider their principles as the principles of entities ; but as numbers must be before mathematics, they were brought to perceive many resemblances to beings and conditions in numbers, rather than in fire or earth, water or air. Thus, they assumed that a particular combination of numbers is *justice*, that another is *Vital Principle and mind*, another proportion or fitness ; and further, perceiving the proportions and impressions of harmonic sounds to be numbers, and other things appearing to bear a resemblance to numbers, and numbers to be the first of created entities, they assumed that the elements of numbers must be the elements of entities ; and that the heavens and every kind of harmony must be numbers. But some while they held that numbers are elements, believed *odd* and *even* to be the origin of numbers, and, therefore, elements in a stricter sense ; and, as the unit is derived from odd and even, they regarded it as the origin of all numbers. Enough, however, has been said for rendering apprehensible to the general reader, the import of the terms and the tenour of the argument ; and it would be idle, even were the doctrine fully known, to attempt any such disquisition as would be required for a full elucidation of this the most abstruse, perhaps, of all the topics of antiquity.

Note 9, p. 22. *There are writers who have combined, &c.*] Simplicius¹ and Philoponus attribute this opinion to

¹ Vide Trendel. *Comment.*

Xenocrates, whom they praise as the ablest expositor of the doctrine of *ideal numbers*. He maintained that Vital Principle has in it an abiding source of ideas congenial with a mobile, ever-changing nature, such as pertains to the external world, and that hence it is a *number* which, while unable to free itself from the nature of things, approximates to *ideas*; and in order to prevent faculties so ungenial from being severed, he derived from Vital Principle the faculty and *origin of motion*, by which, as *by a link*, they are to be retained together. Thus, he thought to reconcile the apparent discrepance of the co-existence of *ideas* and *things* in the same being. Plato¹ has well criticised, in one of his writings, the varying theories of philosophers upon the number, nature and relations of elementary principles.

Note 10, p. 23. *Anaxagoras seems, as we have, &c.*] The writing of Anaxagoras, the Clazomenian, here alluded to, appeared, according to Aristotle², after those of Empedocles, although, in age he was his senior; and Anaxagoras maintained, he says, that first causes are infinite in number. Thus, that almost all homogeneous bodies, such as water or air, can be produced or destroyed only by combination and separation; and that, admitting of no other origin or destruction than these, they must endure for ever. From all which it might be inferred, that he admitted of but one cause, and that in the form of matter. He made mind, to which he attributed

¹ *Sophista.*

² *Metaphys.* I. 3. 9. B. XIII. 4. 5.

intelligence, to be a first cause, (as Empedocles made *affinity* to be an element,) to be innate in and the source of motion in animals, as well as the cause, in nature, of the universe and its order.

Note 11, p. 24. *Thales, too, from what, &c.*] In this allusion to the influence of the magnet, Thales may have been criticising the opinions which made motion dependent upon life. He was the founder of the school which derived all things from one or more material and indestructible elements; he believed water to be the sole element, (whence he demonstrated that the earth is from water), and was probably led, Aristotle observes, to this conception, from perceiving that the nutrition of all creatures is fluid; that heat is produced from water, and that by heat animals live; and, then, that all seminal particles are naturally fluid.

Note 12, p. 24. *Diogenes, together with some other writers, &c.*] It is probable that this opinion was suggested to Diogenes by the respiration, which he knew to be essential to animal existence and dependent upon the air; although the process itself, and the changes effected by it, were of course then unknown. Air, however, was believed to be necessary for the maintenance of life, and so it might well be regarded as *the originating cause* of all things; and more especially by one who saw so far, as was shewn in a former note, into its mode of agency. It is shewn by Aristotle¹ that he had well

¹ *De Part.* III. 2. 6.

studied the vascular system; and he seems to have perceived that the brain is the seat of sensation. In fine, philosophers, generally, in adopting four causes, have been divided between fire, water, and, as with Diogenes, air; which he held to be the origin of all secondary operations.

Note 13, p. 25. *Others, as Critias.*] The opinion that blood differs from the other fluids and has an independent vitality, has prevailed, no doubt, in all ages; but Aristotle¹ placed it, as well as its analogue, the ichor, which circulates in molluscs, insects, &c., among *insentient* and *excrementitious* parts, such as bone, nails, cartilage, and other like parts. It may be added, too, that the brain was so considered. "To conceive," Hunter² observes, "that the blood when circulating is endowed with life, is perhaps carrying the imagination as far as it can go, but the difficulty arises from its being fluid, as the mind is not accustomed to the idea of a living fluid. But when all the circumstances of this fluid are considered, the idea that it has life *within it*, may not appear so difficult to comprehend, for every part is formed, as we grow, out of the blood, and if it has not life previous to this operation, it must acquire it in the act of formation." One of the great proofs of the blood's vitality is to be found in coagulation, as the blood, when circulating, is not subject to certain laws to which it is subject when removed from the vessels.

¹ *De Part. Animal.* 11. 2. 4. 8.

² Hunter's Works, T. III.

Note 14, p. 26. *So many writers as admit.*] Heat is the antagonism to cold, for it is fixed¹, and with a downward tendency, while heat is mobile, and has an inclination upwards; heat, again, tends to dilate bodies, while cold acts by contracting them. Thus, as heat² separates, and cold consolidates, they came to be looked upon as the *elements* or causes of *destruction*, (as heat appears to be *self-motive* and a *cause of change*,) and restoration. But as *heat* (ζέω to boil or be hot) is derived from, or is the synonym of *life* or *living*, (ζάω contr. ζῶ, ζάειν contr. ζῆν,) so some made life, from this supposed identity, to be heat; and others, from the resemblance between cold (ψυχρὸς or ψυχός) and the Vital Principle, (ψυχή) as breathing was supposed, by all the physiologists, to be a process for cooling the blood, made it to be *cold*. It is hardly possible to transfer to another, and that not a cognate tongue, the full sense of a passage which depends upon etymology; but the general import of these two opinions may, perhaps, be gathered from what is here said. Thus, Cervantes³ makes his knight fix upon the name *Rocinante*, because *Rocin* is a *horse*, or *nag* of the *ordinary character*; but, as his charger is to have wide-spread renown, and to be distinguished from all other nags, it ought to have a sonorous and suitable appellation, and this is realised, in his own opinion, by the suffix *ante*, and hence, *Rocinante*.

¹ *Metaphys.* XIII. 5.

² *De Gen. et Corr.* IX. 11.

³ T. I. Cap. 1.

CHAPTER III.

Note 1, p. 29. *It is not easy, however, &c.*] That is, if the Vital Principle be a first cause and an element or combination of the elements, it cannot be determined, if subject to external impulse, what its movements will be—if it be of fire, it must move upwards, if of earth, downwards, and so for intermediate movements. Plato maintains, as was said, that, as there can be nothing visible or tangible without *fire* or solid without *earth*, *these* were the *first* of created elements; and that, as there can be no enduring combination out of two elements, *air* and *water* were next created and placed between the first two.

Note 2, p. 30. *Now, the body is moved by translation.*] This passage has been the subject of much and serious controversy, both as to its meaning and its genuineness; and yet, although an argumentum ad absurdum, it is a fair conclusion from those premises. Thus, if the Vital Principle be an entity distinct from the body which it animates, and if the body be moved, by translation, from it, the Vital Principle, having also that movement, may set itself free, and if able to do this, it may re-enter and

resuscitate the body which it had left. The assumption, in fact, is an evident objection to the opinion that Vital Principle moves itself as it moves the body; and seems to be necessary to the completion of the argument.

The passage, however, has been regarded as an interpolation introduced by some Christian writer, (*adeo verba Christianum seculum referunt*), in order to support the doctrine of the resurrection: and Trendelenberg, while unwilling to suppress the passage, seems to question its authenticity. The subsequent paragraphs are in support of Aristotle's opinion that the Vital Principle, if self-motive, cannot be subject to motion by other impulse than its own, (just as that which is good in itself, cannot be so by or for the sake of something else,) and that, if it were so subject, its motion would be due to sentient impressions.

Note 3, p. 31. *Some philosophers maintain.*] This passage is a covert satire of the doctrine of Democritus that motion is transmitted through all nature by atoms in constant motion; and these are said to have been likened by Philippus, the reputed son, according to Meineke, of Aristophanes, to globules of quicksilver, which, when poured in, made a wooden figure to become moveable. It is uncertain, by the way, when this metal was first employed; it is here alluded to as a well-known substance, and is so spoken of by Theophrastus. ¹Pliny

¹ *Hist. Nat.* 33. 32.

says that "it was brought from the silver mines of Spain, in the form of cinnabar, and, when freed from its ore, used in metallurgy;" further, "that it is always fluid, and an universal poison."

Note 4, p. 31. *It is in this same manner, &c.*] If the Vital Principle be to the body what Plato, in the *Timæus*, made the great animating principle to be to the Universe, a source of intelligence and ordered motion, there must be an accordance between terrene and celestial bodies and movements; but as earthly bodies are moved by objects of sense and perception, and as their movements are not, like those of the heavenly, in a circle, their natures must be different. It would be idle to attempt to make a digest of the opinions entertained in the *Timæus*, the most abstruse and laboured of all Plato's works, or to trace the analogy between the constitution and motions of the supernal orbs, and the constitutions and conditions of earthly bodies. But four points seem to be evident—that the universe moves by motions communicated by the anima; that the anima is from the elements; that it has so been divided, as to have an innate sense of harmonic numbers; and that it has been made to move in the same circles as the sky. This summary is adduced by Aristotle to shew how scarcely possible it could be to adjust this speculation to his own subject of inquiry, and he may have been led to criticise it the rather, as the great principle of the universe is synonymous with his own treatise; each is, in fact, $\psi\upsilon\chi\eta$. But to quote the

learned¹ commentator, "Platonem in *Timæo* quam maxime obscurum illustrare, hujus loci non est."

Note 5, p. 32. *But, in the first place.*] These critical objections cannot be fully realised without reference to the leading opinions and arguments of the *Timæus*, which, although, perhaps, at the time, regarded only as speculations and now stand self-confuted as physics, are enshrined in words which shall endure, until mankind cease to find delight and instruction in pure and abstract studies. The first objection raised by Aristotle is to the ascription of magnitude to that anima (which is to be necessarily inferred from its being divisible,) as well as to the intelligence or mind, which is identified with it; for magnitude would imply a material entity, and matter conjoined with form and essence implies parts, and whatever has parts cannot either be self-existent, or indefinite in duration. Another objection, much insisted upon, is the movement in a circle, which cannot, it is said, be the motion produced by the passions or appetites; but the chief topic is resumed, and the mind is shewn to be, like the thoughts which emanate from it, immaterial. Aristotle's subject, however, unlike that of the *Timæus*, was confined to the agent or principle, whatever it be, which imparts motion and other vital properties to organised matter.

Note 6, p. 33. *Now, there are limits to practical thoughts.*] The origin² of whatever is original is in the

¹ Trendel. *Comment.*

² *Metaphys.* v. i. 5.

maker or creator, whether it be mind, or art, or a special faculty—it is an abstraction that is; but, whatever is practical is dependent only on an agent, or his choice, for the act is identical with what is chosen. Thus, practical thoughts are confined to the *particular* faculties and organs which are required for securing what may have been chosen.

Note 7, p. 33. *Terminated by a syllogism.*] The syllogism¹ is an argument, in which, from given premises, something different from the terms laid down results, necessarily, from their admission. Modern definition is much like this—the syllogism is said to be an argument of three propositions, having the property, that the conclusion necessarily follows from the *two* premises; so that if the premises be true, the *conclusion* must be true; and a conclusion is the proposition which is inferred from certain former propositions, termed the *premises of the* argument.

Note 8, p. 34. *The same incongruity.*] This is an objection by Aristotle to the doctrine of metempsychosis, adopted by the Pythagoreans, and, being placed upon obvious physical relations, it may be considered as irrefragable. Thus, philosophers held numbers to be elements, and perceived in them and their combinations resemblances to, or types of faculties and sentient properties, as has been observed. Their doctrine² was, “that man consists of an elementary nature, and a rational or divine

¹ *Analytic.* a. I. I. 6.

² *Hist. of Philos.* Vol. I. 397.

principle, and that of this last, the divine is seated in the brain, the passions and appetites in the liver and heart ; that the rational part is immortal, the sentient principle perishable." They further taught, that the imperishable part, freed from the chains of the body, assumes a new form, passes to the centre of the earth for judgment, and, if not deemed worthy of associating with perfect spirits, is returned to earth to inhabit another body, of higher or lower nature, according to its former deserts. This doctrine has been so developed and exemplified in the final teaching of Socrates, before his death, that that dialogue¹ may be regarded as a faithful exposition of the argument and its merits. Aristotle, overlooking every supernal cause or agency, objects to the doctrine, not on its own grounds but, by reasonings, which are purely deductive ; and the doctrine is, no doubt, when tested by physical science, incongruous.

Note 9, p. 35. *Such opinions are, in fact, &c.*] This passage is apparently abstruse and ambiguous, owing to the terms being applicable to more than one art or implement ; and yet, "as it involves a kind of antithesis between the art and the implements, the Vital Principle and the body," the general sense can be made sufficiently obvious. The purport of the phrase is well given in the Latin version : *Perinde igitur dicunt atqui si quispiam artem fabrilem fistulas ingredi dicat ; etenim ars quidam instrumentis, anima vero corpore utatur oportet.* The French

¹ *Phædo.*

² *Trendel. Comment.*

version is less definite : “ C'est absolument comme si l'on pretendoit que l'architecture peut se mêler de fabriquer des instruments de musique.”

CHAPTER IV.

Note 1, p. 38. *It is equally absurd to think, &c.]* This is an unanswerable objection to Empedocles and his followers who made all bodies to be combinations, in *differing proportions*, of the elements—for whether the Vital Principle be harmony or a combination of particles, there must, as combinations are various, (since that which forms bone is not that which forms flesh,) be several principles in each member of the body; and if it be not *proportion*, there must then be a second Vital Principle to maintain that relation. The succeeding passages are, necessarily, from the absence of precise knowledge concerning atomic proportion and relation, obscure; but they point to opinions which, although not based on experimental science, anticipate, when closely looked into, much that is now admitted.

Note 2, p. 40. *Now, to maintain that Vital Principle, &c.]* The argument reverts to the question whether the Vital Principle can be subjected to motion casually produced—be subject, that is, to motion through the body which is moved by it, and thus partake of locomotion; but

the Vital Principle, being an essence, cannot be subject to casual motion ; and then it has been shewn that a motor is not, necessarily, itself in motion. There seems, however, to have been some difficulty in refusing all motion to the Vital Principle, since the emotions and passions which emanate from it seem to be motions, or combined with motions,—as passion excites and fear depresses the motions of the heart, and deep thought furrows the brow ; but Aristotle, in order to reconcile these with his own opinion, has recourse to an hypothesis which is left for future inquiry. It is well said, however, that the man rather than the Vital Principle is moved by passions and emotions ; and thus motion may descend from it, as the first motor, and at rest, to the several organs, (act, that is, upon the temperament,) or ascend to it, by perception of the external world, for memory. Philoponus, commenting upon this passage, observes, as proof that recollection originates in the Vital Principle and thence permeates to the body, that, “when reminded of any fearful incident we turn pale, and when recalling a voyage we become qualmish.”

Note 3, p. 40. *The mind seems to be a peculiar innate essence, &c.*] Aristotle has nowhere defined this great faculty, to which he attributed so high a destiny and such lofty privileges—“intellectus nihil patitur ; est atque manet ;” but the opinion was not exclusively his, nor did it originate with him, for Anaxagoras¹, and before him,

¹ *Metaphys.* I. 3. 10.

Hermoticus made the "mind to be the cause as well of existence in animals as of the universe and universal order." There is, evidently, here a want of distinction between mind and Vital Principle; and it may be that, in order to avoid the obvious objection of two bodies in one, Aristotle has always delineated this faculty as homogeneous and pure; that is, as immaterial.

Note 4, p. 40. *For if an aged person.*] This allusion to diminished perception, by changes, from the influence of time, in the sentient organs, implies all that can now be said; for could the organ be restored to its pristine form, and its energies be, so to say, revived, the aged person would see or hear as he did when young. The body is modified, in fact, by age, just as it is, to use Aristotle's apposite reflexion, by maladies and rioting, which anticipate the otherwise slower processes of time; "Senectus non eo existat, quod anima sed quod id patitur in quo inest, i. e. corpus, sicut in ebrietate et morbis."

Note 5, p. 41. *Thus, too, thought and reflexion languish.*] Quid sit, quod intus perire dicatur, commentatores quærunt; sed nihil definiendum, nisi quod oculi similitudini respondeat¹; but Philoponus, who is here cited, clearly perceived that the passage pointed to the *destruction of a corporeal organ*, and not to a mere change of form. Whenever, in fact, there is destruction, however brought about, of a corporeal organ, there is almost universally mental disturbance and delirium.

¹ Trendel. *Comment.*

Note 6, p. 41. *The most unreasonable by far of all the opinions, &c.*] These passages are so associated with the peculiar doctrines of the Pythagoreans¹, that they can hardly, within the compass of a note, be made intelligible to the general reader. These held the unit, it may be said, to be the origin of number, and the point to be the origin of the line; and so they made *unit* and *point* to belong to one common genus. But the unit was said to be a point without position, and, therefore, an abstract entity, which, being without parts or distinctions, cannot be either motor or moved, and, therefore, cannot represent the principle of all motion. Thus, the opinion is objected to as making the Vital Principle a number, which deprives it of locality or position, and then as attributing motion to it which, as a number, it is not susceptible of. The following passages, which treat of the division of plants and insects, further prove, by analogy, that the Vital Principle cannot be a number, as, unlike a number, each part seems to have, after division, all the properties which it had while yet conjoined with the whole. The argument is then turned against the doctrine of Democritus, if the corpuscles be regarded as points, there must still be in each point, as quantity, a motor and a moved; and the theory depended for support upon quantity, rather than relations of size. Unless, then, the Vital Principle be both motor and moved, which it evidently cannot be, there must be a motor power for those corpuscles.

¹ *Topica*, I. 18, 8.

Note 7, p. 41. *How, indeed, is it possible.*] This passage is very elliptical and obscure, but its purport seems to be an objection to the doctrine of Xenocrates, a follower of Plato, who maintained that the Vital Principle might be separate from the body. The argument runs thus: if the Vital Principle be a number, and if each unit be a point, how, as the point is not separable from the line, can the Vital Principle be separate from the body? Although the point may be, abstractedly, apart from the line, yet as the line is not divisible into points, (since *points* are but the termination of the *line*) it follows that the Vital Principle, when regarded as a point, cannot be, actually, separate from the body. The Latin paraphrase is, "Insuper qui fieri potest ut separentur et absolvantur a corporibus, ipsa puncta? siquidem lineæ non dividuntur in puncta¹;" the French is, "Comment est-il possible que les âmes se séparent et se délivrent des corps, puisque les lignes ne se divisent pas en points?"

¹ *Acad. Reg. Borussica.*

CHAPTER V.

Note 1, p. 47. *Now, three modes of defining Vital Principle, &c.*] There is here a want of conformity with other definitions of the Vital Principle, which points either to neglect on the part of copyists, or to want of early revision; for, in one place, Aristotle has distinguished the animate from the inanimate by "motion and sensibility," while in another he has conjoined with them *immateriality*; and here, also, he has three terms, but *incorporeity*, as if to approach nearer to the doctrines of his great preceptor, is substituted for *sensibility*.

Note 2, p. 47. *This opinion has been adopted, &c.*] The elements, and the parts assigned to them in the constitution of bodies, by the schools of antiquity, have been noticed in a former note; but the notion that, as like perceives like, the Vital Principle, being derived from the elements, must perceive each like, cannot account for the perception of compound bodies, unless, (which is an absurdity) it contain, essentially, all compounds whatever. This is all very hypothetical, no doubt, but then it assumes that there are elements, and that elements combine, by affinity, in different proportions, to form different bodies; and, thus, the doctrine may be regarded as a faint outline of the matured theory of modern times.

This is further shewn in the formation of bone, as given in the verse quoted from Empedocles, and which, besides proportion, admits heat as an agent in combination. The epithets employed by that eminent writer are not so precise as might be desired, and it cannot now be determined what was meant by the words "liquid light," or fire, (*νήστις αἴγλη*) (was it phosphorus, in some form ?); but yet proportion and combination, under high temperature, are quite apparent—the Latin version of the quotation is :

" Cœperat ante duas tellus justissima vasis
Aeris ac fontis partes : Vulcanus et ipse
Quatuor ex octo adjunxit, quis candida magna
Vis fœcundaque naturæ confecerat ossa."

Note 3, p. 49. *It is absurd to maintain, &c.*] We have had handed down, by the earliest writers, differences of opinion, Aristotle¹ says, upon "action and impression;" but most of them agree in making *like* unimpressionable by *like*, (since the one is not more active or passive than the other,) and the unlike and different alone to have been so constituted as to act and re-act upon one another. Democritus stood alone in maintaining that the selfsame *like* can be, at once, active and passive; for he would not grant that things which are, essentially, different, can mutually act and re-act upon one another. And even though things should seem to be different, there is ever something *like*, he maintains, by which the impression is made. The difference between these opinions, however,

¹ *De Gen. et Corr.* 1. 7. 1.

when followed out, is, after all, formal rather than substantive ; for, in either case, the Vital Principle, whether like or unlike, must be material, as the opinion still implies some kind of impression, and impression implies material properties.

Note 4, p. 49. *But to shew how many doubts, &c.*] The earlier philosophers differed widely, as has been said, upon the elements, both as to their nature and number ; but those writers are evidently wrong, Aristotle¹ observes, who admit of only one element and one nature, as they take no account of incorporeal entities. Empedocles adopted the *four elements* as *constitutive of the matter* of bodies, and hence the objection to his opinion, that “sensation is produced by corporeal elements in the relation of like ;” for those parts which are formed of *earth* (hair, bones, &c.) are insensible ; and, therefore, this element cannot be perceptive of like. This assumption of insensibility is, of course, too absolute, but such parts are no doubt withdrawn, more or less, from the general sensibility and sympathy of the living body. The term *νεῦρα*, it may be observed, by the way, which here signifies *tendon* or *sinew*, has now the meaning of *nerves*, the conductors, that is, of sentient impressions ; and Galen, who lived so many ages after Aristotle, and was well acquainted with the brain, optic nerves, and office of the nerves, still employed *νεῦρον* as a muscular chord.

¹ *Metaphys.* I. 8. 1 ; XIII. 4, 5.

Note 5, p. 50. *It follows, too, from this theory, &c.]* Empedocles regarded *affinity* (φιλίαν) as an *element*, but what the deity to which he refused, so to say, *repulsion* (τὸ νεῖκος) is uncertain; “whether Sphærus¹ or not, it implies, at all events a being, to which ‘*repulsion*’ (in quem pugna non admittitur) had not been imparted.” If this, like affinity, were an element, then, as each sentient being was supposed to be constituted of all the elements, that deity must have been less favoured than other beings, since he was unconscious of antagonistic properties, and therefore, relatively, less intelligent than they.

Note 6, p. 50. *But we are at a loss to know, &c.]* Aristotle here inquires what the particular faculty or force may be which individualises, makes one, that is, of objects; and, thereby, gives to the sentient being the consciousness of identity. It cannot be a sense, as the senses are derived from the elements, and the elements are akin to matter, while that, whatever it be, which combines the faculties and powers of the body must, of all, be the most influential; and it may be inferred rather than gathered from what is said, that it cannot be either the Vital Principle or the mind. But do not all these doubts and suggestions point to a central organ where the sentient impressions, so to say, meet, and where consciousness has its seat? Does not the brain, which, as the source of sensibility was then it may be said unknown, fulfil all that is required by this suggestion? The

¹ Trendel. *Comment.*

brain is the organ which individualises different impressions, and so enables the mind to compare and judge; it is the organ, too, which, retaining impressions, is the seat of memory, and the source whence imagination draws its images. The mind is again spoken of as higher in nature than aught else, and thus Aristotle agrees with Anaxagoras who held that the "mind was the first of all created entities and powers."

Note 7, p. 51. *Thus, the reasoning in the so-called Orphic verses, &c.*] The epithet, "so-called," seems to imply that there were doubts as to the author of these verses; be this as it may, they shew that animal life was known to be especially dependent upon respiration. Aristotle's criticism seems to imply that he was not acquainted with respiration in any other form than that of air-breathing animals, and therefore, not aware that the influence of the air upon the system is necessary for the maintenance of life in all creatures. Cicero¹ maintains that "Aristotle denied the existence of the poet Orpheus;" and that the verses under that name were attributed, by the Pythagoreans, to one Cecrops.

Note 8, p. 51. *If it be well to form the Vital Principle, &c.*] The wording as well as the meaning of this objection to the opinion that "Vital Principle must be formed from all the elements" is embarrassed and obscure; and, owing to the brevity of the argument, it cannot be expounded with certainty; but it seems to

¹ *De Nat. Deor.* I. 38.

imply that as one part of a contrary can judge itself and the other, so all the elements cannot be necessary, since nature never employs means in vain. ¹“Unum sufficit ex contrariis, ut et hoc et alterum judicetur; ad recti normam etiam curvum exigitur; verum sui index et falsi, ut Spinoza loquitur.”

Note 9, p. 52. *There are writers who maintain, &c.*] Aristotle seems to have interpreted this opinion differently from others, and, differently, it may be, (by regarding the beings alluded to as the representatives of Vital Properties,) from its original import. Cicero², for instance, attributes to Thales, one of the wisest among the seven, the opinion, that “it is expedient for men to suppose that whatever can be perceived is full of gods, for, thereby, all, as if placed in consecrated shrines, would become purer.” Whatever may be the value of that version, the opinion could not be maintained when applied to the cause of living actions, the origin, that is, of living beings; for, as bodies were supposed to be formed of elements, and elements to be everywhere, the elements themselves should be transformed into animals, which involves an absurdity.

Note 10, p. 53. *Since the faculties of knowing, feeling, &c.*] Aristotle, quitting the question of life in its simplest form, here reverts, after enumerating the properties which characterise the highest forms of created beings, to the question, whether or not all the properties may be

¹ Trendel. *Comment.*

² *De Legibus*, II. 11.

derived from one and the same principle ; and if not from one and the same, what that is which combines the parts, and makes them to be one. The passage which follows is an evident allusion to the *Timæus*, according to which, as has been said, reason is placed, as in a soil fit for the heavenly seed, in the brain, the appetite and passions in the heart, liver, or spleen ; and then comes the question, what so connects those organs as to make them mutually subsidiary to one another ? not the body, certainly, it may be answered, as the body itself is but the instrument of the Vital Principle.

Note 11, p. 55. *But the living principle in plants, &c.*] This passage is, to appearance, obscure, owing to its construction and scientific wording, but yet its meaning is obvious : the living *principle in plants*, that which constitutes their vitality, is *assimilation*, (growth, through nutrition, that is,) and it exists in plants without sentient properties ; but sentient properties cannot, of course, exist without nutrition, as nutrition is essential to life, and present, therefore, in every thing which lives.

BOOK THE SECOND.

CHAPTER I.

Note 1, p. 58. *Now matter is potentiality, species reality.]* A few words may suffice for a further attempt to elucidate these terms. Matter, then, per se, has no definite existence, but with essence it becomes a something in *potentiality*, and then capable, under genial conditions, of becoming a *reality*, the specific and individual character of which depends upon *form*. *Matter* is said to be comprised in *essence*, and therefore the distinction between them is hardly discernible, but Aristotle¹, under the term essence, comprises elements (earth, fire, water and air) as well as derivatives from the elements, and that because, while all other bodies are to be considered as dependent upon them, they pre-existed to, and were the origin of all others. In another passage² he assumes one universal, primordial, material essence, as the source whence all things which are have proceeded; yet still he admits of a *peculiar essence* for each genus, as the primal matter of pituita is whatever is sweet or oily,

¹ *Metaphys.* IV. 8. 1.

² *Ibid.* VII. 42.

and as whatever is bitter is the primal matter of bile. Although essence may be an abstraction, yet a generic character is clearly assigned to it in the text, and even in recent times recourse has been had to such an assumption in order to explain the difference between the secretions of organs supplied with the same fluids and animated by the same nerves. Thus, it was assumed that there must be for each organ a peculiar essence, a *substantia propria* (ὕλιχῆ οὐσία), for the fulfilment of its functions as well as the maintenance of its relations and sympathies with the other parts of the system. The text seems to admit of only one essence and one matter to be as the matrix for all things, which is, of course, opposed to the doctrine of *elements* and the formation of bodies by them; but the hypothesis could treat of them only as primordial entities, however diversified by form their manifestations may be. Aristotle was the first, however, who made *form* to be the realising principle, to be that which confers upon matter specific character, and constitutes the series of being; and this has been adopted by modern physiologists, as Reil makes form¹ together with *variety in the combination of the elements* "to be the cause of existing differences in organic bodies and their faculties."

Note 2, p. 58. *But bodies, and above all natural bodies.*] Living bodies, that is, are broadly distinguished from all others by the innate power of reproducing similar bodies, (similar in a specific sense, that is,) and

¹ Müller *Handbuch der Phys.* I. 27.

which are the material for most of the works of man's hand; as the human intellect can confer upon its creations nothing save newness of form. Without asserting that all which is has emanated from living bodies, modern science has shewn that vast masses of matter, now inorganic, were the product of what once had life.

Note 3, p. 59. *Thus every natural body partaking of life, &c.*] The text seems to be in accordance with what had preceded, but it has been objected to by some on account of its supposed obscurity; it seems, however, to imply that the three primordial conditions, *matter*, *essence* and *form*, are necessary to, and concur in the formation of every specific body.

Note 4, p. 59. *And since the body is such a combination, &c.*] This passage is obscure both in wording and purport, but it seems to imply that the living body, being what it has been said to be, is independent and self-existent, and, as such, cannot be Vital Principle, because it cannot be among the subordinates of a subject, which is the part seemingly ascribed to Vital Principle, as merely realising what already had existence in potentiality.

Note 5, p. 59. *Now reality is, in the twofold signification, &c.*] These two terms, which, as has been said, pervade and illustrate Aristotle's philosophical writings, are, themselves illustrated, as it were, here, under the forms of *sleep* and *watching*—the one, being the analogue of potentiality, and the latter, of reality—and thus knowledge,

although possessed, yet, if *not exercised*, is only in potentiality; but when actually exercised, it is raised up and converted into reality. It is not easy, without periphrasis, to fix upon an apposite term for the ἐγρηγόρσις, which signifies, of course, a state the opposite to sleep—watching, adopted here, and the French réveil seem to imply a forced condition; and “being awake” is hardly definite enough.

Note 6, p. 59. *Only this is to be understood of a body which may be organised, &c.]* Organs are instruments subservient to the purposes of the living body, as the living body is subservient to the Vital Principle, and Vital Principle, in its turn, subservient to nature’s design in creation. So that even plants, although insentient, have organs, but organs which, in contradistinction to those of animals, are *homogeneous*; as the *leaf* is said to be formative of all the parts of the fruit. Aristotle¹ distinguished the parts of animals, as is known, as homogeneous (ἀσύνθετα), that is simple or of one nature, as flesh, bone and sinew, and compound (σύνθετα), as hand, foot, &c., which are made up of different or unlike parts. Thus, all the parts which are *heterogeneous* or *unlike*, are made up of parts which are *homogeneous* or *like*, as a hand, for example, is made up of *flesh*, tendons and bones; while the parts of plants, on the contrary, are but *developments of one simple part*, that is the leaf. It is manifest that Aristotle here points, suggestively, to the

¹ *Hist. Animalm*, I. I. 3.

development of organs by their own innate powers, and thus he may be said to have originated a doctrine which has been adopted, and, perhaps, realised as homologous physiology, by modern science. Goëthe¹, before the present century, had observed that "whoever looks even casually at the growth of plants, cannot but perceive that certain outward parts often change, and sometimes assume wholly, at other times, partially, the form of parts lying next to them. The secret affinity between the different outward parts of plants, as leaves, calix, corolla, stamen, which are naturally developed out of one another, has been long known; and this process, whereby one and the same organ is seen to undergo manifold changes, has been designated *Metamorphosis of Plants*." The pericarp is, of course, the seed-vessel, the covering, that is, of the seed, (as the pod of leguminosa, the hairy covering of the chestnut, or the pulpy coat of fruit,) and the germinal part of seeds is by Aristotle² compared to the prolific end of the egg which is attached to the *oviduct*, ($\tau\eta\ \acute{\upsilon}\sigma\tau\epsilon\rho\alpha$,) as the seed is to pods, husks, or other forms. The seed and fruit are well said to be analogous to an animal body in its state of potentiality, (which may be likened to a state of hybernation,) as ages may pass away without extinguishing that latent existence which, under favourable conditions, being resuscitated, can resume the actions of life.

¹ Goëthe, *Einleitung zur Metamorph. der Pflangen*.

² *De Generat.* II. 2.

Note 7, p. 59. *And the roots are analogous to the mouth, &c.]* This is one of those suggestive allusions which characterise Aristotle's writings, and seem to have anticipated knowledge that was yet to be realised; for had it been worked out, science might long since have been in possession of the doctrine of homology. The passage shews that Aristotle had perceived that parts might be designated after their functions rather than their forms, for it is the same process in plants, he observes¹, only they take in food by their roots, out of the earth, already concocted, and hence they have no excrementitious matter; as for them, the soil and its warmth are as a stomach, while animals have within them *a soil*, that is a stomach, from which *they* draw nutrition, as plants do from the earth, until digestion have been completed."

Note 8, p. 60. *It is, therefore, to no purpose.]* An exemplification of *matter* and *form*, as *body* and *Vital Principle*, by the analogy of wax and the *impress* or *form* given to it by the seal; for these may typify a *reality*, as a statue may typify a *reality* in the form given to the marble.

Note 9, p. 60. *It has thus then been explained.]* This is a wider and closer exemplification than had been given, both of the nature and influence of *Vital Principle* as the essence in living bodies—for it is to the living body, according to this analogy, what the special property is to

¹ *De Part. Animalm.* II. 3.

the instrument. Thus, *vision* is the *essence* of an eye, as cutting is that of an axe, for, could the organ or instrument be deprived of those faculties, they would no longer, save in name, be eye or axe; and this holds good of the living body, which, if deprived of its essence, its Vital Principle that is, being no longer able to fulfil its purposes in creation, is not to be regarded, save in name, as an organised body.

Note 10, p. 61. *It is then obvious that neither Vital Principle, &c.]* There is an apparent contradiction in this passage, owing to the want of completeness in the argument—the Vital Principle, as the essence, cannot be distinct from the organs of the body, since they depend upon it for their functions; but the mind, being impassive, (*ἀπαθὴς ὁ νοῦς*), and the cause of all the higher faculties, may exist apart from all which is corporeal and even sentient, and thus survive the body's death and decay. Thus, Aristotle has elsewhere observed that it is scarcely possible for anything to be of higher value or more influential than the Vital Principle, and quite impossible that anything should be more so than the mind.

Note 11, p. 61. *It is doubtful, however, whether, &c.]* Whether, that is, the Vital Principle is separable from the body, as the mariner is from his vessel—whether, as he is not necessarily involved in its wreck, so it may survive the death of the body. But the question evidently pertains to psychology, and can scarcely be

entertained amid inquiries into corporeal functions and sympathies ; and the chief object of this treatise, is to ascertain what that principle is which, for a stated time, animates and presides over the functions of reproduction, nutrition, growth and decay. It is evident, besides, that Aristotle has annexed, so to say, this high privilege to the mind, as the seat and source of all moral and intellectual qualities and faculties.

CHAPTER II.

Note 1, p. 64. *It is not only correct that the wording, &c.]* Aristotle¹ makes a definition to be a *term* significant of what a thing essentially is, and, thus a definition may be employed in place of nouns, or one definition for another ; but a noun cannot be accepted as an adequate definition, since every definition ought to involve *some kind of cause*. It is an expression², in fact, which so explains any term as to distinguish it from all else, as a boundary line separates fields. Aristotle, again, makes it to be something laid down (*θέσις μὲν ἐστὶ*) as the arithmetician *lays down* the unit as indivisible, quantitatively considered ; and yet this is no hypothesis, since the unit,

¹ *Topica*, I. 5. 1. *Analyt.* 6. 1. 2. 7.

² Trendel. *Comment.*

in itself, is not the same as the unit in relation—that is in combination. The conclusion is the close of a syllogism, and to be distinguished from description which proceeds from particulars, and from definition which is a summary derived from universals. The distinction between these terms is exemplified in the text by a geometrical figure—if we say that the “quadrature is that by which a rectangle with unequal sides is reduced to a square, this is a definition but a definition bordering on description, as it gives no account of how the operation is to be performed, or whether it can be performed at all;” and if we say that “the quadrature is the finding of a mean *proportional*, the definition partakes of the character of an explanation rather than a description;” for if there be found “a mean proportional between any two lines which make a rectangular figure, that proportional is the side of the required square.”

Note 2, p. 64. *We say... that the animate, &c.*] Nutrition, or the faculty by which matter can identify other matter with itself and thereby develop and grow is the rudimental principle of life, and the distinction between living and inert matter; for inert unlike living matter, increases in bulk, not through its own agency but, only by the casual agglomeration of external particles. This was assumed to be the sole faculty of plants, as Touch was supposed to be the first and the only sense necessary to animal existence; but it may be questioned whether nutrition and Touch are ever thus found as isolated and

independent faculties. Cuvier¹ also looked upon nutrition as the characteristic property of living matter; for life consists, he observes, in the faculty possessed by certain corporeal combinations of enduring for a time under some determinate form, of drawing incessantly into their composition portions of surrounding substances, and of giving back to the elements portions of their own substance."

Note 3, p. 66. *With respect to some of those faculties, &c.*] It is the purport of this passage to shew that, by experiment and observation, we may obtain an insight into the organs and functions of the body; but that, as the mental faculties do not admit of being so scrutinized, the investigation of them is, necessarily, obscure and complicated. The distinction between sentient properties and mental faculties is further exemplified by the lower forms of animal existence, which continue to live, after having been divided, in each of the parts; and as each part has locomotion and manifests feeling, it is assumed that it must also have imagination (instinct?) and desire. But nothing at all resembling this can be predicated of the mind, since, being indiscerptible, it is without parts, and, so constituted, it cannot be subject to the change or dissolution of the body.

Note 4, p. 67. *But something very like this has taken place, &c.*] Aristotle² is everywhere consistent with what is advanced here—for an animal is defined by him as a

¹ *Règne Animal*, T. I. II.

² *De Part.* II. 8. 2.

being furnished with senses, and, above all, with that which first is manifested—the Touch; and, elsewhere¹, he says, that every animal, as such, must have some one sense, since it is by sensibility that we distinguish what is from what is not an animal. “It is further suggested that animals may be distinguished, grouped that is, after sentient and reasoning faculties, and that Zoology may thus be founded on universal and demonstrable principles.

Note 5, p. 67. *As that by which we live and feel.*] As life, that is, implies a body and living principle, so knowledge implies faculties and mind; and health the liability to sickness; but as Vital Principle is said to be the cause of life and feeling, it is, as such, a *creative energy*, and cannot, therefore, be matter and subject. It cannot, that is, be a mere faculty or function, or be subject to what is termed sickness.

Note 6, p. 68. *On which account it is happily assumed, &c.*] This is a summary of what had been said concerning that something, whatever it be, which constitutes a living body and distinguishes it from inert or inanimate matter; and, although very indefinite, it still is all which can be said concerning it. Aristotle guards against the assumption, as Vital Principle requires for its manifestation *peculiar matter* and exact relation, that it may animate any kind of body, and thus the argument reverts to living matter and its capability of organism, as the germ, so to say, of animal existence. This necessary relation between

¹ *De Sensu et Sens.* I. 6. 7.

the matter and principle is then advanced to refute the doctrine of metempsychosis maintained by the followers of Pythagoras; as the active and passive, the agent and subject, cannot possibly be mere casual associations. The subject is further exemplified, in the closing paragraphs, by those two conditions which pervade all Aristotle's writings—the body while yet in *potentiality* is, by the Vital Principle, realised, converted, that is into *reality*; for Vital Principle can act only upon what is in potentiality, and capable, under its influence, with form, of becoming a specific creature.

CHAPTER III.

Note 1, p. 71. *And all animals, without exception, have the sense of Touch, &c.*] Aristotle, having observed that plants have only the function of nutrition, that is, are not sentient, proceeds to the first and, therefore, most universal of the senses—that which may, as he assumed, be present without any other, although there can be no other without it. Thus, the Touch, as perceptive of food, was supposed to be subservient to the appetite, and the Taste, as discriminating, by tangible qualities, what in food may be genial or otherwise, was held to be a modification of the Touch; but the Touch alone was by Aristotle regarded as distinctive of animal in contrast

with vegetable existence. "According to the argument¹, he adds, by which appetite is said to be the mediate cause of motion, there must, in living animal bodies, be some such medium; and the being, therefore, which by its nature is incapable of motion, is impressionable by appetite, through some other faculty." Plants, that is, are not affected by the appetitive stimulus as are animals.

Note 2, p. 72. *As, however, we shall be more explicit, &c.]* The Touch being the earliest, so to say, of the senses and *distinctive of animal existence*, is here held to be the cause of appetite, as appetite is of motion; and as has been observed, the Touch was supposed to exist independently of the other senses. This sense is said to be especially discriminative of food, as animals are nourished by substances which are hot and cold, dry and moist, and these qualities are subject to it; but it can distinguish only by chance such other properties (odour, colour, sound, for instance) as do not contribute to nutrition. It is not easy to attach a definite notion to the imagination here alluded to, but as Aristotle has elsewhere distinguished the *rational* from the *sentient* imagination, and as *instinct* only can be assigned to creatures with one sense, it may be assumed that this is its meaning.

Note 3, p. 72. *It is clear, then, that there can be but one, &c.]* The triangle² forms all rectilineal figures,

¹ *De Motu An.* 10. 1.

² *Saint Hilaire.*

which have more than three sides, that is, "all such figures may be divided into triangles, as the square into two, the pentagon into three, the hexagon into four, &c.; and geometry has, since that age, reduced this to a special theorem."

Note 4, p. 73. *Thus, the inquiry must, &c.*] The conclusion here arrived at enforces the necessity of attention to individual existences, in order to ascertain what may be the distinction, if such there be, between Vital Principles; so that the question reverts to former speculations, whether or not there is but one Principle variously imparted, or whether rather, each genus of being has its own special cause of vitality and motion. It belongs, also, perhaps, to the same speculation, to ascertain why beings have been ranged in a series—why, that is, such manifold gradations of existence from man down to the zoophyte; unless, indeed, with other conditions of similar character, it is beyond the pale of human inquiry.

Note 5, p. 73. *But to such as possess some one only of the faculties, &c.*] It is far from easy to fix upon the exact equivalents of the original terms (*λογισμὸς, διάνοια, φαντασία*;) which have been here rendered by *calculation, judgment* and *imagination*; but the *speculative intellect*, (*θεωρητικὸς νοῦς*;) implies it may "be assumed" the human mind or understanding, which was said to be impassive, homogeneous, and distinct from all else. It might well, therefore, be regarded as foreign to an inquiry, the purport of which is to detect the animating principle

of bodies fitted for receiving its influences. It is somewhat strange that Aristotle, whose teaching was so didactic, should nowhere have given a definition of that principle or being, to which he has assigned so exalted a destiny.

CHAPTER IV.

Note 1, p. 77. *But since such beings cannot, &c.]*

The purport of this passage is almost too obvious for comment, embodying the great fact of the perpetuation of the species, and compensation, by reproduction, for the death of the individuals; and number refers, of course, to individuals, species to the aggregate.

Note 2, p. 78. *The term final cause, &c.]* This is a kind of parenthetical clause, intended merely to guard against the supposition that the fact of some animals having a fixed habitat, not being locomotive that is, was unknown, or had escaped notice.

Note 3, p. 78. *And this applies equally to growth and decay.]* Aristotle¹ perceived, although it may be indistinctly, that the source of nutrition is through the blood—he perceived, that is, that “the blood is replenished by vessels, which arise on and are spread over the mesentery, and which empty themselves into the cava and the

¹ *De Part. Animalm*, IV. 3. 4.

aorta ;" the anatomy is, no doubt, imperfect, but it still is an outline of the knowledge of the lacteals. It seems to shew that veins gather fluid from the intestines, and convey it to the large blood vessels ; but there was no analogous knowledge, in that age, whereby the process of decay that is absorption could be accounted for. The term decay, therefore, was the mere expression for a general fact.

The objection to the terms " upwards and downwards," used by Empedocles to delineate the growth of plants, suggests the advantage that would accrue to science, if its terms were made sufficiently precise to fix, beyond doubt, the several relations and positions of the same body, or all bodies. And in the analogy between the heads of animals and roots of trees, we cannot but perceive the outline of a doctrine which has been developed, by modern science, into homologous physiology.

Note 4, p. 79. *The nature of fire seems to some philosophers, &c.*] This is an argument, drawn from the agency of fire, to disprove the then prevailing opinion, that, as it alone of the elements appears to be nourished and to grow, it may be the source of *life* and the origin of living actions ; as they are shewn, by the contrast between living and igneous properties, to be essentially distinct from one another. The opinion may have originated from the fact that heat accompanies digestion, and as fire was by some held to be the first element, it was readily supposed to be the agent in that process. As

an illustration of this opinion, it was maintained, even by Aristotle¹, that “food, taken into its appointed receptacles, is vaporised and transmitted to the veins, in which, undergoing change, it is converted into blood, and carried onward to the heart.”

Note 5, p. 81. *There are here three things, &c.*] The meaning of this passage, apart from its scientific wording, is sufficiently obvious—that which nourishes is food when digested; for food both acts and is acted upon by the body, and, when so acted upon, it is assimilated to and incorporated with its substance, through the blood. But food, being dead, is *contrary* to the living matter, which has, however, power to convert it into *like*, to assimilate it, that is, to the living system. Thus, food, in its first state, is *contrary* to or *unlike*, and in its last, or concocted state, it is *like* the body; and, therefore, the same element is in one sense *contrary*, and in another sense *like*, acting upon a contrary or like. So too the rudder, which directs the vessel, represents the stomach, which converts the food into nourishment for the body; and the sensibility, which gives power to the stomach, represents the hand which, through the rudder, directs the motion of the vessel; and the vessel is analogous to the body which is nourished.

¹ *De Somno*, 3. 3.

CHAPTER V.

Note 1, p. 84. *In our treatises upon action and impression, &c.*] Some commentators have, in the treatises here alluded to, seen only a reference to other disquisitions, as those upon “‘reproduction and destruction,’ or decay,” *περὶ γενέσεως καὶ φθοράς*; but as the passages which are cited do not meet the whole question, it has been suggested by Trendelenberg that the allusion may be to some other work which has not come down to us.

Note 2, p. 84. *It is difficult to understand, &c.*] In another chapter of this treatise, Aristotle has alluded to the power possessed by the senses of recalling former impressions; of realizing images at will, that is, without external objects. But the question here is to learn why the senses, which were supposed to be derived from the elements, from which or the accidents of which sensation itself was derived, are not in constant activity. The answer is, that the normal state, so to say, of the sensibility is *potentiality*, and that it is insusceptible, therefore, of perception, without impression by something from without to call it into action; just as the combustible material requires, in order to burn, the agency of fire. But the comparison contains a converse proposition, as while the *material* is required for the *sensibility*, it is *fire*,

which may be regarded as the sensibility, which is required for the material.

Note 3, p. 84. *Since we speak of sentient perception, &c.]* These passages upon perception and sensation, which, in themselves, when deeply inquired into, are sufficiently obscure, are still less, if possible, apprehensible, on account of the wording and the attempted illustration by the leading terms, *potentiality* and *reality*. It is obvious, however, that we may and do speak of an individual as one who hears and sees, whether or not, at the moment, conscious of sound or colour; whether that is, awake or asleep, active or quiescent, in *potentiality* or *reality*. But an individual is, strictly speaking, only then seeing and hearing when he is actually sensible of colours and sounds; just as an individual, to use Aristotle's analogy, is only then to be accounted really learned, when actually reflecting upon and exercising some one special subject of knowledge. All attempts, however, to scrutinize the intimate operations, so to speak, of the sensibility under impression from without or excitation from within soon lose, even with the advanced knowledge of this age, the character of inductive science, and are lost, as in the text, in the maze of metaphysical abstractions. It seems to be the object of the argument to prove, that the sensibility, before being acted upon by external objects, such as light, sound, colour, &c., exists in *potentiality* and is *unlike*; when acted upon, it is raised to the state of *reality*, and thus made *like* to that by which the impression is made.

Note 4, p. 85. *Before proceeding further let us, &c.*] This and the following passages are but repetitions of what had been said, and further attempts at elucidation; they all too depend for a meaning upon the two great leading terms. For motion is in a two-fold state—when generated by impulse from without it is passive, when self-generated it is active; and that may be regarded as *potential*, this as *real*. Thus, if a body be at rest, before being impelled, the agent, by which it is impelled, is *unlike* and *active*; but, when so moved, it is, by the very act of motion, made *active*, and *like* to the agent.

Note 5, p. 85. *But we must draw a distinction, &c.*] These passages embody, in examples, the two terms so often alluded to, and exhibit the opposite conditions of human beings—every man is learned, potentially, because man is naturally so constituted as to be able to become learned, or, being learned, is subject to an eclipse of his learning by sleep, or disease, or inattention; and every man, endowed with the faculties of his nature, may acquire some one branch of learning, and, when there is no impediment to his doing so, by the exercise of that knowledge, become learned in *reality*.

The individual who is learned in the first sense cannot, without a succession of changes, (while passing, that is, from ignorance to knowledge), become, at will, learned, in *reality*; and he can, therefore, be accounted learned, only in *potentiality*.

Note 6, p. 86. *The term impression, &c.*] The same mode of illustration, through those two terms, is still continued—impression may be to an extent to destroy sensibility, and obliterate, of course, sensation, or it may be to that genial extent which raises, so to say, *potentiality* to *reality*, and renders the being *conscious* of external objects. So an individual, with knowledge yet *potential*, that is, possessed but not exercised, can, by reflecting upon it, without any change being wrought, render it a *reality*; for the possession of knowledge, like the endowment of sensibility, implies the self-same two-fold condition. Thus, the state of reflection is to acquired knowledge what external impressions are to sensibility; for, in either case, the agencies, when genial, occasion the transition from *potentiality* to *reality*; and so eliminate practical knowledge or perfect *consciousness*.

Note 7, p. 87. *The first change, however, of this kind, &c.*] It is not easy to perceive how this nascent condition can be a *change*, unless the first germ of being may be so regarded; and, indeed, it may be supposed, from the first moment, to have already, in *potentiality*, the powers which are yet to be developed. It may be, too, that this mysterious entity, along with the faculties and powers of its own nature, may involve the idiosyncrasy of the parent, for good or for ill; which was indeed exemplified in the life and death of the philosophical Montaigne¹.

¹ T. II. chap. 37.

This capacity of the system for retaining dormant within it a something to be developed, by unknown causes, in time, is exemplified in the atom of virus, which, after an indefinite period, may, by mysterious agency, become a *reality* in the form of Hydrophobia. Well might the philosopher, when reflecting upon these incidents, exclaim, "Qui m'éclaircira de ce progrès, je le croirai d'autant d'autres miracles qu'il voudra."

Note 8, p. 86. *So that the process by which an individual, &c.]* This very obscure passage seems to intimate that, as instruction is only the *development* of faculties pre-existing and in *potentiality*, it is not to be regarded as an *impression*; for such an opinion would imply, instead of nature's ordinary process (development), a change from a *privative state* (ignorance), as well as change in habits of thought. This cannot, however, be insisted upon with much confidence; the French version is, "Donc, ce qui fait passer l'être qui est en puissance à la réalité parfaite, à l'entelechie, en fait d'intelligence et de pensée, doit s'appeller, non du nom d'apprentissage, mais d'un tout autre nom."

Note 9, p. 87. *There is an analogy between, &c.]* Sensation, that is, is to the body what reflection is to the mind, save that the one is produced by impression from without, and, therefore, not subject to the will, while the latter is the operation of will upon internal faculties. Thus, sensation admits a series of individual impressions which are to be analyzed and compared by the mental

operation; and as the former becomes the parent of inductive, the latter is the source of deductive science.

Note 10, p. 88. *Let it for the present suffice, &c.*] An obvious distinction of *potentiality*—a boy is, potentially, qualified to be a general; that is, he has, by nature, faculties and powers which, when developed, will fit him for the office; and so is one who, although of suitable age, and whose faculties and powers are developed, may not yet have acquired the necessary military knowledge. An analogous distinction may be traced in sentient properties, but it is too evanescent for precise description; and the closing paragraph is a kind of summary of the conversion of the potential and unlike into the *real* and *like*.

CHAPTER VI.

Note 1, p. 90. *The Touch indeed, &c.*] This sense has a wider range of perception than any other—that is, it is not restricted, like the Sight, Hearing, and Smell, to a definite organism and one mode of impression; and, besides being extended over the body, it is essential to animal existence. The text makes no allusion to the *Taste*, because this sense was regarded¹ as subsidiary to or a modification of the Touch. The *special* senses are Sight, Hearing, and Smell; Taste is less definite, as the tongue is sensible

¹ *De Sensu et Sens.* IV. 2.

of tangible as well as sapid qualities; and Touch is extended over the body. Some properties, however, which are enumerated, are subject to all the senses, and, hence, termed *common*; but the attempted illustration of them by "*a kind of motion*" (κίνησις τις) does not, owing to its vagueness, assist in explaining them.

Note 2, p. 91. *An object is said to be perceived, &c.*] An example in illustration of *casual* or *accidental perception*; but it is by its wording so obscure as to stand itself in need of elucidation. The purport, however, seems to be, that the percipient does not, by sight, (as sight distinguishes only colour and form) discern what the white object really is; but the other senses, by some *accidental* perception, coming in aid of the special sense, may determine that the white object is a certain individual. There may besides, perhaps, be a covert allusion to the two-fold acceptance of the term *accident*, which signified then as it does now both *casual incidents* and the *real*, or inalienable properties of bodies; and if so, the passage may imply that the individual is perceived by *chance*; detected, that is, by a mere *guess*. It is of little moment, but the individual alluded to is said, by Philoponus, to have been a friend of Aristotle's; and that letters which had passed between them were extant in his time.

CHAPTER VII.

Note 1, p. 93. *The visible is colour, &c.*] Aristotle¹ says that the faculty of Sight announces to us, distinguishes, that is, the manifold and various shades of colours, on account of all bodies partaking of colour, and thus by Sight, especially, we are able to perceive common properties, such as form, magnitude, motion and number ; but the Hearing, on the contrary, is perceptive only of distinctions of sounds from sonorous bodies and the variations of voice from such as have speech². The sense of "Hearing, however, contributes more than any other, since speech is the channel for instruction, to the cultivation of the understanding."

Note 2, p. 93. *All colour is motive of the diaphanous, &c.*] These passages seem almost to indicate a presentiment of the modern or undulatory theory of light, for they assume the existence of a diaphanous, that is, a subtle medium which, by its motion, is creative of vision. So too, the modern theory assumes a subtle elastic ether, which has inertia without gravity, which fills space, permeates all bodies, and admits of being *set in motion* by the agitation of the particles of ponderable matter, and which particles, when set in motion, communicating a like

¹ *De Sensu et Sens.* I. 10.

² I. 11.

motion to the molecules adjacent, act upon others, and thus motion is propagated further and further in all directions. The theory of Aristotle is much the same—there is a diaphanous medium which may well represent the subtle ether, and which, when potential, that is quiescent, is darkness, and when set in motion by colour, (the property of which is to render it motive), is light, renders objects visible, that is. Thus, the same diaphaneity when passive, that is, potential, is darkness, when active, that is, in reality, is light, and the cause of objects being visible. The value of the hypothesis is diminished by the identification of the “diaphaneity” with air and water and solid bodies, because of their affinity with the supernal region or firmament above, which, together with all the heavenly bodies, was supposed to be of igneous¹ nature; and to be corporeal, circular, and in constant motion.

Note 3, p. 94. *Light is the active state, &c.*] The *diaphaneity* which, when *passive*, is darkness, when set in motion and made *active*, is light, is made visible, that is; and thus light, being a mere condition of the *diaphaneity*, “is not a body, for, were it so, there would be two bodies in one, which is an impossibility.” It may now seem strange that Aristotle should have paid so little attention to the opinion of Empedocles², “that light arrives midway from the sun, before it reaches the sight, or the earth;” for although it differed from his own, in regarding the sun

¹ *Meteorologica*, 3. 2.

² *De Cælo*, 2. 3.

as the source of light and the distinction of day from night, yet, in transmitted light, it supplied a motor, which was required for the completion of his own theory of sensation through the agency of a medium acted upon by impulsion.

Note 4, p. 95. *Now that which is without colour, &c.]* The diaphaneity, that is, when *passive*, is receptive of colour and made active, just as the air, when quite still, is more readily set in motion and made sonorous by percussion; and this leads, amid some confusion of thought, to the consideration of those luminous appearances (*ignes fatui*) which are visible only in the dark, by their colour. 'The precise nature of these appearances is still only conjectural, notwithstanding the advance of chymistry; but they are supposed to be due to phosphorytted hydrogen eliminated, under favouring circumstances, from decaying animal and vegetable matter, and ignited by contact with the atmosphere.'

Note 5, p. 95. *Therefore, without light colour is not visible.]* Colour, that is, by imparting motion to the diaphaneity, renders it, from being potential and dark, actual and visible, that is, light; and thus, as without light there is no colour, so without colour there is no light; and this lends support to the opinion, that the air, as being a diaphanous *medium*, is essential to sight. Aristotle had indeed maintained, in opposition to Empedocles¹ and others, that vision is not caused by the

¹ *De Sensu et Sens.* II. 15, 16.

emanation of luminous rays from the eye as light proceeds from a torch or lamp ; and he ridiculed the notion that vision is precluded in the dark owing to the extinction of those rays therein. It is probable that this theory first led him to adopt a medium and its successive motion, as the immediate cause of vision ; as he had accounted for hearing by the propagation of the impulse given to the air by the sonorous body. Aristotle was unacquainted with the structure of the eye ; but he was aware, of course, that it contains humours, and these he held to be necessary, not as being aqueous that is elementary but, as being diaphanous, for this property seemed to be as requisite for vision within the eye, as it is for the transmission of light to the eye. It was this assumed succession of action, after impression upon a diaphanous medium, which led to the conclusion that the eye itself must be diaphanous, and, therefore, that the visual power must be somewhere on the *inside* of the eye ; and this is the only approximation to a right knowledge of the retina and its relations.

Note 6, p. 96. *It has thus then been said, &c.]* The cause of colour being visible is sufficiently obvious from what has been said ; but fire was said to be visible both in darkness and in light, owing to its being, as fire, of the nature of the firmament above, which was believed to be fire, or something identical with fire. It may be presumed that the subject was here introduced, in order to notice and account for those luminous appearances,

which have been alluded to, and which, in that age, could not but have been topics of wonder and speculation; they were irreconcilable besides, with the prevailing notions of colour and light.

Note 7, p. 96. *The air is the medium for sounds, &c.*] The air was by Aristotle held to be essential to sound; but it is not apparent why odour was supposed to be transmitted by some modified condition of air or water, unless, indeed, it was required in order to account for the perception of odours by fishes and aquatic animals. There was a difficulty, in fact, in accounting for the transmission of odour through air and water, because odour¹ was held to be a vaporous exhalation eliminated by *fire*; and the "special organ of smell was said to be located *about the brain*,"² the coldest of all parts of the body, in order that the exhalation might there be condensed and made productive of smell. Thus, it might seem to be irreconcilable with odour, that it should be transmissible in air or water, and this may have led to the hypothesis of a modified condition of the elements for smell.

Note 8, p. 97. *But neither man nor animals which breathe, &c.*] The term in the text (*ἀνάπνει*), like our own term breathing, is expressive both of inspiration and expiration, whereas it is evident that the sense of the passage requires the former process only. And yet

¹ *De Sensu et Sens.* II. 19, 20.

² *De Part. Animalm*, II. 7.

elsewhere¹, Aristotle, in his criticism of the theory adopted by Diogenes and Anaxagoras to account for the respiration of fishes, has clearly distinguished the one from the other. He objected also to Timæus and some others who had maintained that expiration must precede the other. Enough, however, that he perceived, although unacquainted with the parts on which odours impinge, or the organ by which they are made sensible, that they could gain access to the sense only through inspiration.

CHAPTER VIII.

Note 1, p. 100. *Sound of the actual kind is the, &c.*] As sound is the result of percussion, the passage implies something to be percussed, as well as something *in which* that which percusses is to move; but what that something is in which percussion is to be made is not explained. Some commentators, as Simplicius, have considered the words *ἐν τινι* to imply, “the air which *is interposed* between the sonorous body and the sense,” and which, but for the contradictory opinions of that age with respect to the air, might be at once accepted as its meaning; and even taken as some *special medium*, as has been suggested, it still *may signify a body of air*. We

¹ *De Respiratione*, 2. 3.

may consider the voice, Plato¹ observes, as percussion (sound, that is,) transmitted, *by the air*, through the ears, brain and blood, to the sentient principle. But as the nature and properties of the air were then, from the want of experimental science, unknown, they were available for any hypothesis; and yet there is evidence that Aristotle, not to add Plato, did regard the air as essential to sound and voice. Aristotle², while agreeing with most philosophers in ranking *air* among the four elements, “sees a difficulty in determining what its nature may be in the *universe* around the earth, or what its order in relation to the other elements of bodies.” He was aware of the air holding water in solution, and observes that, whether water be or be not produced, equally, from the whole air, that which is around the earth must be not air only but vapour, which is again to be condensed and become water. Thus, “we maintain,” he adds, “that fire and air, water and earth are producible out of one another, and that each of them is present, *in potentiality*, in each of the others; as is the case with all bodies, which *have a base into which each of them is ultimately reducible*.” He has distinguished the air we *inspire* from that which we *send forth* (ἐκπέμπειν) and to which he has given a specific appellation (τὸ πνεῦμα); but owing to the difficulty of determining either its nature or its office, (although it is the subject of a special³ treatise,) no

¹ *Timæus*, 67 B.

² *Meteorologica*, I. 3. 3. 2.

³ περὶ πνεύματος.

unexceptionable equivalent for it can be offered. These quotations shew, amid many suggestive observations, that knowledge concerning the air was then very unsettled; and yet they prove, it may be assumed, that air was implied in the passage referred to.

Note 2, p. 101. *An echo is produced whenever, &c.*] This passage is obscure, both from its elliptical wording and the want of adequate exemplification; but, in attributing to the air elasticity and capability of being *reflected*, it seems to suggest that the atmosphere only is the cause of sound and, therefore, of echoes. So, according to modern science¹, “an echo is sound *reflected* from a distant surface and repeated to the ear; although several other conditions are required for its production.” In another treatise², it is assumed that reflexion of the air (*ἡ ἀνάκλασις*) is the immediate cause of an echo; and since an echo is *reflexion*, “must there not be, for its production, air confined, impacted and communicating, as one mass, with that which is to be reflected?” But an echo, whether or not audible, ought, as the text states, looking at the properties of the air, to be a constant occurrence; for as light is continually reflected from bodies, and thereby casting shadows by which light is distinguished, so sound, owing to the air’s elasticity, must be often reflected and, therefore, repeated, in varying degrees of intensity, according to the nature of the surface on which it may have impinged. That age, in fine, was

¹ Brande’s *Hist. of Science*.

² *Problemata*, XI. 8.

acquainted with several of the properties of the air, but, as they had not been tested experimentally, its acquaintance with them was but conjectural, and could lead to no positive inference; it was reserved for modern science to ascertain what the air is, and what its properties in relation to the world, its productions and inhabitants.

Note 3, p. 101. *A void is rightly said, &c.*] It would be difficult even to conjecture what could have been meant by *a void* in that age; for although it had been perceived¹, it may be but obscurely, that the air rises by fire (heat) to the upper regions and becomes ether, (as in the *Timæus*, expiration is accounted for by the *rising up* from within of *the heated breath*,) yet it is not to be supposed that rarefaction was an admitted property of the air, or that any condition like rarefaction was implied in the void. Aristotle² observes, upon this topic, that, “according to some philosophers, a plenum is a space or vessel when full, and a vacuum or *void* is the same when empty, thus making, as he says, the plenum to be identical with the vacuum and space, excepting in conditions of relation.” In all this it is evident that no account was taken of the air; and he objects to Anaxagoras, (who had shewn, experimentally, that *the air is substance of some kind*,) that he argues against what had never been contended for—the advocates for a void maintain, he says, that it is a space in which there is no tangible body, and, holding every

¹ *Meteorologica*, II. 2.

² *Nat. Auscult.* IV. 6. 1.

thing to be corporeal, they consider that only to be a void in which there is absolutely nothing ; so that it can be to no purpose to shew that the air is *something*. This epitome shews sufficiently how widely apart from one another are the antient and modern significations of a void, since it now implies such a *rarefaction of the air* as can be obtained through the air-pump ; and, as rarefaction cannot be carried beyond 300 times, no proof can be afforded of the possible existence of a void. Aristotle¹ objects to those who maintained that the void is identical with any space filled with air, “ for, if the air be driven out, the space will clearly, he observes, be a void, in a stricter sense than it was, since it will no longer be full of air.” But it would be foreign to the purport of these notes to inquire further into the opinions of that age ; it may be inferred, however, from what has been adduced, that Aristotle, although he refused corporeity to the air, was not a very consistent supporter either of the plenum or vacuum.

Note 4, p. 102. *Every sonorous body, &c.*] This passage is a summary of all that physiology has now to offer upon sound and hearing ; but although it might have been surmised that sound is vibration of the air, caused by a sonorous body and conveyed, by successive undulations, to the organ of hearing, yet, as the internal ear was then unknown, it is a surprising assumption that air must be contained within the *organ*, in order that the

¹ *Topica*, VII. I. II.

vibration may be communicated to the *sense*. Aristotle may perhaps have been led, notwithstanding the unstable opinions of his age upon the air, to conclude that, as sound "is present in the air," air must be connected with the hearing, and, if so, be contained, naturally, within its organ. The succeeding passages hardly admit of comment, on account of their evident want of anatomical knowledge; but they prove that the tympanic membrane had been made out, as also that it may be so injured, as to admit fluid from without into the ear. And this disease of the membrane is aptly compared to ulceration and consequent opacity of the eye's membrane, (the cornea,) whereby the rays of light are precluded from entering the eye and producing vision.

Note 5, p. 102. *But proof is afforded, &c.*] This somewhat puerile experiment is still extant. It seems strange that the very obvious cause of this phænomenon did not occur to one who had surmised, without anatomical proof, that there is air within the tympanum; it had escaped Aristotle, besides, that, in a former passage, he had made the air which is *immured within the ear to be immovable*.

Note 6, p. 104. *The voice is a sound, &c.*] This passage is a clear definition of the voice, and it points, although indistinctly, to the parts and functions concerned in its formation. The voice¹ is said to be different from sound, and speech to be different from either; and, as

¹ *Hist. Animalm*, IV. 9. 1.

speech can be produced by no other part than the *pharynx*, those creatures only can speak which have lungs, as speech is the articulation of the voice by the tongue. Wherefore, the voice and larynx send forth vowels, the tongue and lips consonants, and these together make up speech. So, too¹, Cuvier says, that "man alone among animals can articulate sounds, owing probably to the *form of his mouth* and *the mobility of his lips*." The² *pharynx*, so called, and *trachea*, are of cartilaginous nature, and this because they are for the sake of the voice as well as breathing; and it is necessary that that, which is to give out sound, should have firmness as well as smoothness. But the *larynx* and *pharynx* are here alluded to as if they were one and the same organ, and it may be, that owing to the complicity of the parts and their multiplied relations to one another, they were then so considered; but yet passages³ might be cited, which seem to shew that they were known, both by function and position, to be different organs.

Note 7, p. 105. *Nature employs, simultaneously, the air, &c.*] It was assumed by the physiologists of that and, indeed, many subsequent ages, that the office of respiration is merely to cool the blood, or rather to temper its heat, which was supposed to be constantly tending to an excess incompatible with life. In modern times, on the

¹ *Anatomie Comp.* t. I. 15.

² *De Part. Animalm*, VII. 3. 5.

³ *Ibid.* II. 3. 9; III. 3. 2.

contrary, the action of the air which is inspired upon the venous blood has been by some regarded as a process of combustion, and the source, through combustion, of the special temperature which characterises all organised and living bodies. Respiration is said, by Grant¹, to be essential to the constitution of animal bodies; for by this function "the vital fluids are purified and replenished, the muscular system is furnished with its capability of action, and the high temperature of the mammalia is preserved in every condition of the surrounding element."

Note 8, p. 106. *As proof of which we are unable, &c.*] The meaning of this passage, owing in part to the unsettled knowledge of that age, is by no means evident; but it can be readily admitted, that the act of holding the breath must set in motion, disturb, that is, the *air which has been inspired*, and produce *coughing* rather than *articulation*. The French commentator makes the text (*κινεῖ καὶ τοῦτο*) to imply "disturbance of the *function*;" Trendelenburg, however, sanctions the version here given. It will be apparent, from what has been adduced, that the word *pharynx* (of fishes) should have been *larynx*, for this, being the upper part of the trachea, is the tube which conveys air to the lungs, as the other, being the upper part of the œsophagus, is the tube which conveys food to the stomach; and all fishes have a *pharynx*, of course, but, as they do not breathe, they are without a *larynx*.

¹ *Outlines*, p. 592.

CHAPTER IX.

Note 1, p. 109. *And there seems to be an analogy, &c.*] Aristotle¹, in thus making Touch superior to, and more influential than any other sense, (for it is the most perfect, he observes, of man's senses, although with respect to some others he is inferior to many animals,) is supported by Cuvier², who says, "that Touch is the most important of all the senses, and that its several degrees of perfection exercise a surprising influence over the nature of different animals; and that of all the vertebrata man has the most perfect Touch." It is difficult to attach a sense to the term *hard* or *soft* applied to *flesh*, which, by anatomical³ description, corresponds with the muscular substance of the body; but man is said to have softer flesh than any animal⁴, and on this account, through the delicacy of his sense of Touch, to be of all creatures the most intelligent. It is presumable that Aristotle was led to suppose, from this sense being spread, so to say, like the muscular substance, over the surface of the body, that its organ lies somewhere *in or beneath the flesh*, and thus to have concluded that a relative hardness or density of that substance, by impeding tangible impressions, may be

¹ *Hist. Animalm*, I. 15. 14.

² *Anat. Comp.* t. III. 569.

³ *Hist. Animalm*, III. 16. 1.

⁴ *De Part.* II. 16. 16.

the cause of, or concomitant with dulness of the faculties. The nervous system was then unknown, and Aristotle, so fond of analogies, might readily suppose that the Touch had, like other senses, its appointed organism; and, if there were such an organ, that it is extended over the body, and thus must be in or beneath the flesh. The Taste, as being a modification of Touch, was said to be more delicate in man than animals.

Note 2, p. 110. *There is a close analogy.*] A similar observation is made in the following chapter, and, besides bringing sentient perceptions under some general law, it was, probably, intended to shew that colour, sound, and odour, although inappreciable by our senses, may still be present. It shews, in fact, that our senses, being limited in their capacity of perception, are not to be relied upon when impressions are very greatly in excess or proportionally faint.

Note 3, p. 111. *The smell is perceptive.*] “That fishes smell,” Aristotle¹ observes, “is shewn in their being taken by baits which have the particular odour, foul or grateful, to which they are attached.” But modern science has, of course, determined both the seat and the structure of the olfactory organ in fishes; and shewn “how it is protected from the violent and incessant action of the currents of water required for respiration.” Sanguineous² creatures are all such as have red blood, and insanguineous, those which, in place of red blood, have a pale bluish fluid

¹ *Hist. Animalm*, IV. 8. 19.

² *Ibid.* I. 4. 3.

circulating in their veins. These last include "insects, molluscs, crustacea, and creatures with more than four feet."

Note 4, p. 111. *And hence the difficulty of determining, &c.*] If the site and structure of the olfactory sense, in the lower forms of life, are still somewhat conjectural, it may well be supposed that the smell in non-breathing animals was, in that age, although seen to be a fact, inexplicable. But yet, although anatomy could not then determine the seat of the sense, it might have been conjectured that, as such creatures are obviously affected by odours, there must be some other inlet for them than that through which impression is made upon animals; and the detection of this mode of perception, would have been another instance of homologous physiology. Aristotle¹, following Plato, placed the seat of the smell and other senses in the neighbourhood of the heart; but "the organ was said to be located, suitably, between the eyes."

Note 5, p. 112. *The olfactory organ in man, appears to differ, &c.*] The analogy is obviously faulty, as it seems to imply that the olfactory, like the respiratory organs, are furnished with a cover, by the raising of which odours gain access to the sense; or rather, owing to the intricacy of the parts and imperfect anatomical knowledge, the epiglottis has been associated with the velum and posterior fauces. It could answer no purpose, then,

¹ *De Part. Animalm*, II. 30. 9. 17.

to inquire, as some have, what animals have an operculum for the smell, of that kind? or what mean those veins and pores? As although the operculum, that is, the epiglottis, was known to be protective of the larynx and, therefore, the respiratory organs, the relations of the larynx with the parts associated with it had not been made out; and the *veins* and pores refer, probably, to the bronchi and vessels within the chest.

Note 6, p. 112. *In fine, odour is derived, &c.*] Aristotle here differs from Plato, who held that odorous particles are in a state rather of fluidity; and Cuvier¹ says, that “the organ of smell is moistened with abundant viscosity, which arrests the odorous particles contained in air or water; as fishes are sensible of odours. But odour, being regarded as exhalation, was assumed to be of fiery nature and, therefore, like the element, dry, and this required, for the conformity of the hypothesis of *like upon like*, that the organ of the sense, when in potentiality, should be also dry, and so, in due relation to odour.

¹ *Anat. Comparée, 15^{me} leçon.*

CHAPTER X.

Note 1, p. 114. *Colour, however, is not thus made visible.*] The opinion here objected to originated with Democritus. Aristotle¹ held it to be absurd to suppose that colour and vision could be a process of *emanation from the eyes*; for colour produces sensation, he observes, not by emanation but, by contact, and so it is better, at once, to admit that vision is produced by the action of the medium. There are², it is said, seven distinctions of colour and as many of savour; and in another work³ seven vowels, seven pleiads, and seven chords.

Note 2, p. 114. *No object, however, which is without humidity.*] This is little more than a repetition of what had been said concerning sapid substances. Aristotle⁴ seems to have adopted a theory, derived from mechanics, for explaining the solubility of objects—Whence comes it, he asks, that an earth is both melted and moistened by fluid (καὶ τήκεται καὶ τέγγεται) while soda (τὸ δὲ νίτρον) is melted but not moistened? The answer is, because there are pores throughout the soda which cause its parts to be, at once, separated by the fluid; while the pores in

¹ *De Sensu et Sens.* 3. 15.

² *De Sensu et Sens.* 4. 18.

³ *Metaphysica*, XIII. 6. 5.

⁴ *De Meteorol.* IV. 9. 4.

the earth are in alternate rows, so that the influence of the fluid, in whatever way it may gain access, cannot but be different.

Note 3, p. 114. *As vision is perceptive, &c.*] The argument here is interrupted and obscured by parenthetical explanations; but the purport is, that the senses are the sole judges of sentient impressions through all their degrees of intensity, and that, as sensibility is a mean, they cannot discriminate such as are far above or below the allotted medial standard. There is a seeming discrepancy, however, in employing the term *invisible* as analogous to *impossible* on other subjects, as vision is not altogether lost in any darkness; but a creature without feet could not continue its existence, nor a fruit without the kernel continue its species.

Note 4, p. 115. *The impotable as well as the potable, &c.*] The impotable implies, of course, whatever is neither moist nor capable of becoming moist, and every such substance must, necessarily, pain—be very disagreeable to, that is—and pervert the Taste. All these passages, however, while proving that moisture is required for savour, point to a want of knowledge of the salivary and mucous glands which were yet to be discovered. But over and above the due conditions of moisture, there was still required the knowledge of the nervous system to account for the many perversions of Taste which are manifested, both in sick and well; and manifested, at times, without any apparent cause. It will occur to many, besides, how differently the

Taste is affected by the same substance, as sugar for instance, in different persons, and even, at times, in the same person.

Note 5, p. 116. *Kinds of savour are like shades of colour, &c.*] There must ever be difficulty in fixing upon terms for savours or other sentient qualities, and still greater difficulty in settling what are the exact equivalents for such terms in another, and that not a cognate tongue; for although some savours, as bitter and sweet, may be supposed to have an universal acceptance, there are others which, being far less definite, are subject to variation, according to climate and race. So that, with the exception of bitter and sweet, it can hardly be pretended that the other terms, as oily, pungent, rough, astringent, &c., are perfect representatives of those in the text.

Note 6, p. 116. *In fine the sapid sense, &c.*] This passage does but repeat what has been already insisted upon, that the sense, in *potentiality*, that is, when *inactive*, is identical with that which is to act upon it; but that, having been acted upon, it is brought into the state of *reality*, and then becomes perceptive of the qualities of the excitant.

CHAPTER XI.

Note 1, p. 118. *Each sense seems to be perceptive, &c.*] This passage seems to imply that all sentient impressions may, in a strict sense, be tangible impressions. Aristotle¹, in another treatise, observes that sentient bodies are bodies sensible of tangible impressions, and that tangible impressions only have contraries, which, in kind, are specific and causative. And, "thus, neither whiteness and blackness, sweetness and bitterness, or any other contraries save those alluded to, can form elementary distinctions." All which implies, perhaps, that the Touch is either the origin of or coeval with animal existence; and that the other senses are but for the higher forms of being. The properties, besides, which are attributed, so to say, to the Touch are, in contradistinction to those of the organs of relation, mainly concerned in the changes continually going on in inert bodies; and this consideration may have, in part, contributed to the speculative opinion just quoted.

Note 2, p. 120. *It may be a question whether as all bodies, &c.*] This is an argument to prove that, as there cannot be absolute contact of bodies in water, so neither

¹ *De Gen. et Corr.* II. 2. 2.

can there be in air ; and thus that the flesh can be only the medium for tangible impressions—that there must ever be air interposed, that is, between the object and the surface of the body. It may seem now to be supererogatory, but, as the atmosphere had not then been experimentally investigated, crude and contrary opinions, as might be supposed, were entertained concerning it, and its manifold relations¹. The term “third magnitude” is derived from, or associated with the Pythagorean doctrine of number—as of *magnitude*, continuous *length* is referrible to one, *breadth* to two, and *depth* to three ; and, thus, *depth* is the “third degree” of or relation to *magnitude*.

Note 3, p. 122. *But tangible differ from visible, &c.*] It will be evident that whatever may, in these passages, be erroneous, is traceable to the flesh being regarded as the sense or the medium for the sense of Touch, as, in either case, the Touch, differing from every other sense, would, from what has been maintained, require two media. There seems to be something like forgetfulness in withdrawing, so to say, the medium in the example given of tangible impression, and supposing that the man and his shield can be simultaneously transfixed.

Note 4, p. 122. *The different states of the body as a body, &c.*] As the Touch was regarded as a primal or elementary sense, so the qualities, of which it is perceptive, (as hot and cold, dry and moist, &c.) were also regarded

¹ *Metaphysica*, IV. 13. 1.

as elementary qualities ; and distinguished from visual or sonorous impressions, by being necessary to animal existence. It is uncertain whether the work "upon the Elements" here alluded to was a distinct work, or a chapter in one of the treatises which have been cited ; but the question is of little consequence, and foreign, besides, to the purpose of these notes.

Note 5, p. 123. *The mean, in fact, is critical, &c.*] This is a transfer, so to say, of moral to physical relations. "Whatever is continuous and divisible comprehends," Aristotle¹ says, "the three terms, more, less, and equal, which all bear a relation either to the thing itself or to ourselves ; for the equal is a given mean between excess and deficiency. Now, the mean implies that which is equidistant from either of the extremes, and it is one and the same in all material conditions ; but the mean, in relation to us, implies a state in which there is neither *excess* nor *deficiency*." Thus, temperance nourishes and preserves the body, while excess or deficiency of food and drink tends to destroy it. Moderate exercise increases, while immoderate or insufficient exercise impairs the strength ; and so for other conditions which are readily adducible.

Note 6, p. 123. *As vision was said to be in some sense, &c.*] The passage is obscure, but it seems to repeat a former observation, that, as the senses can judge of sentient properties only in their mediate state, the terms *invisible* and *intangible* are, strictly speaking, incorrect

¹ *Ethica Nicom.* II. 6. 5.

and inapplicable. "The air¹, moving in currents, was said to be wind;" and, when at rest, it was supposed, like all else, when either in excess or deficiency, to be withdrawn from sentient perception.

CHAPTER XII.

Note 1, p. 125. *It is the primal organ, &c.*] Philoponus and Simplicius, according to some commentators, believed that the "mind" was the organ or principle here alluded to; but Saint Hilaire is disposed to regard it as "sensibility, irrespective of any thinking principle." Trendelenburg inquires, what means the term 'primal' quid hoc *πρῶτον*? He seems, however, to consider the mind as the special seat of the faculty in question—"quod primum dicitur, id tacite *mentem* spectari videtur, quæ propria est hujus facultatis sedes; et ea *prima* quidem, si ab *intimo fonte proficiscaris*." It may, however, with some confidence, be assumed that this primal organ points, suggestively, to the brain; for it evidently implies a central organ connected with each of the senses, and receptive of all sentient impressions. Thus, such an organ, while receptive of form, may well be said to be identical with the object; and yet, seeing how opposed are the manifes-

¹ *Meteorologica*, I. 13. 2.

tations of the sensibility to the properties of matter, not be so, in an absolute sense. The organ, like the brain, in fact, being perceptive of forms and properties through the senses, is identified, pro tanto, with objects; although it cannot but differ from them absolutely, in mode of being, that is in essence.

Note 2, p. 126. *But why do not plants feel, &c.*] The answer to this question, by assigning to the organ a definite locality and function, seems to lend support to the explanation offered in the foregoing note. The passage in the original τὸ μὴ ἔχειν μεσότητα is rendered too freely, perhaps, in this version, as mediate faculty; but the French "qualité moyenne" is to the same purport. The Latin is, "neque id medium, tanquam mensuram et modum habent, quo sensus quasi judicant." It may be that as Aristotle had refused, so to say, sensibility to the brain, he found himself constrained, in order to explain the function of the senses and their power of recalling images, to adopt a central organ, to be as well the source of sensibility as the sensorium or store-house, for the mind and memory. He had been led, in fact, to regard the brain as insentient, because of its not imparting sensation when touched, and as subsidiary to the respiration for tempering the internal heat, because of its apparent coldness. All this was the settled conviction of this great man; Democritus, however, seems to have perceived that the brain is either the organ or the seat of sensibility, although the opinion was not generally admitted.

Plato agreed with physiologists in making the seat of the senses to be the liver and neighbourhood of the heart, but he differed from Aristotle in believing the brain to be continuous with the spinal chord, and to be the source of the intellectual faculties. He held the brain, in fact, to be the seat if not the source of the higher faculties, while he assigned the appetites and coarser passions to the viscera. Hippocrates¹, who lived some years before him, assigns to the brain the guardianship of the mind, and makes it to be not only the first percipient of all the changes of the seasons, but also the source and seat of all the more deadly and complicated maladies.

Note 3, p. 126. *It may be questioned, &c.*] The argument, in these passages, is to account for the changes which are constantly going on in bodies, and for which that age could assign no adequate cause; but still it was perceived that tangible and sapid qualities (hot and cold, wet and dry, acid, saline, astringent, and others) must be the agents principally concerned in their production. Thus, although neither light nor darkness, sound nor odour, can act upon bodies, yet something *present with them may*, and this seems to point, suggestively, to those imponderable and invisible forces (heat, magnetism, electricity, &c.), for which, as yet, even “no plausible theory has been adopted.”

Note 4, p. 126. *But all bodies are not impressionable, &c.*] These passages are very obscure; but their purport

¹ *Epistola*, T. III. 824; T. I. 614.

seems to be, that odour and sound can act only upon such bodies as, like the air and water, are neither limited nor stationary—are made to be the carriers, as it were, of delicate emanations and vibrations to sentient organs. Thus, it is added, the air, having been impressed by odour, readily gives it out, and, then, through the smell, becomes perceptible to the sentient being. But neither odour nor sound, as such, can in aught contribute to the changes to which all inert bodies are subject; and the actions of sound and odour, therefore, seem to be limited to sentient, that is, living properties. This may be to us a truism, but it must be recollected that even to Aristotle the olfactory passages were but imperfectly known; that the opinions upon the Atmosphere were hypothetical; and that the processes by which changes are wrought in inert matter were still to be detected.

BOOK THE THIRD.

CHAPTER I.

Note 1, p. 131. *The sentient organs, however, are constituted, &c.*] The senses were formed, according to that age, from the elements—as the hearing from air, and the eye, which alone was supposed to have a special organ, from the purest part of the fluid secreted by the brain; and vision is the result, according to Aristotle, of refraction. Thus, Democritus¹ was held to be right in saying that the eye is water but to be wrong in supposing vision to be caused by reflection, (τὸ ὄραν εἶναι τὴν ἔμφασιν) as vision is, not in the eye but, in the percipient; for “vision is refraction” (ἀνάκλασις γὰρ τὸ πάθος). Aristotle shews that, according to the admitted doctrines, these two elements only constitute the sentient organs of all animals which are perfect; and adds, as if to guard against a possible objection, that the mole has eyes although they may not be very apparent. It is then argued that, unless there is some kind of body or mode of impression different from all

¹ *De Sensu et Sens.* 2. 10.

with which we are acquainted, no sense can be wanting; and Cuvier¹ adopted a similar argument to prove that no animal, unknown to Zoology, remains to be discovered.

Note 2, p. 132. *And this we are able to do, &c.*] This passage is elliptical and obscure; but, as “the relative is too closely connected with the example *something sweet* to admit of being separated,” it may imply that the sight may, by colour and refraction, determine the quality of a particular fluid. But, as no sense can judge, excepting indirectly, of compound qualities, the perception of such is accidental, a kind of guess, that is, just as it would be in the case of a fair individual, in the example of Cleon’s son.

Note 3, p. 133. *The senses, however, do perceive casually, &c.*] This passage remains, according to its wording, unintelligible, notwithstanding the attention bestowed upon it by commentators, because of the difficulty of attaching any sense to the assumption, that the senses can become as *one*. The comment “*si unum et idem uno et eodem tempore a diversis sensibus percipitur, ni sensus in unum coalescunt,*” assumes but does not shew that the senses can so coalesce, and then judge of impressions made upon them individually. And thus here again is required a central organ, the common origin of the perceptive power of the senses, to which all impressions are to be referred and by which they are to be compared; and such an organ is the brain. But still, from the moment that we judge of more

¹ *Discours sur les Revolutions de la terre*, 66—67.

than a simple impression or a single idea, there is liability to error, as was observed and exemplified in the case of a fluid, which, from being bitter and yellow, is at once assumed to be bile because those are the known qualities of that fluid. Many of our errors arise, no doubt, in like manner, from our not sufficiently scrutinising the impressions derived from external objects.

CHAPTER II.

Note 1, p. 135. *It is then manifest that perception &c.]* This is a conclusion drawn from the reasoning of a former chapter, and its purport is to shew that our senses enable us to judge even of privative conditions, as darkness and silence ; and, further, that, being receptive of forms without matter, they can retain images, and so, through the sensorium recall objects after their withdrawal.

Note 2, p. 136. *The action of the object of perception, &c.]* It has been attempted, by some of the ancient commentators, to annex this to the preceding argument, and shew that, as sight must first be imbued with colour, so the hearing must, in order to perceive sounds, be first sensible of the actions of sonorous bodies. But the more obvious signification, and which is equally supported by the text, is, that there must be simultaneous-

ness of action between the object and the sense, although the modes of that action are as different as material are from living properties. The succeeding passage is, by its wording, obscure, but yet it admits of being elucidated by the term on which its meaning chiefly depends; for hearing, when *in potentiality*, must involve both sound (as without hearing there is no sound,) and hearing, in *reality*, just as the Vital Principle must exist, innately in the body *in potentiality*, but which, under genial circumstances, is to be acted upon and made a *reality*; and thus, too, the power which impels may, itself, be at rest.

Note 3, p. 136. *But while for some senses these two states, &c.]* It is scarcely possible, owing to the difficulty of fixing upon synonyms, to make this passage clear to the general reader—the text instances two terms ($\psi\omicron\phi\eta\sigma\iota\varsigma$ καὶ ἡ ἀκουσις), as *potential conditions* of sound and hearing ($\psi\acute{o}\phi\omicron\varsigma$ καὶ ἡ ἀκοή), and it may be assumed that they conveyed a modified signification of the action and sensation, which another language, even were the meaning quite evident, may fail in imparting. But even the plastic Greek fails, in many instances, in discriminating, without periphrasis, the two conditions; for vision, although potential, is still vision, nor has it any other designation when made *reality* by colour, and this applies equally to the taste and savour. In this version, the double condition of sound is rendered by sound and sounding, that of the sense by hearing, and audition for

want of a vernacular term ; the French version gives them as “*le son et la résonnance, et l’acte de ce qui peut entendre est l’ouïe ou l’audition.*” It is clear that hearing and sound, and other senses and actions, in *reality*, must coincide to eliminate sensation ; although this does not, of course, apply, as the text observes, to the senses in *potentiality*. And, hence, in this state, there are, for a sentient being, no such qualities as white or black, bitter or sweet, as they depend, for their *reality*, upon a given condition of the sensibility, which depends again, in part, upon the will.

Note 4, p. 137. *If a voice of any kind is harmony, &c.]* This deviation from the immediate subject of the chapter, which was to prove that the five senses satisfy all our wants as sentient creatures, and that, therefore, there can be no other sense besides them, is, no doubt, episodical, although it is annexed, by the extremes of sounds, to the general argument upon sensibility. But the phrase itself is by its wording obscure, and, by its conclusion unsatisfactory, for it may not follow that, because voice may be harmony and harmony proportion, the hearing must be proportion also. It¹ has been suggested that, by a slight change of position in the words, and so, instead of the present wording, making *harmony, voice to be* (εἰ δ’ ἡ φωνὴ συμφωνία vice εἰ δὲ συμφωνία φωνή τις) *of any kind*, it might be assumed that hearing should be harmony. Aristotle², by allotting

¹ Vide Trendel. *Comment.*

² *De Part. Animalm*, IV. 9. 2.

“vowels and consonants, which constitute speech, to the larynx, tongue and lips,” seems, by this variety of sounds, to consider voice as a kind of harmony ; and Cuvier says, that all the modifications of sound which are expressible by the letters of the alphabet, “take place in the mouth, and depend on the relative mobility of the tongue, and still more the lips, whence the perfection of man’s speech is derived.”

Note 5, p. 138. *But since we judge of white, sweet, and each other, &c.]* The only answer to this, as it was to a former inquiry, is, that the brain is that generalising faculty, and that it fulfils all the conditions, however enigmatically described, which are required in the text. It is impossible to refuse to the brain the property of receiving and comparing contrary impressions, simultaneously, and receiving them, therefore, in the words of the text, as an indivisible principle, just as the mind can compare opposite ideas ; and all the speculations upon impulses and the divisibility and indivisibility of that which is to perceive and judge only shew the want of a central organ for the reception and comparison of individual sensations. And many of these passages are necessarily obscure, owing to their partaking of the character of inquiry or suggestion, rather than didactic statement ; but their obscurity may be, in part, seen through by the introduction of that source of sensibility, which is said, in the closing paragraph, to constitute animal in contradistinction to mere vegetive life.

CHAPTER III.

Note 1, p. 142. *Thus, then the ancients affirm, &c.*] Parmenides, Anaxagoras, Empedocles and Democritus, are cited by Aristotle¹ as maintaining the doctrine alluded to in the text; but as Homer² can hardly be said in the passage quoted to have adopted it, there is probably an error in the reference. The arguments of these writers, in support of the doctrine, are derived from the uncertain and varying nature of sentient impressions which, as they depend upon individual organisms, cannot, for the attainment of truth, be brought under any absolute law. Thus, they held that it belongs not to the many nor even the few to judge of truth, since the selfsame fluid, when tasted, seems to some to be sweet, to others bitter; so that if all were sick or mad, and two or three only well or sane, then these and not the others would seem to be in that state. Many things, besides, appear to have for many animals opposite qualities from what they have for us; and even for the same individual, similar substances do not always produce the same sensation. So that it is uncertain which of these are true or false, since these are neither more nor less true than

¹ *Metaphysica*, III. 4. 8. 9.

² *Odyss.* XVIII. 135.

those ; and this made Democritus say, that either nothing is true, or else that truth is for us uncertain (*ἀδηλον*). From their assuming, as a general proposition, that reflection is sensation, they maintained that reflection is change, and that the apparent, through sensation, is, of necessity, true ; and it is from such conclusions, Aristotle adds, that Empedocles and Democritus as well as their followers became fettered by those opinions. For Empedocles affirmed, that men, by changing their *habit* (*ἔξις*) change also their judgment, “for man’s wisdom is enlarged,” &c. ; and elsewhere he says, that “in so far as men are capable of *change*, in so far they are capable of forming different judgments.” The opinion of Parmenides is to the same purport ; and there is a recorded saying of Anaxagoras to some of his followers, that “beings will be to them such as they may suppose them to be.” These writers attribute the same opinion to Homer, (but it was shewn in a former note that this reference is faulty,) because he made “Hector, as *if beside himself* under the blow, to lie thinking differently,” (*ἀλλοφρονέοντα*). But it was incumbent upon these writers, as is observed in the text, to have dwelt upon the liability to error to which we are all ever subject through the senses ; for if all appearances are to be held as true, then the same impression may be at once true and false ; which is to admit an impossibility. The doctrine, in fine, of this school, as given in the text was, that the power by which animals move is corporeal, and like to the faculty which thinks,

as also that the faculty of conclusions (judgment) is some form of sensibility; and thus, it reduced, so to say, the faculties of thought to sensual impressions and conditions.

Note 2, p. 142. *On which account, either all appearances, &c.]* This is a dilemma, as an objection to their doctrine, in that, "either all appearances are, as they maintain, necessarily true, or else (in opposition to their dogma, that *like* is recognised by *like*,) there is recognition by *unlike*;" and thus the error from contraries is made identical with the knowledge of contraries. The objection is then placed upon the obvious ground that, while sensation is allotted to all creatures, reflection, which implies reason, belongs but to few; and next, as a general argument, it shews that mental faculties, being derived from other sources than feeling, cannot be identical with sentient perceptions.

Note 3, p. 143. *But it is manifest that imagination, &c.]* The argument next proceeds to the subject of imagination, and as has been well observed, it is thus appropriately placed between sentient perceptions and thoughts, "as imagination cannot be without senses, or the mind without imagination." For "imagination is not identical with sensation," Aristotle¹ observes, and yet "it is called up either through thought or through sensation." Imagination then, is neither sensation nor conception, as the former depends upon external

¹ *Metaphysica*, III. 5. 23. *De Motu Animalium*, 8. 5.

influences, and the latter, which is a result from reasoning, being true or false, is removed from the will; but imagination on the contrary, can be exercised how and when we please. It is difficult either to represent graphically the process here alluded to, or to determine the precise import of the text; and other versions seem to be equally indefinite. The Latin is, "licet namque, cum libet, fingere quicquid volumus, atque ante oculos ponere, perinde atque ii faciunt qui, in artificiosæ memoriæ comparatis atque dispositis locis, imaginis fingunt atque simulacra collocant," and the French, "et l'on peut s'en mettre l'objet devant les yeux, comme le pratiquent ceux qui traduisent les choses en signes mnémoniques, et inventent des symboles." Hence, an opinion, arrived at by a chain of reasoning drawn from particulars which we hold to be true, cannot but affect us differently from imaginings which are of our own coining, and which we know to be fictitious. A succeeding passage, which shews that imagination cannot be opinion, is to the same purport—for, being derived from particulars, its issue is, so to say, independent of us; but imagination may be exercised upon any combinations which the will may choose to recall.

Note 4, p. 147. *But the motion produced by the act, &c.]* The wording, by the *act*, is but an indifferent representative of the original ὑπὸ τῆς ἐνεργείας, and yet its exact signification, or its relation to the ἐντελέχεια is by no means obvious; the phrase, besides, notwithstanding

its repetitions, is still vague and obscure. It seems, however, to embody former assertions—that a single sensation from a special organ, that is, must be true; and that there is room for fallacy when other qualities are added to that sensation, and still more so when common properties, as motion, magnitude, or number, are, for explanation, to be taken into the account.

Note 5, p. 147. *And since vision is a sense, &c.*] It will be apparent that this passage depends, for its meaning, upon etymology—*φαντασία* (fancy or imagination) may be derived, if not from *φάος*, yet, from the same root as *φάος*, which probably is *φῶς* (light), as light is essential to vision; and *φάος* may have formed *φαίνω*, which is an approximation to *φαντασία*. The Latin version is, “cum autem visus maxime sit sensus, hinc est quod nomen imaginatio ab ipso lumine sumpsit, phantasiaque dicitur, quia sine lumine visio fieri nequit.” Imagination or the mental perception of images, that is, being regarded as an inward sight, and sight as the most precious of the senses, was derived from the same root as light, because light is essential to sight.

CHAPTER IV.

Note 1, p. 153. *There is a distinction between positive, &c.]* All the passages, under this head, are obscure, if not incomprehensible ; their purport seems to be whether the mind judges, by one and the same faculty, of realities, (qualities, that is, perceived through the senses) and realities viewed, abstractedly, in their essence. Thus, the inquiry seems to be whether the mind is sensibility or associated, so to say, with sensibility, or altogether distinct from it ; whether the sentient perception which is engaged upon particulars, can ever be capable of the abstract reasoning which detects the essence of things, and so generalises and groups them for universal laws. This does not, however, apply, it is said, to all subjects, as, with some, “the two states are identical ;” and this is the case with abstractions or immaterialities, which fall within the province of the mind apart from sense.

Note 2, p. 153. *Now, it is by the sensibility that we judge, &c.]* This phrase seems to allude to the then admitted doctrine that the sense of Touch either is flesh or in the flesh, and that it, therefore, directly or indirectly, is perceptive of hot and cold, and other such qualities ; and this assumed sentient property may have led to this com-

plicated argument, which makes flesh to be rather an abstract than a positive substance. Trendelenburg, in the allusion to curved and straight lines, sees a reference to Plato's opinions upon intellectual processes: "Sane Plato actiones intellectus circulis primum recto, mox circinato recurrentique interius comparat: Aristoteles lineæ explicatæ et replicatæ, sive porrectæ et curvatæ." It may, however, be assumed that, whatever the figures or analogies employed, the operations of the mind will still remain as mysterious as those of the sensibility; and, thus, that all such inquiries are, as final causes, beyond our research and, so far, unprofitable.

The Latin version of the phrase is, "Sensitiva igitur parte calidum discernit et frigidum, quorum quædam est ratio caro, alia vero esse carnis discernit, aut separabile aut se habente ad se ipsam perinde atque se habet cum extensa fuerit linea flexa." That of the French, "Mais c'est certainement par une autre faculté qui est séparée, ou qui du moins devient à elle-même ce que la ligne brisée est à elle-même aussi quand on la redresse, que nous jugeons ce que signifie être la chair."

Note 3, p. 154. *But we have to consider why the mind, &c.*] The chapter is closed rather abruptly with this passage, which, by some, is said to be spurious; but, although obscure in its wording, it is in keeping with the general tone of the inquiry and argument. The main purpose of the inquiry is why, as every subject of thought, in potentiality, is among material substances, the mind is

not constantly thinking, just as it has been asked why the sensibility, which is ever acted upon by external influences, is not constantly made percipient. The answer seems to be, that the sensibility, being in potentiality, is incapable of perception without the agency of external influences, while the mind, being immaterial, is able to judge of the relations of things, without being identified with them; and thus, that, although every object, as a subject of thought, may be said to belong to the *mind*, it cannot belong to any one of them. It may well, however, be said, with respect to this, among other passages of this chapter, “est enim Aristotelis, liberum cogitationis cursum sequi neque anxia perspicuitatis causa deflecti.”

CHAPTER V.

Note 1, p. 156. *As if it were a virtuality like light.*] The original $\omega\varsigma \ \epsilon\acute{\xi}\iota\varsigma \ \tau\iota\varsigma$ is ill represented by virtuality, and yet neither habit, state, nor condition would represent the agency of the mind as a realising principle; as that which can collect, compare, and so give reality, in generalisations, to perceptions received through the senses. “Sicut colores expectant, ut appareant, (i. e. ut colorum vice vere fungantur) ita sensuum notitiæ et quidquid ad intellectum patientem pertinet mentem agentem requirunt,

ut omnes veritatis numeros habeant, et veræ notionis vim consequantur.”

Note 2, p. 156. *Knowledge in activity is identical with, &c.*] This passage seems to be the complement of what had just been asserted, that the agent is ever more influential than the subject, and the originating cause than the matter; for the intellect, in activity, may be said to create, to identify with itself that is, the knowledge which it acquires concerning external things through abstract reasoning. Knowledge pre-exists, however, as has been said, in every well-constituted individual, because each is furnished, at birth, with faculties for acquiring knowledge; but yet it cannot strictly be said to pre-exist, since it may, or may not be developed by education or reflection; as the mind, moreover, is impassive, it is not impressionable, and cannot, therefore, be the seat of memory. But what means the impressionable mind which is perishable? may it not be again said that, suggestively, the brain is here implied; since this organ is the sensorium, the seat of memory, and dependent, besides, like all other organs, upon life, for its functions and its continuance.

CHAPTER VI.

Note 1, p. 159. *In the way that Empedocles, &c.*] The passage cited in support of the above opinion is not very apposite; for Empedocles¹, who had made “nature to be nothing more than the combination of (*μίξις*) and change among commingled particles,” (*attraction and repulsion*, in other words), is quoted by Aristotle² in the words, “many heads of creatures without necks budded forth;” and, as if to turn against him, as it were, his own doctrine, it is added, “they were *by affinity* joined together.” This led Aristotle to the simile in the text, as Empedocles³ formed things in nature by the combination of individual particles, so may the mind eliminate new by the association of former or admitted ideas; and as, in the verse cited, head and neck lie dissevered, so, in the idea of quantity, there is nothing in common between the measure of the diagonal and the side of the square. Thus, as there is no common measure for the diagonal and the side of the square, they are, in so far, distinct; but although, in themselves, distinct, they can, in thought, be combined and made one. “By diameter may be

¹ *De Gen. et Corr.* I. 1. 7.

² *De Cælo*, III. 2. 7.

³ Vide Trendel. *Comment.*

understood the diagonal which divides the square into two equal triangles ; or it may mean the diameter of the circle which is incommensurate with the circumference." In a word, it is by combination that error creeps into our judgments, and falsifies our perceptions.

Note 2, p. 159. *It is the mind, &c.*] The question of a fact, such as that in the example, is dependent upon the brain rather than the mind, as that organ can combine the individual notices obtained through the senses ; but when the mind intervenes, so to say, and judges from what is, of what was or is to be, there is room for error. It is almost puerile to explain that the assertion "*something is not white*" is not, necessarily, fallacious ; and that, if the object be white, the fallacy comes from the addition of the negative. The double sense of indivisibility is to the same purport ; extension is clearly divisible, and, therefore, divisibility is made, actually, apparent as a fact ; but the mind can realise to itself extension without parts, as indivisible, that is, and in potentiality.

Note 3, p. 160. *It may not then be said, &c.*] In this version, the term *mind* is used, and in another, "*intelligence*," (which is its synonym), as that which *thinks*, (*τί ἐννόει*), but the text does not so specify it ; and any allusion to halves would but ill-accord with the notion of homogeneity and impassibility assigned to the thinking principle. But no theory which could be framed of the mind would aid in explaining the train of reasoning

here; for, independently of the abstruse nature of all mental processes, there is, evidently about it, confusion, arising from the assumption of a something associated with sensibility, which the brain only could rectify.

Note 4, p. 160. *The point and every analogous division, &c.*] With respect to quantity¹, in relation to indivisibility, “a *point* which has position, (καὶ θέσιν ἔχον στικμῆ) is indivisible, but a line is divisible in one, surface in two, and body in several directions;” and by *privation* is implied that the point is without length, depth, or breadth; the line without either breadth or depth; and the surface without depth. It is obvious, from what has been said, that every affirmation or negation must, as depending upon sentient impressions, be either true or false; but that the judgment, when deciding upon essential or abiding qualities, may be true, and that, when drawing its inferences from accidental qualities or relations of bodies, it may be erroneous.

CHAPTER VII.

Note 1, p. 165. *Images belong, naturally, to the thinking principle, &c.*] This very suggestive comparison between intellectual and sentient perceptions, seems, even in the absence of knowledge of the brain, to assume that

¹ *Metaphysica*, IV. 6. 24.

practical thoughts must be derived from the senses, and, therefore, through a sensorium ; and as impressions may be genial or otherwise, the faculties suggest pursuit or flight. The practical mind, in fact, never thinks without an image which acts, in its turn, so to say, upon it, as the air, which has been impressed by colour, does upon the pupil and the pupil upon something else (that is, the retina), and so sound upon the hearing ; but the last term, that is, the visual or auditory sense, is one, as the mean or *medium*, however modified in condition, is one. It will be evident, with but little consideration, that the obscurity which is palpable in the succeeding passages is occasioned by the absence of the brain, and can be cleared away only by its introduction ; and that, with it, the analogies of unit and limit acquire some kind of signification.

Note 2, p. 166. *Thus the cogitative faculty dwells, &c.*] Aristotle seems here to consider images or thoughts, present in memory, as necessary to ratiocination, and he has elsewhere said that an individual without senses could neither learn nor understand ; but he is evidently alluding to a higher faculty than the sensibility, and which is able, by abstract reasoning, to draw, from present appearances or images, conclusions as to future occurrences, and, by that prevision, to determine what should or should not be done.

Note 3, p. 166. *And with respect to all which, &c.*] This passage seems, although obscure from its brevity, to

imply that without action, when thoughts are not carried out that is, there can for us be neither *good* nor *bad*, as these are relations pertaining to individuals, and dependent, not upon any universal law but, upon social institutions ; but that truth, being the same for ever, is, even when not exercised, in an absolute relation to all men, and in opposition to all falsehood.

Note 4, p. 166. *The mind dwells upon abstractions, &c.*] The term abstractions here, as in an earlier passage, signifies mathematical questions, which, from not being referrible to any particular body, admit of being treated as such ; and so a snub-nose, as the realisation of a particular form, may, by that form apart from matter, be regarded as an abstraction. The argument is then resumed that the mind, when thinking, is, *when active or in act*, the subject thought upon. The closing passage, by its questioning whether “the mind, *without being itself immaterial*, can comprehend abstractions,” seems to militate against the arguments adduced to prove that it is *impassive* and *homogeneous*, freed, that is, from all the conditions of matter ; but it is yet doubtful where (whether or not in “the metaphysics”) this argument may, according to promise, have been continued.

CHAPTER VIII.

Note 1, p. 169. *But the question here must necessarily refer, &c.*] This argument, while maintaining the opinion that sensibility is receptive of form without matter, is an objection to the doctrine of Empedocles and others, who, having derived the Vital Principle from material elements, made perception to be material also, in the relation of *like by like*. But here it is said that, as the hand is the instrument for making instruments, so the mind is the archetype of forms, and sensibility the recipient of the forms of things without their matter, perceived through the senses. Aristotle, however, does make imagery, the power that is, of recalling forms, to be essential to cogitation, and, consequently, to reflection; although doubting whether there may not be thoughts which cannot have a sentient origin.

Note 2, p. 170. *Imagination, on the other hand, &c.*] Imagination, or the faculty which calls up images is, necessarily, different from that which determines the truth or falsehood of any proposition, and which affirms or denies; for affirmation or negation, as the predicant of something held to be true or erroneous, is, as was said, a combination of thoughts; and thoughts, being made up

of simple ideas, are not, like the imagination, under our own control. Thus, while the former may be regarded as a single faculty, and, in some sense, independent of the judgment, the latter involves many and opposing ideas and perceptions. But what is here meant by *primal thoughts* (τὰ δὲ πρῶτα νοήματα)? Do the words imply *innate ideas*, or conceptions of pure abstraction, such as creation, virtue, responsibility, and others? Or must it be admitted that no definite sense can be attached to them? If *primal* mean *innate* thoughts, (thoughts, that is, no way dependent upon sentient properties,) then such are distinguishable at once from those which are derived from images, although these are not, themselves, images in reality.

CHAPTER IX.

Note 1, p. 173. *But a difficulty at once presents itself, &c.]* There is an apparent want of discrimination here between the faculties which are the privilege and distinction of higher creatures and the functions which are essential to life, and without which there can be neither animal nor living being. In a subsequent paragraph the rational faculty or *mind* (καὶ ὁ καλούμενος νοῦς) is excluded from all participation in corporeal movements, and held to have no part in sentient perception. It is

supposed, in fact, never to be engaged upon what is practical as its office is contemplation, so that, "when dwelling upon what may be fearful, or otherwise, it does not, at once, suggest, flight or pursuit;" although, independently of its influence, "the heart or some other organ of the body may be accelerated or depressed." But in all this, as no allusion is made to a moving force, whether the motive be imagination or the stimulus of appetite, the inquiry may be said to be defective.

Note 2, p. 173. *But to resume the more especial, &c.*] Although these passages, which allude both to physical and moral causes of motion, are sufficiently obvious, yet, as they do not explain how locomotion is effected, they fail in the object of the inquiry; and then the motion concerned in nutrition, growth and decay, is almost in the same category, so to say, with that of progression. It may be mentioned that the "motion and progression of animals," "breathing and expiration," "sleep and watching," "youth and age," are special treatises, and probably composed for the elucidation of this particular work upon "life." The comparison between the intemperate man who, although rational, acts against his reason, and the physician who, although versed in medical science, does not cure, seems to exemplify the adage, that to advise is one thing, to do, another; or to confirm the solemn words of Johnson, "that teachers of morality discourse like angels, but they live like men."

CHAPTER X.

Note 1, p. 178. *Thus it is the object longed for alone, &c.]* Food, that is, being necessary both for stilling the appetite and preserving the body, is the first motor; for, were there, as the text says, two motors, then, as the practical mind never impels to move without appetite, appetite could not impel to move without the mind, which is not the case. This is the argument; but it is less distinct than might be wished for owing to the nature of the practical mind not having been defined, and to insufficient knowledge concerning both muscular agency and the brain and nervous system.

Note 2, p. 178. *The mind then is always right, &c.]* The intellect, that is, when neither moved by appetite nor perverted by imagination, (for both may be wrong) is, when freed from those influences, always right; but food incites to move because it is either good or appears to be a good, in the sense, not of a moral but, of a *practical* good, and, as such, it may, *by abuse*, be the opposite of good.

Note 3, p. 179. *The appetites admit of being opposed, &c.]* "Appetite and reason are not always in accordance," Aristotle¹ observes, and as, when any one desire is

¹ *Eth. Eud.* II. 8. 5.

subdued another may arise and strive for the mastery, so appetite may well be opposed to appetite. But resistance to desire can be manifested only in such beings as have a sense of time, have, that is, powers of abstraction, by which, withdrawing themselves from what is present, and foreseeing consequences in the future, they are enabled to resist the immediate compliance which desire or passion is urging upon them. For “the¹ portion of time now present, is a portion of that which is future and indivisible.”

Note 4, p. 179. *For without having been itself moved, &c.*] Owing to the wording there is obscurity about this passage, but yet it may be elucidated—the object desired, food, that is, although at rest, may, acting upon the appetitive sense, incite to move, and so be regarded as a motor; and there are, of course, as many such motors as there are kinds of food. These then are the three terms—first, the motor or food; then the muscular agency by which locomotion is effected; and lastly, that which is moved, or the animal.

Note 5, p. 180. *But to speak summarily, &c.*] The passage has, in this version, been rendered with a bias that the analogy was drawn from the structure of the knee-joint, which, in all times, has been likened to a hinge, and hence termed “ginglymoid;” and conchologists, following Aristotle², have so termed the hinge of

¹ *Nat. Ausc.* IV. 10.

² *Hist. Animalm*, IV. 4. 22.

the bivalves. The Latin is, "nunc ut in summa dicamus, id quod movet ut instrumentum, ibi est collocandum ubi idem principii rationem finisve subit ut in cardine fit—hinc enim convexum et concavum est; quorum alterum finis, alterum principium est; quapropter alienum quiescit alterum movetur." The closing paragraph seems to confirm what has been assumed, that sentient imagination is analogous to "animal instinct."

CHAPTER XI.

Note 1, p. 182. *The sentient imagination belongs, &c.*] Instinct is the fixed but unerring guide of the lower animals; the voluntary imagination, on the other hand, the faculty, that is, which can, at will, be called up and supply images for selection and combination by the judgment, can belong only to beings endowed with reason—that is, to man. The faculties associated with this imagination, enable the individual, by idealising a measure, to select what may be, relatively, larger and better, and out of several impressions or sensations, to form general notions. It is unnecessary to follow the argument which explains why these creatures, so low in the scale, cannot form opinions.

Note 2, p. 182. *But appetite has no deliberative will, &c.*] The meaning of this passage is, seemingly, too

obvious to require comment; but some commentators have in the term *σφαῖρα* seen an allusion to the celestial spheres, rather than a ball, because, as the upper controls in its movements the lower sphere, so reason, being superior to appetite, is to control inordinate desires. "Quibus collatis, non temerarium erit, *σφαίρας* similitudinem ita interpretari: consilium tanquam superius (*ἡ ἀνω*) ita appetitum in suum motum convertere, sicut superior sphaera eas, quæ inferiores volvuntur." The words which follow "that which is *superior is ever naturally* more dominant," may require some such interpretation, for they seem to imply that *motion, by translation*, may be derived from the motions of the spheres above, which were said to be in three directions; but the knowing faculty, the mind, that is, like the first motor, is, for ever, at rest.

Note 3, p. 183. *Although the conception of the universal, &c.]* This abstruse passage can only be understood by reference to the special treatise upon "the motion of animals, wherein this topic is considered;" it is asked, "whence comes it, that an individual, after thinking, sometimes acts and sometimes does not act, sometimes moves and sometimes does not move?" and the answer¹ is, that "action or motion is the conclusion of a syllogism," of which "the conception of the universal is the major, that of the particular, the middle, and the action following it the minor."

¹ *De Motu Animalm*, 5. 7. 1.

CHAPTER XII.

Note 1, p. 186. *Simple or homogeneous bodies, &c.*] There is no clue in Aristotle's writings to the meaning of "simple (or homogeneous) bodies" (τὸ σῶμα ἀπλοῦν), unless it be the *Acalepha*¹, "the body of which, like that of the oyster, is said to be altogether fleshy, but, unlike the oyster, to be without a shell; and it is further said to belong rather to plants than animals." But as in the following chapter it is shewn that an animal body, if homogeneous, cannot exist, so the tenor of the whole argument may be, to shew that no animal body can be homogeneous.

Note 2, p. 187. *As to creatures which are fixed, &c.*] These include such species of the Testacea as are fixed to one habitat, and derive nutriment from the water with which they are surrounded; but it is not easy to determine what is meant by the term ἀγεννήτων, (spontaneously generated,) as this mode of reproduction was attributed, by Aristotle, to some fishes and eels, which are certainly neither homogeneous nor insentient.

Note 3, p. 188. *The other senses, being for, &c.*] It may be questioned whether this description is absolutely true,

¹ *Hist. Animalm*, IV. 6. 6. VIII. I. 7.

as there are creatures which, although fixed to one habitat, not capable of progression that is, are endowed with all the senses, although it may be in some modified, or less active form than in the higher animals. For “the ¹ nervous system has been detected in every division of the animal kingdom, and almost in every class, and it is everywhere connected with sensation and motion.”

Note 4, p. 188. *Be sensible through a medium, &c.*] The medium, that is, made *diaphanous* and motive by colour or sound, acts, by a succession of undulations, upon the eye or the ear, and finally, through the humours of the former and the air in the latter, upon the sentient part of these organs; so that there is an evident analogy between these undulations and the impulses which maintain locomotion until lost in the state of *rest*. This succession of impulses may well apply to the changes which, without change of locality, are slowly and silently going on in bodies, and be compared to colouring matter which permeates and gradually combines with each molecule of wax up to saturation; but every substance cannot, of course, be thus affected—a stone, for instance, owing to the condensation of its particles, cannot be made receptive of colour.

Note 5, p. 189. *The air is mobile in the highest degree, &c.*] The nature and properties of the atmosphere were imperfectly known, as has been said, in the age of Aristotle. It was deemed necessary to sensation that

¹ Grant's *Outlines*, 179.

the air should be still (for, when in motion, it was converted, according to opinion, into wind), and as one mass ; and as this aggregation of the air could be only over smooth surfaces, the outer coat of the eye (the cornea) seemed, by its smoothness, to favour Aristotle's doctrine, that vision is through a medium, and completed, by refraction, at the bottom of the organ. The medium, set in motion, by colour, was said to give motion, by successive impulses, to the air over the cornea, which communicated the impulse to the organ within ; and this superseded the doctrine that vision is produced by rays emanating from the eye. Thus, "the air (that over the cornea), in its turn, sets vision in motion ;" but the last clause of the sentence is very obscure, and offers, as some commentators have said, "great difficulties." It may, perchance, be a continuation of the analogy and suggest that, as colouring matter acts, successively, until each particle is saturated, so the impulse is transmitted to the cornea, and finally, from it, to the visual faculty within.

CHAPTER XIII.

Note 1, p. 192. *The Touch is made sensible...and hence its name, &c.*] The text refers to etymology to shew, that as, in all times, it had been noticed that the impression upon other senses is different from that upon Touch, it had hence obtained its appellation *ἀφίη*, which, being derived from *ἄπτω*, (to fasten or bind,) signifies fastening or binding, and so (by touching,) immediate contact; as contact is necessary for the sensation of Touch. This may suffice for the explanation of the term in the original, but it may not, of course, be applicable to its synonym in a modern language, since its origin may be from another idea, and, therefore, a different root.

Note 2, p. 192. *And yet the other sentient organs, &c.*] It had been proved analogically, that, as bodies in the water are separated by the water, (as was supposed to be proved by their extremities being wet,) so bodies in the air are separated by air, and therefore, that, as no one body is in immediate contact with another body, sensation can be effected only through a medium; and this was supposed to hold good even for the Touch. Thus, the medium, acted upon and acting in its turn, reduces

all sensual impressions to the one impression by contact, and this generalisation is supported by some modern writers and regarded as the theory of Sensation. "There¹ may, however, be many other impressions derived from outward bodies, for which the sensitive nerves of the lower animals are adapted, besides those which affect us, and we cannot always be certain of the identity of the feelings communicated to them by organs which appear analogous to our own."

Note 3, p. 193. *On which account, other sentient, &c.*] This is consonant with the opinion that the Touch is the only sense necessary to animal existence; although the organs of relation are required for the higher forms of being. Thus, impressions in excess upon those organs, whether by colour, sound, or odour, may injure or pervert the senses, but cannot further affect the individual; while tangible impressions, hot, cold, or hard, can together with the sense destroy the animal.

Note 4, p. 193. *Animals, in fact, possess...the other senses, &c.*] This is referrible, of course, only to the higher orders of animals, as they alone require such organs for the exercise of their faculties, and the enjoyment of their existence. The Tongue is here introduced, whether by inadvertence or in submission to common opinion, as if it were a sense, or the sole organ for speech; and yet, as the chief of the organs for taste

¹ Grant's *Outlines*, p. 248.

and speech, it may be said to constitute one of the distinguishing features of humanity. As no creature, however, is without a tongue, it can scarcely be supposed to be wanting, and yet, as it would not seem to be so essential as some other parts, life might, perhaps, for a time, be maintained without it. But speech is, of course, nowise necessary to life, as the learned commentator observes: "Nam etiam linguæ sermone, si vitam, detractis ornamentis, ad necessitatis angustias redigere velis, vitæ conservatio carere potest."