

BOOK II

412^a Let the foregoing suffice as our account of the views concerning the soul which have been handed on by our predecessors; let us now dismiss them and make as it were a completely fresh start, endeavouring to give a precise answer to the question, What is soul? i.e. to formulate the most general possible definition of it.

We are in the habit of recognizing, as one determinate kind of what is, substance, and that in several senses, (a) in the sense of matter or that which in itself is not 'a this', and (b) in the sense of form or essence, which is that precisely in virtue of which a thing is called 'a this', and thirdly (c) in the sense of that which is compounded of both (a) and [10] (b). Now matter is potentiality, form actuality; of the latter there are two grades related to one another as e.g. knowledge to the exercise of knowledge.

Among substances are by general consent reckoned bodies and especially natural bodies; for they are the principles of all other bodies. Of natural bodies some have life in them, others not; by life we mean self-nutrition and [15] growth (with its correlative decay). It follows that every natural body which has life in it is a substance in the sense of a composite.

But since it is also a *body* of such and such a kind, viz. having life, the *body* cannot be soul; the body is the subject or matter, not what is attributed to it. Hence the soul must be a substantial body having life potentially within it. But substance is actuality, and thus soul is the actuality of a body as above characterized. Now the word actuality has two senses corresponding respectively to the possession of knowledge and the actual exercise of knowledge. It is obvious that the soul is actuality in the first sense, viz. that of knowledge as possessed, for both [25] sleeping and waking presuppose the existence of soul, and of these waking corresponds to actual knowing, sleeping to knowledge possessed but not employed, and, in the history of the individual, knowledge comes before its employment or exercise.

That is why the soul is the first grade of actuality of a natural body having life potentially in it. The body so described is a body

in spite of their extreme simplicity are 'organs'; e.g. the leaf serves to shelter the pericarp, the pericarp to shelter the fruit, while the roots of plants are analogous to the mouth of animals, both serving for the absorption of food. If, then, we have to give a general formula applicable to all kinds of soul, we must describe it as the first grade of actuality of a natural organized body. That is why we can wholly dismiss as unnecessary the question whether the soul and the body are one: it is as meaningless as to ask whether the wax and the shape given to it by the stamp are one, or generally the matter of a thing and that of which it is the matter. Unity has many senses (as many as 'is' has), but the most proper and fundamental sense of both is the relation of an actuality to that of which it is the actuality.

[10] We have now given an answer to the question, What is soul?—an answer which applies to it in its full extent. It is substance in the sense which corresponds to the definitive formula of a thing's essence. That means that it is 'the essential whatness' of a body of the character just assigned. Suppose that what is literally an 'organ', like an axe, were a *natural* body, its 'essential whatness', would have been its essence, and so its soul; if this disappeared from it, it would have ceased to be an axe, except in name. As it is, it is just an axe; [15] it cept in name. As it is, it is just an axe; it wants the character which is required to make its whatness or formulable essence a soul; for that, it would have had to be a *natural* body of a particular kind, viz. one having *in itself* the power of setting itself in movement and arresting itself. Next, apply this doctrine in the case of the 'parts' of the living body. Suppose that the eye were an animal—sight would have been its soul, for sight is the substance or essence of the eye which corresponds [20] to the formula, the eye being merely the matter of seeing; when seeing is removed the eye is no longer an eye, except in name—it is no more a real eye than the eye of a statue or of a painted figure. We must now extend our consideration from the 'parts' to the whole living body; for what the departmental sense is to the bodily part which is its organ, that the whole faculty of sense is to the whole sensitive body as such.

[25] We must not understand by that which is 'potentially capable of living' what has lost the soul if had, but only what still retains it:

413^b but seeds and fruits are bodies which possess the qualification. Consequently, while waking is actuality in a sense corresponding to the cutting and the seeing, the soul is actuality in the sense corresponding to the power of sight and the power in the tool; the body corresponds to what exists in potentiality; as the pupil *plus* the power of sight constitutes the eye, so the soul *plus* the body constitutes the animal.

From this it indubitably follows that the soul is inseparable from its body, or at any rate that certain parts of it are (if it has parts)—[5] for the actuality of some of them is nothing but the actualities of their bodily parts. Yet some may be separable because they are not the actualities of any body at all. Further, we have no light on the problem whether the soul may not be the actuality of its body in the sense in which the sailor is the actuality of the ship.

This must suffice as our sketch or outline [10] determination of the nature of soul.

2

Since what is clear or logically more evident emerges from what in itself is confused but more observable by us, we must reconsider our results from this point of view. For it is not enough for a definitive formula to express as [15] most now do the mere fact; it must include and exhibit the ground also. At present definitions are given in a form analogous to the conclusion of a syllogism; e.g. What is squaring? The construction of an equilateral rectangle equal to a given oblong rectangle. Such a definition is in form equivalent to a conclusion. One that tells us that squaring is the discovery of a line which is a mean proportional between the two unequal sides of the given rectangle discloses the ground of what is defined.

[20] We resume our inquiry from a fresh starting-point by calling attention to the fact that what has soul in it differs from what has not, in that the former displays life. Now this word has more than one sense, and provided any one alone of these is found in a thing we say that thing is living. Living, that is, may mean thinking or perception or local movement and rest, or movement in the sense of [25] nutrition, decay and growth. Hence we think of plants also as living, for they are observed to possess in themselves an originative power through which they increase or decrease in all spatial directions: they grow up and

down, and everything that grows increases its bulk alike in both directions or indeed in all, [30] and continues to live so long as it can absorb nutriment.

This power of self-nutrition can be isolated from the other powers mentioned, but not they from it—in mortal beings at least. The fact is obvious in plants; for it is the *only* psychic power they possess.

413^b This is the originative power the possession of which leads us to speak of things as *living* at all, but it is the possession of sensation that leads us for the first time to speak of living things as animals; for even those beings which possess no power of local movement but do possess the power of sensation we call animals and not merely living things.

The primary form of sense is touch, which [5] belongs to all animals. Just as the power of self-nutrition can be isolated from touch and sensation generally, so touch can be isolated from all other forms of sense. (By the power of self-nutrition we mean that departmental power of the soul which is common to plants and animals: all animals whatsoever are observed to have the sense of touch.) What the [10] explanation of these two facts is, we must discuss later.¹ At present we must confine ourselves to saying that soul is the source of these phenomena and is characterized by them, viz. by the powers of self-nutrition, sensation, thinking, and motivity.

Is each of these a soul or a part of a soul? And if a part, a part in what sense? A part merely distinguishable by definition or a part [15] distinct in local situation as well? In the case of certain of these powers, the answers to these questions are easy, in the case of others we are puzzled what to say. Just as in the case of plants which when divided are observed to continue to live though removed to a distance from one another (thus showing that in *their* case the soul of each individual plant before division was actually one, potentially many), so we notice a similar result in other varieties [20] of soul, i.e. in insects which have been cut in two; each of the segments possesses both sensation and local movement; and if sensation, necessarily also imagination and appetite; for, where there is sensation, there is also pleasure and pain, and, where these, necessarily also desire.

We have no evidence as yet about mind or [25] the power to think; it seems to be a widely different kind of soul, differing as what is

¹ III, 12, esp. 434^a 22-30, 510 ff.

eternal from what is perishable; it alone is capable of existence in isolation from all other psychic powers. All the other parts of soul, it is evident from what we have said, are, in spite of certain statements to the contrary, incapable of separate existence though, of course, distinguishable by definition. If opining is distinct [30] from perceiving, to be capable of opining and to be capable of perceiving must be distinct, and so with all the other forms of living above enumerated. Further, some animals possess all these parts of soul, some certain of them only, others one only (this is what enables us to classify animals); the cause must 414^a be considered later.¹ A similar arrangement is found also within the field of the senses; some classes of animals have all the senses, some only certain of them, others only one, the most indispensable, touch.

Since the expression 'that whereby we live [5] and perceive' has two meanings, just like the expression 'that whereby we know'—that may mean either (a) knowledge or (b) the soul, for we can speak of knowing *by* or *with* either, and similarly that whereby we are in health may be either (a) health or (b) the body or some part of the body; and since of the two terms thus contrasted knowledge or health is the name of a form, essence, or ratio, or if we so express it an actuality of a recipient [10] matter—knowledge of what is capable of knowing, health of what is capable of being made healthy (for the operation of that which is capable of originating change terminates and has its seat in what is changed or altered); further, since it is the soul by or with which primarily we live, perceive, and think—it follows that the soul must be a ratio or formula-ble essence, not a matter or subject. For, as we said,² the word substance has three meanings—[15] form, matter, and the complex of both—and of these three what is called matter is potentiality, what is called form actuality. Since then the complex here is the living thing, the body cannot be the actuality of the soul; it is the soul which is the actuality of a certain kind of body. Hence the rightness of the view that the soul cannot be without a body, while it cannot *be* a body: it is not a body but something relative to a body. That is why it is *in* a body, and a body of a definite kind. It was a mistake, therefore, to do as former thinkers did, merely to fit it into a body without adding a definite specification of the kind or character [25] of that body. Reflection confirms the ob-

served fact; the actuality of any given thing can only be realized in what is already potentially that thing, i.e. in a matter of its own appropriate to it. From all this it follows that soul is an actuality or formulable essence of something that possesses a potentiality of being besouled.

3

Of the psychic powers above enumerated³ some kinds of living things, as we have said,⁴ possess all, some less than all, others one only. [30] Those we have mentioned are the nutritive, the appetitive, the sensory, the locomotive, and the power of thinking. Plants have none but the first, the nutritive, while another order of living things has this *plus* the sensory. 414^b If any order of living things has the sensory, it must also have the appetitive; for appetite is the genus of which desire, passion, and wish are the species; now all animals have one sense at least, viz. touch, and whatever has a sense has the capacity for pleasure and pain and therefore has pleasant and painful objects present to it, and wherever these are present, [5] there is desire, for desire is just appetition of what is pleasant. Further, all animals have the sense for food (for touch is the sense for food); the food of all living things consists of what is dry, moist, hot, cold, and these are the qualities apprehended by touch; all other sensible qualities are apprehended by touch only [10] indirectly. Sounds, colours, and odours contribute nothing to nutriment; flavours fall within the field of tangible qualities. Hunger and thirst are forms of desire, hunger a desire for what is dry and hot, thirst a desire for what is cold and moist; flavour is a sort of seasoning added to both. We must later⁵ clear up these [15] points, but at present it may be enough to say that all animals that possess the sense of touch have also appetite. The case of imagination is obscure; we must examine it later.⁶ Certain kinds of animals possess in addition the power of locomotion, and still another order of animate beings, i.e. man and possibly another order like man or superior to him, the [20] power of thinking, i.e. mind. It is now evident that a single definition can be given of soul only in the same sense as one can be given of figure. For, as in that case there is no figure distinguishable and apart from triangle, &c.,

so here there is no soul apart from the forms of soul just enumerated. It is true that a highly general definition can be given for figure which will fit all figures without expressing the peculiar nature of any figure. So here in the case of soul and its specific forms. Hence [25] it is absurd in this and similar cases to demand an absolutely general definition which will fail to express the peculiar nature of anything that *is*, or again, omitting this, to look for separate definitions corresponding to each *infima species*. The cases of figure and soul are exactly parallel; for the particulars assumed under the common name in both cases—figures and living beings—constitute a se- [30] ries, each successive term of which potentially contains its predecessor, e.g. the square the triangle, the sensory power the self-nutritive. Hence we must ask in the case of each order of living things, What is its soul, i.e. What is the soul of plant, animal, man? Why the terms are related in this serial way must form 415^a the subject of later examination.¹ But the facts are that the power of perception is never found apart from the power of self-nutrition, while—in plants—the latter is found isolated from the former. Again, no sense is found apart from that of touch, while touch *is* found [5] by itself; many animals have neither sight, hearing, nor smell. Again, among living things that possess sense some have the power of locomotion, some not. Lastly, certain living beings—a small minority—possess calculation and thought, for (among mortal beings) those which possess calculation have all the other [10] powers above mentioned, while the converse does not hold—indeed some live by imagination alone, while others have not even imagination. The mind that knows with immediate intuition presents a different problem.

It is evident that the way to give the most adequate definition of soul is to seek in the case of *each* of its forms for the most appropriate definition.

4

It is necessary for the student of these forms of soul first to find a definition of each, ex- [15] pressive of what it is, and then to investigate its derivative properties, &c. But if we are to express what each is, viz. what the thinking power is, or the perceptive, or the nutritive, we must go farther back and first give an account of thinking or perceiving, for in the or- 1 III, 12, 13.

It follows that first of all we must treat of nutrition and reproduction, for the nutritive soul is found along with all the others and is the most primitive and widely distributed power of soul, being indeed that one in virtue [25] of which all are said to have life. The acts in which it manifests itself are reproduction and the use of food—reproduction, I say, because for any living thing that has reached its normal development and which is unmutated, and whose mode of generation is not spontaneous, the most natural act is the production of another like itself, an animal producing an animal, a plant a plant, in order that, as far as its nature allows, it may partake in the eternal 415^b and divine. That is the goal towards which all things strive, that for the sake of which they do whatsoever their nature renders possible. The phrase 'for the sake of which' is ambiguous; it may mean either (a) the end to achieve which, or (b) the being in whose interest, the act is done. Since then no living thing is able to partake in what is eternal and divine by uninterrupted continuance (for nothing perishable can for ever remain one and [5] the same), it tries to achieve that end in the only way possible to it, and success is possible in varying degrees; so it remains not indeed as the self-same individual but continues its existence in something *like* itself—not numerically but specifically one.

The soul is the cause or source of the living body. The terms cause and source have many senses. But the soul is the cause of its body alike in all three senses which we explicitly [10] recognize. It is (a) the source or origin of movement, it is (b) the end, it is (c) the essence of the whole living body.

That it is the last, is clear; for in everything the essence is identical with the ground of its being, and here, in the case of living things, their being is to live, and of their being and their living the soul in them is the cause or source. Further, the actuality of whatever is potential is identical with its formulable essence.

[15] It is manifest that the soul is also the final cause of its body. For Nature, like mind,

³ 413^a 23-5, ^b 11-13, 21-4.

⁴ 413^b 32-4, 14^a 1.

⁵ Chapter II, III, 12 (434^b 18-21); *Sense and the Sensitive*, 4.

⁶ *Ibid.*, 4.

always does whatever it does for the sake of something, which something is its end. To that something corresponds in the case of animals the soul and in this it follows the order of nature; all natural bodies are organs of the soul. This is true of those that enter into the constitution of plants as well as of those which enter into that of animals. This shows that that [20] for the sake of which they are is soul. We must here recall the two senses of 'that for the sake of which', viz. (a) the end to achieve which, and (b) the being in whose interest, anything is or is done.

We must maintain, further, that the soul is also the cause of the living body as the original source of local movement. The power of locomotion is not found, however, in all living things. But change of quality and change of quantity are also due to the soul. Sensation is held to be a qualitative alteration, and nothing except what has soul in it is capable of sensation. The same holds of the quantitative changes which constitute growth and decay; nothing grows or decays naturally except what feeds itself, and nothing feeds itself except what has a share of soul in it.

Empedocles is wrong in adding that growth in plants is to be explained, the downward rooting by the natural tendency of earth to 416^a travel downwards, and the upward branching by the similar natural tendency of fire to travel upwards. For he misinterprets up and down; up and down are not for all things what they are for the whole Cosmos: if we are to distinguish and identify organs according [5] to their functions, the roots of plants are analogous to the head in animals. Further, we must ask what is the force that holds together the earth and the fire which tend to travel in contrary directions; if there is no counteracting force, they will be torn asunder; if there is, this must be the soul and the cause of nutrition and growth. By some the element of fire is held to be the cause of nutrition and growth, [10] for it alone of the primary bodies or elements is observed to feed and increase itself. Hence the suggestion that in both plants and animals it is it which is the operative force. A concurrent cause in a sense it certainly is, but [15] not the principal cause, that is rather the soul; for while the growth of fire goes on without limit so long as there is a supply of fuel, in the case of all complex wholes formed in the course of nature there is a limit or ratio which determines their size and increase, and limit

belongs to the side of formulable essence rather than that of matter.

Nutrition and reproduction are due to one and the same psychic power. It is necessary first to give precision to our account of food, [20] for it is by this function of absorbing food that this psychic power is distinguished from all the others. The current view is that what serves as food to a living thing is what is contrary to it—not that in every pair of contraries each is food to the other: to be food a contrary must not only be transformable into the other and vice versa, it must also in so doing increase the bulk of the other. Many a contrary is transformed into its other and vice versa, where neither is even a quantum and so cannot increase in bulk, e.g. an invalid into a [25] healthy subject. It is clear that not even those contraries which satisfy both the conditions mentioned above are food to one another in precisely the same sense; water may be said to feed fire, but not fire water. Where the members of the pair are elementary bodies only one of the contraries, it would appear, can be said to feed the other. But there is a difficulty here. One set of thinkers assert that like [30] is fed, as well as increased in amount, by like. Another set, as we have said, maintain the very reverse, viz. that what feeds and what is fed are contrary to one another; like, they argue, is incapable of being affected by like; but food is changed in the process of digestion, and change is always to what is opposite or to [35] what is intermediate. Further, food is 416^b acted upon by what is nourished by it, not the other way round, as timber is worked by a carpenter and not conversely; there is a change in the carpenter but it is merely a change from not-working to working. In answering this problem it makes all the difference whether we mean by 'the food' the 'finished' or the 'raw' product. If we use the word food of both, viz. of the completely undigested and the completely digested matter, we can [5] justify both the rival accounts of it; taking food in the sense of undigested matter, it is the contrary of what is fed by it, taking it as digested it is like what is fed by it. Consequently it is clear that in a certain sense we may say that both parties are right, both wrong.

Since nothing except what is alive can be fed, what is fed is the besouled body and just because it has soul in it. Hence food is essentially [10] related to what has soul in it. Food has a power which is other than the power to

increase the bulk of what is fed by it; so far forth as what has soul in it is a quantum, food may increase its quantity, but it is only so far as what has soul in it is a 'this-somewhat' or substance that food acts as food; in that case it maintains the being of what is fed, and that continues to be what it is so long as the process [15] of nutrition continues. Further, it is the agent in generation, i.e. not the generation of the individual fed but the reproduction of another like it; the substance of the individual fed is already in existence; the existence of no substance is a self-generation but only a self-maintenance.

Hence the psychic power which we are now studying may be described as that which tends to maintain whatever has this power in it of continuing such as it was, and food helps it to do its work. That is why, if deprived of food, it must cease to be.

[20] The process of nutrition involves three factors, (a) what is fed, (b) that wherewith it is fed, (c) what does the feeding; of these (c) is the first soul, (a) the body which has that soul in it, (b) the food. But since it is right to call things after the ends they realize, and the end of this soul is to generate another being like that in which it is, the first soul ought to [25] be named the reproductive soul. The expression (b) 'wherewith it is fed' is ambiguous just as is the expression 'wherewith the ship is steered'; that may mean either (i) the hand or (ii) the rudder, i.e. either (i) what is moved and sets in movement, or (ii) what is merely moved. We can apply this analogy here if we recall that all food must be capable of being digested, and that what produces digestion is warmth; that is why everything that has soul in it possesses warmth.

[30] We have now given an outline account of the nature of food; further details must be given in the appropriate place.

5

Having made these distinctions let us now speak of sensation in the widest sense. Sensation depends, as we have said,¹ on a process of movement or affection from without, for it is held to be some sort of change of quality. Now [35] some thinkers assert that like is affected only by like; in what sense this is possible and 417^a in what sense impossible, we have explained in our general discussion of acting and being acted upon.²

¹ 415^b 24, cf. 410^a 25.

² On Generation and Corruption, 323^b 18ff.

Here arises a problem: why do we not perceive the senses themselves as well as the external objects of sense, or why without the stimulation of external objects do they not produce sensation, seeing that they contain in [5] themselves fire, earth, and all the other elements, which are the direct or indirect objects of sense? It is clear that what is sensitive is so only potentially, not actually. The power of sense is parallel to what is combustible, for that never ignites itself spontaneously, but requires an agent which has the power of starting ignition; otherwise it could have set itself on fire, and would not have needed actual fire to set it ablaze.

In reply we must recall that we use the word [10] 'perceive' in two ways, for we say (a) that what has the power to hear or see, 'sees' or 'hears', even though it is at the moment asleep, and also (b) that what is actually seeing or hearing, 'sees' or 'hears'. Hence 'sense' too must have two meanings, sense potential, and sense actual. Similarly 'to be a sentient' means either (a) to have a certain power or (b) to manifest a certain activity. To begin with, for [15] a time, let us speak as if there were no difference between (i) being moved or affected, and (ii) being active, for movement is a kind of activity—an imperfect kind, as has elsewhere been explained.³ Everything that is acted upon or moved is acted upon by an agent which is actually at work. Hence it is that in one sense, as has already been stated,⁴ what [20] acts and what is acted upon are like, in another unlike, i.e. prior to and during the change the two factors are unlike, after it like.

But we must now distinguish not only between what is potential and what is actual but also different senses in which things can be said to be potential or actual; up to now we have been speaking as if each of these phrases had only one sense. We can speak of something as 'a knower' either (a) as when we say that man is a knower, meaning that man falls within the class of beings that know or have [25] knowledge, or (b) as when we are speaking of a man who possesses a knowledge of grammar; each of these is so called as having in him a certain potentiality, but there is a difference between their respective potentialities, the one (a) being a potential knower, because his kind or matter is such and such, the other (b), because he can in the absence of any external countervailing cause realize his knowl-

³ Physics, 201^b 31, 257^b 8.

⁴ 416^a 29^b-9.

edge in actual knowing at will. This implies a third meaning of a knower (*c*), one who is already realizing his knowledge—he is a knower in actuality and in the most proper [30] sense is knowing, e.g. this A. Both the former are potential knowers, who realize their respective potentialities, the one (*a*) by change of quality, i.e. repeated transitions from one state to its opposite under instruction, the other (*b*) by the transition from the 417^b inactive possession of sense or grammar to their active exercise. The two kinds of transition are distinct.

Also the expression 'to be acted upon' has more than one meaning; it may mean either (*a*) the extinction of one of two contraries by the other, or (*b*) the maintenance of what is potential by the agency of what is actual and already like what is acted upon, with such likeness as is compatible with one's being actual [5] and the other potential. For what possesses knowledge becomes an actual knower by a transition which is either not an alteration of it at all (being in reality a development into its true self or actuality) or at least an alteration in a quite different sense from the usual meaning.

Hence it is wrong to speak of a wise man as being 'altered' when he uses his wisdom, just as it would be absurd to speak of a builder as being altered when he is using his skill in building a house.

[10] What in the case of knowing or understanding leads from potentiality to actuality ought not to be called teaching but something else. That which starting with the power to know learns or acquires knowledge through the agency of one who actually knows and has the power of teaching either (*a*) ought not to be said 'to be acted upon' at all or (*b*) we [15] must recognize two senses of alteration, viz. (i) the substitution of one quality for another, the first being the contrary of the second, or (ii) the development of an existent quality from potentiality in the direction of fixity or nature.

In the case of what is to possess sense, the first transition is due to the action of the male parent and takes place before birth so that at birth the living thing is, in respect of sensation, at the stage which corresponds to the *possession* of knowledge. Actual sensation corresponds to the stage of the exercise of knowledge. But between the two cases compared [20] there is a difference; the objects that ex-

heard, &c., are outside. The ground of this difference is that what actual sensation apprehends is individual, while what knowledge apprehends is universals, and these are in a sense within the soul. That is why a man can exercise his knowledge when he wishes, but his sensation does not depend upon himself—

[25] a sensible object must be there. A similar statement must be made about our *knowledge* of what is sensible—on the same ground, viz. that the sensible objects are individual and eternal.

A later more appropriate occasion may be found¹ thoroughly to clear up all this. At present [30] it must be enough to recognize the distinctions already drawn; a thing may be said to be potential in either of two senses, (*a*) in the sense in which we might say of a boy that he may become a general or (*b*) in the sense in which we might say the same of an adult, and there are two corresponding senses 418^a of the term 'a potential sentient'. There are no separate names for the two stages of potentiality; we have pointed out that they are different and how they are different. We cannot help using the incorrect terms 'being acted upon or altered' of the two transitions involved. As we have said,² what has the power of sensation is potentially like what the perceived object is actually; that is, while at the beginning of the process of its being acted upon the two interacting factors are dissimilar, [5] at the end the one acted upon is assimilated to the other and is identical in quality with it.

6

In dealing with each of the senses we shall have first to speak of the objects which are perceptible by each. The term 'object of sense' covers three kinds of objects, two kinds of which are, in our language, directly perceptible, while the remaining one is only incidentally perceptible. Of the first two kinds one (*a*) consists of what is perceptible by a single sense, [10] the other (*b*) of what is perceptible by any and all of the senses. I call by the name of special object of this or that sense that which cannot be perceived by any other sense than that one and in respect of which no error is possible; in this sense colour is the special object of sight, sound of hearing, flavour of taste. Touch, indeed, discriminates more than one set of different qualities. Each sense has one [15] kind of object which it discerns, and nev-

¹ III. 4. 5.

² 417^b 12-20.

er errs in reporting that what is before it is colour or sound (though it may err as to what it is that is coloured or where that is, or what it is that is sounding or where that is.) Such objects are what we propose to call the special objects of this or that sense.

'Common sensibles' are movement, rest, number, figure, magnitude; these are not peculiar to any one sense, but are common to all. There are at any rate certain kinds of movement which are perceptible both by touch and by sight.

[20] We speak of an incidental object of sense where e.g. the white object which we see is the son of Diares; here because 'being the son of Diares' is incidental to the directly visible white patch we speak of the son of Diares as being (incidentally) perceived or seen by us. Because this is only incidentally an object of sense, it in no way as such affects the senses. Of the two former kinds, both of which are in their own nature perceptible by sense, the first kind—that of special objects of the several senses—constitute *the* objects of sense in the [25] strictest sense of the term and it is to them that in the nature of things the structure of each several sense is adapted.

7

The object of sight is the visible, and what is visible is (*a*) colour and (*b*) a certain kind of object which can be described in words but which has no single name; what we mean by (*b*) will be abundantly clear as we proceed. Whatever is visible is colour and colour is what lies upon what is in its own nature visible [30] ble; in its own nature' here means not that visibility is involved in the definition of what thus underlies colour, but that that substratum contains in itself the cause of visibility. Every colour has in it the power to set in movement what is actually transparent; that 418^b power constitutes its very nature. That is why it is not visible except with the help of light; it is only in light that the colour of a thing is seen. Hence our first task is to explain what light is.

Now there clearly is something which is transparent, and by 'transparent' I mean what [5] is visible, and yet not visible in itself, but rather owing its visibility to the colour of something else; of this character are air, water, and many solid bodies. Neither air nor water is transparent because it is air or water; they are transparent because each of them has contained in it a certain substance which is the

same in both and is also found in the eternal body which constitutes the uppermost shell of the physical Cosmos. Of this substance light is the activity—the activity of what is transparent so far forth as it has in it the determining [10] nate power of becoming transparent; where this power is present, there is also the potentiality of the contrary, viz. darkness. Light is as it were the proper colour of what is transparent, and exists whenever the potentially transparent is excited to actuality by the influence of fire or something resembling 'the uppermost body'; for fire too contains something which is one and the same with the substance in question.

We have now explained what the transparent is and what light is; light is neither fire nor any kind whatsoever of body nor an efflux [15] from any kind of body (if it were, it would again itself be a kind of body)—it is the presence of fire or something resembling fire in what is transparent. It is certainly not a body, for two bodies cannot be present in the same place. The opposite of light is darkness; darkness is the absence from what is transparent of the corresponding positive state above characterized; clearly therefore, light is just the presence of that.

[20] Empedocles (and with him all others who used the same forms of expression) was wrong in speaking of light as 'travelling' or being at a given moment between the earth and its envelope, its movement being unobservable by us; that view is contrary both to the clear evidence of argument and to the observed facts; if the distance traversed were [25] short, the movement might have been unobservable, but where the distance is from extreme East to extreme West, the draught upon our powers of belief is too great.

What is capable of taking on colour is what in itself is colourless, as what can take on sound is what is soundless; what is colourless includes (*a*) what is transparent and (*b*) what is invisible or scarcely visible, i.e. what is [30] 'dark'. The latter (*b*) is the same as what is transparent, when it is potentially, not of course when it is actually transparent; it is the same substance which is now darkness, now light.

419^a Not everything that is visible depends upon light for its visibility. This is only true of the 'proper' colour of things. Some objects of sight which in light are invisible, in darkness stimulate the sense; that is, things that appear fiery or shining. This class of objects has no

simple common name, but instances of it are [5] fungi, flesh, heads, scales, and eyes of fish. In none of these is what is seen their own 'proper' colour. Why we see these at all is another question. At present what is obvious is that what is seen in light is always colour. That is why without the help of light colour remains invisible. Its being colour at all means [10] precisely its having in it the power to set in movement what is already actually transparent, and, as we have seen, the actuality of what is transparent is just light.

The following experiment makes the necessity of a medium clear. If what has colour is placed in immediate contact with the eye, it cannot be seen. Colour sets in movement not the sense organ but what is transparent, e.g. the air, and that, extending continuously from [15] the object to the organ, sets the latter in movement. Democritus misrepresents the facts when he expresses the opinion that if the interspace were empty one could distinctly see an ant on the vault of the sky; that is an impossibility. Seeing is due to an affection or change of what has the perceptive faculty, and it cannot be affected by the seen colour itself; it remains that it must be affected by what comes between. Hence it is indispensable that there [20] be *something* in between—if there were nothing, so far from seeing with greater distinctness, we should see nothing at all.

We have now explained the cause why colour cannot be seen otherwise than in light. Fire on the other hand is seen both in darkness and in light; this double possibility follows necessarily from our theory, for it is just fire that makes what is potentially transparent actually transparent.

[25] The same account holds also of sound and smell; if the object of these senses is in immediate contact with the organ no sensation is produced. In both cases the object sets in movement only what lies between, and this in turn sets the organ in movement: if what sounds or smells is brought into immediate contact with the organ, no sensation will be [30] produced. The same, in spite of all appearances, applies also to touch and taste; why there is this apparent difference will be clear later.¹ What comes between in the case of sounds is air; the corresponding medium in the case of smell has no name. But, corresponding to what is transparent in the case of colour, there is a quality found both in air and water, which serves as a medium for what has

[35] smell—I say 'in water' because animals that live in water as well as those that live on land seem to possess the sense of smell, and 'in air' because man and all other land animals that breathe, perceive smells only when they breathe air in. The explanation of this too will be given later.²

8

Now let us, to begin with, make certain distinctions about sound and hearing.

[5] Sound may mean either of two things—(a) actual, and (b) potential, sound. There are certain things which, as we say, 'have no sound', e.g. sponges or wool, others which have, e.g. bronze and in general all things which are smooth and solid—the latter are said to have a sound because they can make a sound, i.e. can generate actual sound between themselves and the organ of hearing.

Actual sound requires for its occurrence (i, ii) two such bodies and (iii) a space between them; for it is generated by an impact. Hence it is impossible for one body only to generate a sound—there must be a body impinging and a body impinged upon; what sounds does so by striking against something else, and this is impossible without a movement from place to place.

As we have said, not all bodies can by impact on one another produce sound; impact on wool makes no sound, while the impact on [15] bronze or any body which is smooth and hollow does. Bronze gives out a sound when struck because it is smooth; bodies which are hollow owing to reflection repeat the original impact over and over again, the body originally set in movement being unable to escape from the concavity.

Further, we must remark that sound is heard both in air and in water, though less distinctly in the latter. Yet neither air nor water is the principal cause of sound. What is [20] quired for the production of sound is an impact of two solids against one another and against the air. The latter condition is satisfied when the air impinged upon does not retreat before the blow, i.e. is not dissipated by it.

That is why it must be struck with a sudden sharp blow, if it is to sound—the movement of the whip must outrun the dispersion of the air, just as one might get in a stroke at a heap or whirl of sand as it was traveling rapidly past.

[25] An echo occurs, when, a mass of air hav-

ing been unified, bounded, and prevented from dissipation by the containing walls of a vessel, the air originally struck by the impinging body and set in movement by it rebounds from this mass of air like a ball from a wall. It is probable that in all generation of sound echo takes place, though it is frequently only indistinctly heard. What happens here must be analogous to what happens in the case of light; light is *always* reflected—otherwise it would [30] not be diffused and outside what was directly illuminated by the sun there would be blank darkness; but this reflected light is not always strong enough, as it is when it is reflected from water, bronze, and other smooth bodies, to cast a shadow, which is the distinguishing mark by which we recognize light.

It is rightly said that an empty space plays the chief part in the production of hearing, for what people mean by 'the vacuum' is the air, which is what causes hearing, when that air is set in movement as one continuous mass; but [35] owing to its friability it emits no sound, being dissipated by impinging upon any surface 420^a face which is not smooth. When the surface on which it impinges is quite smooth, what is produced by the original impact is a united mass, a result due to the smoothness of the surface with which the air is in contact at the other end.

What has the power of producing sound is what has the power of setting in movement a single mass of air which is continuous from the impinging body up to the organ of hearing. The organ of hearing is physically united with air, and because it is *in* air, the air inside [5] is moved concurrently with the air outside. Hence animals do not hear with all parts of their bodies, nor do all parts admit of the entrance of air; for even the part which can be moved and can sound has not air everywhere in it. Air in itself is, owing to its friability, quite soundless; only when its dissipation is prevented is its movement sound. The air in the ear is built into a chamber just to prevent this dissipating movement, in order that the [10] animal may accurately apprehend all varieties of the movements of the air outside.

That is why we hear also in water, viz. because the water cannot get into the air chamber or even, owing to the spirals, into the outer ear. If this does happen, hearing ceases, as it also does if the tympanic membrane is damaged, just as sight ceases if the membrane covering the pupil is damaged. It is also a test of [15] deafness whether the ear does or does not

reverberate like a horn; the air inside the ear has always a movement of its own, but the sound we hear is always the sounding of something else, not of the organ itself. That is why we say that we hear with what is empty and echoes, viz. because what we hear with is a chamber which contains a bounded mass of air. Which is it that 'sounds', the striking body or the struck? Is not the answer 'it is both, but [20] each in a different way'? Sound is a movement of what can rebound from a smooth surface when struck against it. As we have explained¹ not everything sounds when it strikes or is struck, e.g. if one needle is struck against another, neither emits any sound. In order, [25] therefore, that sound may be generated, what is struck must be smooth, to enable the air to rebound and be shaken off from it in one piece.

The distinctions between different sounding bodies show themselves only in actual sound; as without the help of light colours remain invisible, so without the help of actual sound the distinctions between acute and grave sounds remain inaudible. Acute and grave are here metaphors, transferred from their proper sphere, viz. that of touch, where they mean [30] respectively (a) what moves the sense much in a short time, (b) what moves the sense little in a long time. Not that what is sharp really moves fast, and what is grave, slowly, but that the difference in the qualities of the one and the other movement is due to their respective speeds. There seems to be a 420^b sort of parallelism between what is acute or grave to hearing and what is sharp or blunt to touch; what is sharp as it were stabs, while what is blunt pushes, the one producing its effect in a short, the other in a long time, so that the one is quick, the other slow.

[5] Let the foregoing suffice as an analysis of sound. Voice is a kind of sound characteristic of what has soul in it; nothing that is without soul utters voice, it being only by a metaphor that we speak of the voice of the flute or the lyre or generally of what (being without soul) possesses the power of producing a succession of notes which differ in length and pitch and timbre. The metaphor is based on the fact that all these differences are found also in voice. Many animals are voiceless, e.g. all non-sanguineous animals and among sanguineous animals [10] mals fish. This is just what we should expect, since voice is a certain movement of air. The fish, like those in the Achelous, which are

¹ 422^b 34 ff.

² 421^b 17-422^a 6.

¹ 419^b 6, 13.

said to have voice, really make the sounds with their gills or some similar organ. Voice is the sound made by an animal, and that with a special organ. As we saw, everything that makes a sound does so by the impact of something (a) [15] against something else, (b) across a space, (c) filled with air; hence it is only to be expected that no animals utter voice except those which take in air. Once air is inbreathed, Nature uses it for two different purposes, as the tongue is used both for tasting and for articulating; in that case of the two functions tasting is necessary for the animal's existence (hence it is found more widely distributed), while articulate speech is a luxury subserving its possessor's well-being; similarly in the former case [20] Nature employs the breath both as an indispensable means to the regulation of the inner temperature of the living body and also as the matter of articulate voice, in the interests of its possessor's well-being. Why its former use is indispensable must be discussed elsewhere.¹

The organ of respiration is the windpipe, and the organ to which this is related as means to end is the lungs. The latter is the part of the body by which the temperature of land [25] animals is raised above that of all others. But what primarily requires the air drawn in by respiration is not only this but the region surrounding the heart. That is why when animals breathe the air must penetrate inwards. Voice then is the impact of the inbreathed air against the 'windpipe', and the agent that produces the impact is the soul resident in these parts of the body. Not every sound, as we [30] said, made by an animal is voice (even with the tongue we may merely make a sound which is not voice, or without the tongue as in coughing); what produces the impact must have soul in it and must be accompanied by an act of imagination, for voice is a sound *with a meaning*, and is not *merely* the result of any impact of the breath as in coughing; in voice the breath in the windpipe is used as an instrument to knock with against the walls of the 421^a windpipe. This is confirmed by our inability to speak when we are breathing either out or in—we can only do so by holding our breath; we make the movements with the breath so checked. It is clear also why fish are voiceless; they have no windpipe. And they have no windpipe because they do not breathe

[5] or take in air. Why they do not is a question belonging to another inquiry.²

9

Smell and its object are much less easy to determine than what we have hitherto discussed; the distinguishing characteristic of the object of smell is less obvious than those of sound or colour. The ground of this is that our power of smell is less discriminating and in general [10] inferior to that of many species of animals; men have a poor sense of smell and our apprehension of its proper objects is inseparably bound up with and so confused by pleasure and pain, which shows that in us the organ is inaccurate. It is probable that there is a parallel failure in the perception of colour by animals that have hard eyes: probably they discriminate differences of colour only by the presence or absence of what excites fear, and [15] that it is thus that human beings distinguish smells. It seems that there is an analogy between smell and taste, and that the species of tastes run parallel to those of smells—the only difference being that our sense of taste is more discriminating than our sense of smell, because the former is a modification of touch, which reaches in man the maximum of discriminative accuracy. While in respect of all [20] the other senses we fall below many species of animals, in respect of touch we far excel all other species in exactness of discrimination. That is why man is the most intelligent of all animals. This is confirmed by the fact that it is to differences in the organ of touch and to nothing else that the differences between man and man in respect of natural endowment are due; men whose flesh is hard are ill-endowed [25] by nature, men whose flesh is soft, well-endowed.

As flavours may be divided into (a) sweet, (b) bitter, so with smells. In some things the flavour and the smell have the same quality, i.e. both are sweet or both bitter, in others they diverge. Similarly a smell, like a flavour, may [30] be pungent, astringent, acid, or succulent. But, as we said, because smells are much less easy to discriminate than flavours, the names of these varieties are applied to smells only 421^b metaphorically; for example 'sweet' is extended from the taste to the smell of saffron or honey, 'pungent' to that of thyme, and so on. In the same sense in which hearing has for

its object both the audible and the inaudible, [5] sight both the visible and the invisible, smell has for its object both the odorous and the inodorous. 'Inodorous' may be either (a) what has no smell at all, or (b) what has a small or feeble smell. The same ambiguity lurks in the word 'tasteless'.

Smelling, like the operation of the senses previously examined, takes place through a medium, i.e. through air or water—I add water [10] ter, because water-animals too (both sanguineous and non-sanguineous) seem to smell just as much as land-animals; at any rate some of them make directly for their food from a distance if it has any scent. That is why the following facts constitute a problem for us. All animals smell in the same way, but man smells only when he inhales; if he exhales or holds his breath, he ceases to smell, no difference being [15] made whether the odorous object is distant or near, or even placed inside the nose and actually on the wall of the nostril; it is a disability common to all the senses not to perceive what is in immediate contact with the organ of sense, but our failure to apprehend what is odorous without the help of inhalation is peculiar (the fact is obvious on making the experiment). Now since bloodless animals do [20] not breathe, they must, it might be argued, have some novel sense not reckoned among the usual five. Our reply must be that this is impossible, since it is scent that is perceived; a sense that apprehends what is odorous and what has a good or bad odour cannot be anything but smell. Further, they are observed to be deleteriously effected by the same strong odours as man is, e.g. bitumen, sulphur, [25] and the like. These animals must be able to smell without being able to breathe. The probable explanation is that in man the organ of smell has a certain superiority over that in all other animals just as his eyes have over those of hard-eyed animals. Man's eyes have in the eyelids a kind of shelter or envelope, which must be shifted or drawn back in order [30] that we may see, while hard-eyed animals have nothing of the kind, but at once see whatever presents itself in the transparent medium. Similarly in certain species of animals the organ of smell is like the eye of hard-eyed animals, uncurtained, while in others which take in air it probably has a curtain over it, which is drawn back in inhalation, owing to the dilating of the veins or pores. That explains also why such animals cannot smell un-

[5] der water; to smell they must first inhale, and that they cannot do under water.

Smells come from what is dry as flavours from what is moist. Consequently the organ of smell is potentially dry.

10

What can be tasted is always something that can be touched, and just for that reason it cannot be perceived *through* an interposed foreign body, for touch means the absence of any in- [10] tervening body. Further, the flavoured and tasteable body is suspended in a liquid matter, and this is tangible. Hence, if we lived in water, we should perceive a sweet object introduced into the water, but the water would not be the medium *through* which we perceived; our perception would be due to the solution of the sweet substance in what we imbibed, just as if it were mixed with some drink. There is no parallel here to the perception of colour, which is due neither to any blending of anything with anything, nor to any efflux of anything from anything. In the [15] case of taste, there is nothing corresponding to the medium in the case of the senses previously discussed; but as the object of sight is colour, so the object of taste is flavour. But nothing excites a perception of flavour without the help of liquid; what acts upon the sense of taste must be either actually or potentially liquid like what is saline; it must be both (a) itself easily dissolved, and (b) capable of dis- [20] solving along with itself the tongue. Taste apprehends both (a) what has taste and (b) what has no taste, if we mean by (b) what has only a slight or feeble flavour or what tends to destroy the sense of taste. In this it is exactly parallel to sight, which apprehends both what is visible and what is invisible (for darkness is invisible and yet is discriminated by sight; so is, in a different way, what is over- [25] brilliant), and to hearing, which apprehends both sound and silence, of which the one is [25] audible and the other inaudible, and also over-loud sound. This corresponds in the case of hearing to over-bright light in the case of sight. As a faint sound is 'inaudible', so in a sense is a loud or violent sound. The word 'invisible' and similar privative terms cover not only (a) what is simply without some power, but also (b) what is adapted by nature to have it but has not it or has it only in a very low degree, as when we say that a species of swallow is 'footless' or that a variety of fruit is

¹ On Breathing, 478^a 28; On the Parts of Animals, 642^a 31-4.

² Cf. On Breathing, 474^b 25-9, 476^a 6-15; On the Parts of Animals, 609^a 2-3.

'stoneless'. So too taste has as its object both [30] what can be tasted and the tasteless—the latter in the sense of what has little flavour or a bad flavour or one destructive of taste. The difference between what is tasteless and what is not seems to rest ultimately on that between what is drinkable and what is undrinkable—both are tasteable, but the latter is bad and tends to destroy taste, while the former is the normal stimulus of taste. What is drinkable is the common object of both touch and taste.

422^b Since what can be tasted is liquid, the organ for its perception cannot be either (a) actually liquid or (b) incapable of becoming liquid. Tasting means a being affected by what can be tasted as such; hence the organ of taste must be liquefied, and so to start with must be non-liquid but capable of liquefaction without loss of its distinctive nature. This is [5] confirmed by the fact that the tongue cannot taste either when it is too dry or when it is too moist; in the latter case what occurs is due to a contact with the pre-existent moisture in the tongue itself, when after a foretaste of some strong flavour we try to taste another flavour; it is in this way that sick persons find everything they taste bitter, viz. because, when they taste, their tongues are overflowing with bitter moisture.

[10] The species of flavour are, as in the case of colour, (a) simple, i.e. the two contraries, the sweet and the bitter, (b) secondary, viz. (i) on the side of the sweet, the succulent, (ii) on the side of the bitter, the saline, (iii) between these come the pungent, the harsh, the astringent, and the acid; these pretty well exhaust the varieties of flavour. It follows that [15] what has the power of tasting is what is potentially of that kind, and that what is tasteable is what has the power of making it actually what it itself already is.

11

Whatever can be said of what is tangible, can be said of touch, and vice versa; if touch is not a single sense but a group of senses, there must be several kinds of what is tangible. It is a problem whether touch is a single sense or a [20] group of senses. It is also a problem, what is the organ of touch; is it or is it not the flesh (including what in certain animals is homologous with flesh)? On the second view, flesh is 'the medium' of touch, the real organ being situated farther inward. The problem arises because the field of each sense is accord-

range between a single pair of contraries, white and black for sight, acute and grave for [25] hearing, bitter and sweet for taste; but in the field of what is tangible we find several such pairs, hot cold, dry moist, hard soft, &c. This problem finds a partial solution, when it is recalled that in the case of the other senses more than one pair of contraries are to be met with, e.g. in sound not only acute and grave [30] but loud and soft, smooth and rough, &c.; there are similar contrasts in the field of colour. Nevertheless we are unable clearly to detect in the case of touch what the single subject is which underlies the contrasted qualities and corresponds to sound in the case of hearing.

To the question whether the organ of touch lies inward or not (i.e. whether we need look any farther than the flesh), no indication in 423^a favour of the second answer can be drawn from the fact that if the object comes into contact with the flesh it is at once perceived. For even under present conditions if the experiment is made of making a web and stretching it tight over the flesh, as soon as this web is touched the sensation is reported in the same manner as before, yet it is clear that the organ is not in this membrane. If the membrane [5] could be *grown* on to the flesh, the report would travel still quicker. The flesh plays in touch very much the same part as would be played in the other senses by an air-envelope growing round our body; had we such an envelope attached to us we should have supposed that it was by a single organ that we perceived sounds, colours, and smells, and we should have taken sight, hearing, and [10] smell to be a single sense. But as it is, because that through which the different movements are transmitted is not naturally attached to our bodies, the difference of the various sense-organs is too plain to miss. But in the case of touch the obscurity remains.

There must be such a naturally attached 'medium' as flesh, for no living body could be constructed of air or water; it must be something solid. Consequently it must be composed of earth along with these, which is just what flesh and its analogue in animals which have no true flesh tend to be. Hence of neces- [15] sity the medium through which are transmitted the manifoldly contrasted actual qualities must be a body naturally attached to the organism. That they are manifold is clear when we consider touching with the tongue; we apprehend at the tongue all tangible quali-

our flesh was, like the tongue, sensitive to flavour, we should have identified the sense of [20] taste and the sense of touch; what saves us from this identification is the fact that touch and taste are not always found together in the same part of the body. The following problem might be raised. Let us assume that every body has depth, i.e. has three dimensions, and that if two bodies have a third body between them they cannot be in contact with one another; let us remember that what is liquid is a body [25] and must be or contain water, and that if two bodies touch one another under water, their touching surfaces cannot be dry, but must have water between, viz. the water which wets their bounding surfaces; from all this it follows that in water two bodies cannot be in contact with one another. The same holds of two bodies in air—air being to bodies in air precisely what water is to bodies in wa-

[30] ter—but the facts are not so evident to our observation, because we live in air, just as animals that live in water would not notice that the things which touch one another in 423^b water have wet surfaces. The problem, then, is: does the perception of all objects of sense take place in the same way, or does it not, e.g. taste and touch requiring contact (as they are commonly thought to do), while all other senses perceive over a distance? The distinction is unsound; we perceive what is hard [5] or soft, as well as the objects of hearing, sight, and smell, through a 'medium', only that the latter are perceived over a *greater* distance than the former; that is why the facts escape our notice. For we do perceive everything through a medium; but in these cases the fact escapes us. Yet, to repeat what we said before, if the medium for touch were a membrane separating us from the object without our observing its existence, we should be relatively to [10] it in the same condition as we are now to air or water in which we are immersed; in their case we fancy we can touch objects, nothing coming in between us and them. But there remains this difference between what can be touched and what can be seen or can sound; in the latter two cases we perceive because the medium produces a certain effect upon us, whereas in the perception of objects of touch we are affected not *by* but *along with* the me- [15] dium; it is as if a man were struck through his shield, where the shock is not first given to the shield and passed on to the man, but the concussion of both is simultaneous. In general, flesh and the tongue are related

to the real organs of touch and taste, as air and water are to those of sight, hearing, and smell. [20] Hence in neither the one case nor the other can there be any perception of an object if it is placed immediately upon the organ, e.g. if a white object is placed on the surface of the eye. This again shows that what has the power of perceiving the tangible is seated inside. Only so would there be a complete analogy with all the other senses. In their case if you place the object on the *organ* it is not per- [25] ceived, here if you place it on the flesh it is perceived; therefore flesh is not the organ but the *medium* of touch.

What can be touched are distinctive qualities of body *as* body; by such differences I mean those which characterize the elements, viz. hot cold, dry moist, of which we have [30] spoken earlier in our treatise on the elements.¹ The organ for the perception of these is that of touch—that part of the body in which primarily the sense of touch resides. This is that part which is potentially such as its object is actually: for all sense-perception is a process of being so affected; so that that which makes 424^a something such as it itself actually is makes the other such because the other is already potentially such. That is why when an object of touch is equally hot and cold or hard and soft we cannot perceive; what we perceive must have a degree of the sensible quality lying beyond the neutral point. This implies that the sense itself is a 'mean' between any two opposite qualities which determine the field of [5] that sense. It is to this that it owes its power of discerning the objects in that field. What is 'in the middle' is fitted to discern; relatively to either extreme it can put itself in the place of the other. As what is to perceive *both* white and black must, to begin with, be actually neither but potentially either (and so with all the other sense-organs), so the organ of touch must be neither hot nor cold.

[10] Further, as in a sense sight had for its object both what was visible and what was invisible (and there was a parallel truth about all the other senses discussed),² so touch has for its object both what is tangible and what is intangible. Here by 'intangible' is meant (a) what like air possesses some quality of tangible things in a very slight degree and (b) what possesses it in an excessive degree, as destructive things do.

¹ On Generation and Corruption, II, 2, 3.

² 421^b 3-6, 422^a 29.

[15] We have now given an outline account of each of the several senses.

12

The following results applying to any and every sense may now be formulated.

(A) By a 'sense' is meant what has the power of receiving into itself the sensible forms of things without the matter. This must be conceived of as taking place in the way in which a piece of wax takes on the impress of a signet-ring without the iron or gold; we say that what produces the impression is a signet of bronze or gold, but its particular metallic constitution makes no difference: in a similar way the sense is affected by what is coloured or flavoured or sounding, but it is indifferent what in each case the *substance* is; what alone matters is what *quality* it has, i.e. in what *ratio* its constituents are combined.

(B) By 'an organ of sense' is meant that in which ultimately such a power is seated.

[25] The sense and its organ are the same in fact, but their essence is not the same. What perceives is, of course, a spatial magnitude, but we must not admit that either the having the power to perceive or the sense itself is a magnitude; what they are is a certain ratio or power *in* a magnitude. This enables us to explain why objects of sense which possess one of two opposite sensible qualities in a degree largely in excess of the other opposite destroy the organ of sense; if the movement set up by an object is too strong for the organ, the equipoise of contrary qualities in the organ, which just *is* its sensory power, is disturbed; it is precisely as concord and tone are destroyed by too violently twanging the strings of a lyre. This explains also why plants cannot perceive, in spite of their having a portion of soul in them and obviously being affected by tangible objects themselves; for undoubtedly their tem-

424^b perature can be lowered or raised. The explanation is that they have no mean of contrary qualities, and so no principle in them capable of taking on the forms of sensible objects without their matter; in the case of plants the affection is an affection by form-and-matter together. The problem might be raised: Can what cannot smell be said to be affected by [5] smells or what cannot see by colours, and so on? It might be said that a smell is just what can be smelt, and if it produces any effect it can only be so as to make something smell it, and it might be argued that what cannot smell cannot be affected by smells and further that what can smell can be affected by it only in so far as it has in it the power to smell (similarly with the proper objects of all the other senses). Indeed that this *is* so is made quite evident as [10] follows. Light or darkness, sounds and smells leave *bodies* quite unaffected; what does affect bodies is not these but the bodies which are their vehicles, e.g. what splits the trunk of a tree is not the sound of the thunder but the air which accompanies thunder. Yes, but, it may be objected, bodies are affected by what is tangible and by flavours. If not, by what are things that are without soul affected, i.e. altered in quality? Must we not, then, admit that the objects of the other senses also may affect them? Is not the true account this, that all bodies *are* capable of being affected by smells [15] and sounds, but that some on being acted upon, having no boundaries of their own, disintegrate, as in the instance of air, which does become odorous, showing that *some* effect is produced on it by what is odorous? But smelling is more than such an affection by what is odorous—*what* more? Is not the answer that, while the air owing to the momentary duration of the action upon it of what is odorous does itself become perceptible to the sense of smell, smelling is an *observing* of the result produced?

BOOK III

1

[20] THAT there is no sixth sense in addition to the five enumerated—sight, hearing, smell, taste, touch—may be established by the following considerations:

If we have actually sensation of everything of which touch can give us sensation (for all [25] the qualities of the tangible *qua* tangible

sense of a sense necessarily involves absence of a sense-organ; and if (1) all objects that we perceive by immediate contact with them are perceptible by touch, which sense we actually possess, and (2) all objects that we perceive through media, i.e. without immediate contact, [30] are perceptible by or through the simple elements, e.g. air and water (and this is so arranged that (a) if more than one kind of sensible object is *irretrievable* through a single me-

dium, the possessor of a sense-organ homogeneous with that medium has the power of perceiving both kinds of objects; for example, if the sense-organ is made of air, and air is a medium both for sound and for colour; and that (b) if more than one medium can transmit 425^a the same kind of sensible objects, as e.g. water as well as air can transmit colour, both being transparent, then the possessor of either alone will be able to perceive the kind of objects transmissible through both); and if of the simple elements two only, air and water, go to form sense-organs (for the pupil is made of water, the organ of hearing is made of air, and the organ of smell of one or other of these [5] two, while fire is found either in none or in all—warmth being an essential condition of all sensibility—and earth either in none or, if anywhere, specially mingled with the components of the organ of touch; wherefore it would remain that there can be no sense-organ formed of anything except water and air); and if these sense-organs are actually found in certain animals;—then all the possible senses are [10] possessed by those animals that are not imperfect or mutilated (for even the mole is observed to have eyes beneath its skin); so that, if there is no fifth element and no property other than those which belong to the four elements of our world, no sense can be wanting to such animals.

Further, there cannot be a special sense-

[15] organ for the common sensibles either, i.e. the objects which we perceive incidentally through this or that special sense, e.g. movement, rest, figure, magnitude, number, unity; for all these we perceive by movement, e.g. magnitude by movement, and therefore also figure (for figure is a species of magnitude); what is at rest by the absence of movement; number is perceived by the negation of continuity, and by the special sensibles; for each sense perceives one class of sensible objects. So [20] that it is clearly impossible that there should be a special sense for any one of the common sensibles, e.g. movement; for, if that were so, our perception of it would be exactly parallel to our present perception of what is sweet by vision. *That* is so because we have a sense for each of the two qualities, in virtue of which when they happen to meet in one sensible object we are aware of both contemporaneously. If it were not like this our per-

[25] ception of the common qualities would always be incidental, i.e. as is the perception of colour, when we perceive him not as

Cleon's son but as white, and the white thing which we really perceive happens to be Cleon's son.

But in the case of the common sensibles there is already in us a *general sensibility* which enables us to perceive them directly; there is therefore no special sense required for their perception; if there were, our perception of them would have been exactly like what has been above¹ described.

[30] The senses perceive each other's special objects incidentally; not because the percipient sense is this or that special sense, but because all form a unity: this incidental perception takes place whenever sense is directed at one and the same moment to two disparate qualities in one and the same object, e.g. to the bitterness and the yellowness of bile, the assertion of the identity of both cannot be the act of either of the senses; hence the illusion of sense, e.g. the belief that if a thing is yellow it is bile.

It might be asked why we have more senses [5] than one. Is it to prevent a failure to apprehend the common sensibles, e.g. movement, magnitude, and number, which go along with the special sensibles? Had we no sense but sight, and that sense no object but white, they would have tended to escape our notice and everything would have merged for us into an indistinguishable identity because of the concomitance of colour and magnitude. As it is, the fact that the common sensibles are given in the objects of more than one sense reveals [10] their distinction from each and all of the special sensibles.

2

Since it is through sense that we are aware that we are seeing or hearing, it must be either by sight that we are aware of seeing, or by some sense other than sight. But the sense that gives us this new sensation must perceive both sight and its object, viz. colour: so that either (1) there will be two senses both percipient of the same sensible object, or (2) the sense must [15] be percipient of itself. Further, even if the sense which perceives sight were different from sight, we must either fall into an infinite regress, or we must somewhere assume a sense which is aware of itself. If so, we ought to do this in the first case.

This presents a difficulty: if to perceive by sight is just to see, and what is seen is colour (or the coloured), then if we are to see that

which sees, that which sees originally must be [20] coloured. It is clear therefore that 'to perceive by sight' has more than one meaning; for even when we are not *seeing*, it is by sight that we discriminate darkness from light, though not in the same way as we distinguish one colour from another. Further, in a sense even that which sees *is* coloured; for in each case the sense-organ is capable of receiving the sensible object without its matter. That is why even [25] when the sensible objects are gone the sensings and imaginings continue to exist in the sense-organs.

The activity of the sensible object and that of the percipient sense is one and the same activity, and yet the distinction between their being remains. Take as illustration actual sound and actual hearing: a man may have hearing and yet not be hearing, and that which has a sound is not always sounding. But when that which can hear is actively hearing and [30] that which can sound is sounding, then the actual hearing and the actual sound are merged in one (these one might call respectively *426^a* *tively* hearing and sounding).

If it is true that the movement, both the acting and the being acted upon, is to be found in that which is acted upon, both the sound and the hearing so far as it is actual must be found in that which has the faculty of hearing; for it is in the passive factor that the actuality of the active or motive factor is realized; that [5] is why that which causes movement may be at rest. Now the actuality of that which can sound is just sound or sounding, and the actuality of that which can hear is hearing or hearingness; 'sound' and 'hearing' are both ambiguous. The same account applies to the other senses and their objects. For as the acting-and-passive, not in the active factor, so also the actuality of the sensible object and that of the sensitive subject are both realized in the latter. But while in some cases each aspect of the total actuality has a distinct name, e.g. sounding and hearingness, in some one or other is nameless, e.g. the actuality of sight is called seeing, but the actuality of colour has no name: the actuality of the faculty of taste is called tasting, but the actuality of flavour has no name. Since the [15] actualities of the sensible object and of the sensitive faculty are *one* actuality in spite of the difference between their modes of being, actual hearing and actual sounding appear and disappear from existence at one and the same moment: and so actual savour and actual tast-

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ing, &c., while as potentialities one of them [20] may exist without the other. The earlier students of nature were mistaken in their view that without sight there was no white or black, without taste no savour. This statement of theirs is partly true, partly false: 'sense' and 'the sensible object' are ambiguous terms, i.e. may denote either potentialities or actualities; [25] the statement is true of the latter, false of the former. This ambiguity they wholly failed to notice.

If voice always implies a concord, and if the voice and the hearing of it are in one sense one and the same, and if concord always implies a ratio, hearing as well as what is heard must [30] be a ratio. That is why the excess of either the sharp or the flat destroys the hearing. *426^b* (So also in the case of savours excess destroys the sense of taste, and in the case of colours excessive brightness or darkness destroys the sight, and in the case of smell excess of strength whether in the direction of sweetness or bitterness is destructive.) This shows that the sense is a ratio.

That is also why the objects of sense are (1) pleasant when the sensible extremes such as acid or sweet or salt being pure and unmixed are brought into the proper ratio; then they are [5] pleasant: and in general what is blended is more pleasant than the sharp or the flat alone; or, to touch, that which is capable of being either warmed or chilled: the sense and the ratio are identical: white (2) in excess the sensible extremes are painful or destructive.

Each sense then is relative to its particular group of sensible qualities: it is found in a sense-organ as such and discriminates the differences which exist within that group; e.g. [10] sight discriminates white and black, taste sweet and bitter, and so in all cases. Since we also discriminate white from sweet, and indeed each sensible quality from every other, with what do we perceive that they are different? It must be by sense; for what is before us is [15] sensible objects. (Hence it is also obvious that the flesh cannot be the ultimate sense-organ: if it were, the discriminating power could not do its work without immediate contact with the object.)

Therefore (1) discrimination between white and sweet cannot be effected by two agencies which remain separate; both the qualities discriminated must be present to something that is one and single. On any other supposition even if I perceived sweet and you perceived [20] white, the difference between them would

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be apparent. What says that two things are different must be one; for sweet is different from white. Therefore what asserts this difference must be self-identical, and as what asserts, so also what thinks or perceives. That it is not possible by means of two agencies which remain separate to discriminate two objects which are separate, is therefore obvious; and that (2) it is not possible to do this in separate movements of time may be seen if we look at it as follows. For as what asserts the difference between the good and the bad is one and the [25] same, so also the time at which it asserts the one to be different and the other to be different is not accidental to the assertion (as it is for instance when I now assert a difference but do not assert that there is now a difference); it asserts thus—both now and that the objects are different now; the objects therefore must be present at one and the same moment. Both the discriminating power and the time of its exercise must be one and undivided.

But, it may be objected, it is impossible that [30] what is self-identical should be moved at one and the same time with contrary movements in so far as it is undivided, and in an undivided moment of time. For if what is sweet be the quality perceived, it moves the sense or thought in this determinate way, *427^a* while what is bitter moves it in a contrary way, and what is white in a different way. Is it the case then that what discriminates, though both numerically one and indivisible, is at the same time divided in its being? In one sense, it is what is divided that perceives two separate objects at once, but in another sense it does so *qua* undivided; for it is divisible in its being, but spatially and numerically undivided.

[5] But is not this impossible? For while it is true that what is self-identical and undivided may be both contraries at once *potentially*, it cannot be self-identical in its being—it must lose its unity by being put into activity. It is not possible to be at once white and black, and therefore it must also be impossible for a thing to be affected at one and the same moment by the forms of both, assuming it to be the case that sensation and thinking are properly so described.

[10] The answer is that just as what is called a 'point' is, as being at once one and two, properly said to be divisible, so here, that which discriminates is *qua* undivided one, and active in a single moment of time, while so far forth as it is divisible it twice over uses the same dot at one and the same time. So far forth then as

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it takes the limit as two, it discriminates two separate objects with what in a sense is divided: while so far as it takes it as one, it does so with what is one and occupies in its activity a single moment of time.

About the principle in virtue of which we [15] say that animals are percipient, let this discussion suffice.

3

There are two distinctive peculiarities by reference to which we characterize the soul—(1) local movement and (2) thinking, discriminating, and perceiving. Thinking both speculative and practical is regarded as akin to [20] a form of perceiving; for in the one as well as the other the soul discriminates and is cognizant of something which *is*. Indeed the ancients go so far as to identify thinking and perceiving; e.g. Empedocles says¹ 'For 'tis in respect of what is present that man's wit is increased', and again² 'Whence it befalls them from time to time to think diverse thoughts'; [25] and Homer's phrase³ 'For suchlike is man's mind' means the same. They all look upon thinking as a bodily process like perceiving, and hold that like is *known* as well as *perceived* by like, as I explained at the beginning of our discussion.⁴ Yet they ought at the same time to have accounted for error also; for *427^b* it is more intimately connected with animal existence and the soul continues longer in the state of error than in that of truth. They cannot escape the dilemma: either (1) whatever seems is true (and there are some who accept this) or (2) error is contact with the unlike; for that is the opposite of the knowing of like by like.

[5] But it is a received principle that error as well as knowledge in respect to contraries is one and the same.

That perceiving and practical thinking are not identical is therefore obvious; for the former is universal in the animal world, the latter is found in only a small division of it. Further, speculative thinking is also distinct from perceiving—I mean that in which we find rightness and wrongness—rightness in prudence [10] dence, knowledge, true opinion, wrongness in their opposites; for perception of the special objects of sense is *always* free from error, and is found in all animals, while it is possible to think falsely as well as truly, and thought is found only where there is discourse

¹ Fr. 106.

² Fr. 108.

³ *Odyssey*, xviii, 136.

⁴ *404^b* 8-18.

of reason as well as sensibility. For imagination is different from either perceiving or dis-
 [15] cursive thinking, though it is not found without sensation, or judgement without it. That this activity is not the same kind of thinking as judgement is obvious. For imagination lies within our own power whenever we wish (e.g. we can call up a picture, as in the practice of mnemonics by the use of mental im-
 [20] ages), but in forming opinions we are not free: we cannot escape the alternative of falsehood or truth. Further, when we think something to be fearful or threatening, emotion is immediately produced, and so too with what is encouraging; but when we merely imagine we remain as unaffected as persons who are looking at a painting of some dreadful or encouraging scene. Again within the field
 [25] of judgement itself we find varieties—knowledge, opinion, prudence, and their opposites; of the differences between these I must speak elsewhere.

Thinking is different from perceiving and is held to be in part imagination, in part judgement: we must therefore first mark off the sphere of imagination and then speak of judgement. If then imagination is that in virtue of which an image arises for us, excluding metaphorical uses of the term, is it a single faculty or disposition relative to images, in virtue of which we discriminate and are either in error or not? The faculties in virtue of which we do this are sense, opinion, science, intelligence.

[5] That imagination is not sense is clear from the following considerations: Sense is either a faculty or an activity, e.g. sight or seeing: imagination takes place in the absence of both, as e.g. in dreams. (2) Again, sense is always present, imagination not. If actual imagination and actual sensation were the same, imagination would be found in all the brutes: this is
 [10] held not to be the case; e.g. it is not found in ants or bees or grubs. (3) Again, sensations are always true, imaginations are for the most part false. (4) Once more, even in ordinary speech, we do not, when sense functions precisely with regard to its object, say that we imagine it to be a man, but rather when there is some failure of accuracy in its exercise. And
 [15] (5), as we were saying before, ¹visions appear to us even when our eyes are shut. Neither is imagination *any* of the things that are never in error: e.g. knowledge or intelligence; for imagination may be false.

It remains therefore to see if it is opinion, for opinion may be either true or false.

[20] But opinion involves belief (for without belief in what we opine we cannot have an opinion), and in the brutes though we often find imagination we never find belief. Further, every opinion is accompanied by belief, belief by conviction, and conviction by discourse of reason: while there are some of the brutes in which we find imagination, without discourse of reason. It is clear then that imagination
 [25] nation cannot, again, be (1) opinion *plus* sensation, or (2) opinion mediated by sensation, or (3) a blend of opinion and sensation; this is impossible both for these reasons and because the content of the supposed opinion cannot be different from that of the sensation (I mean that imagination must be the blending of the perception of white with the opinion that it is white: it could scarcely be a blend
 [30] of the opinion that it is good with the perception that it is white): to imagine is therefore 428^b fore (on this view) identical with the thinking of exactly the same as what one in the strictest sense perceives. But what we imagine is sometimes false though our contemporaneous judgement about it is true; e.g. we imagine the sun to be a foot in diameter though we are convinced that it is larger than the inhabited part of the earth, and the following dilemma presents itself. Either
 (a) while the fact has not changed and the
 [5] observer has neither forgotten nor lost belief in the true opinion which he had, that opinion has disappeared, or (b) if he retains it then his opinion is at once true and false. A true opinion, however, becomes false only when the fact alters without being noticed.

Imagination is therefore neither any one of the states enumerated, nor compounded out of them.

[10] But since when one thing has been set in motion another thing may be moved by it, and imagination is held to be a movement and to be impossible without sensation, i.e. to occur in beings that are percipient and to have for its content what can be perceived, and since movement may be produced by actual sensation and that movement is necessarily similar in character to the sensation itself, this movement must be (1) necessarily (a) incapable of
 [15] existing apart from sensation, (b) incapable of existing except when we perceive, (2) such that in virtue of its possession that in which it is found may present various phenomena both active and passive, and (3) such that it may be either true or false.

nomena both active and passive, and (3) such that it may be either true or false.

The reason of the last characteristic is as follows. Perception (1) of the special objects of sense is never in error or admits the least possible amount of falsehood. (2) That of the concomitance of the objects concomitant with the sensible qualities comes next: in this case
 [20] certainly we may be deceived; for while the perception that there is white before us cannot be false, the perception that what is white is this or that may be false. (3) Third comes the perception of the universal attributes which accompany the concomitant objects to which the special sensibles attach (I mean e.g. of movement and magnitude); it is in respect of these that the greatest amount of sense-illusion is possible.

[25] The motion which is due to the activity of sense in these three modes of its exercise will differ from the activity of sense; (1) the first kind of derived motion is free from error while the sensation is present; (2) and (3) the others may be erroneous whether it is present or absent, especially when the object of perception is far off. If then imagination presents no other features than those enumerated and is what we have described, then imagination
 [30] tion must be a movement resulting from an actual exercise of a power of sense.

As sight is the most highly developed sense, the name *φαντασία* (imagination) has been formed from *φῶς* (light) because it is not possible to see without light.

And because imaginings remain in the organs of sense and resemble sensations, animals in their actions are largely guided by them, some (i.e. the brutes) because of the non-existence in them of mind, others (i.e. men) because of the temporary eclipse in them of mind by feeling or disease or sleep.

About imagination, what it is and why it exists, let so much suffice.

4

[10] Turning now to the part of the soul with which the soul knows and thinks (whether this is separable from the others in definition only, or spatially as well) we have to inquire (1) what differentiates this part, and (2) how thinking can take place.

If thinking is like perceiving, it must be either a process in which the soul is acted upon by what is capable of being thought, or a process different from but analogous to that. The
 [15] thinking part of the soul must therefore

be, while impassible, capable of receiving the form of an object; that is, must be potentially identical in character with its object without being the object. Mind must be related to what is thinkable, as sense is to what is sensible.

Therefore, since everything is a possible object of thought, mind in order, as Anaxagoras says, to dominate, that is, to know, must be
 [20] pure from all admixture; for the co-presence of what is alien to its nature is a hindrance and a block: it follows that it too, like the sensitive part, can have no nature of its own, other than that of having a certain capacity. Thus that in the soul which is called mind (by mind I mean that whereby the soul thinks and judges) is, before it thinks, not actually any real thing. For this reason it cannot reasonably be regarded as blended with the body;
 [25] if so, it would acquire some quality, e.g. warmth or cold, or even have an organ like the sensitive faculty: as it is, it has none. It was a good idea to call the soul 'the place of forms', though (1) this description holds only of the intellectual soul, and (2) even this is the forms only potentially, not actually.

Observation of the sense-organs and their employment reveals a distinction between the
 [30] impassibility of the sensitive and that of the intellectual faculty. After strong stimulation of a sense we are less able to exercise it than before, as e.g. in the case of a loud sound 429^b we cannot hear easily immediately after, or in the case of a bright colour or a powerful odour we cannot see or smell, but in the case of mind thought about an object that is highly intelligible renders it more and not less able afterwards to think objects that are less intelligible: the reason is that while the faculty of sensation is dependent upon the body, mind is separable from it.

[5] Once the mind has become each set of its possible objects, as a man of science has, when this phrase is used of one who is actually a man of science (this happens when he is now able to exercise the power on his own initiative), its condition is still one of potentiality, but in a different sense from the potentiality which preceded the acquisition of knowledge by learning or discovery: the mind too is then able to think *itself*.

[10] Since we can distinguish between a spatial magnitude and what it is to be such, and between water and what it is to be water, and so in many other cases (though not in all; for in certain cases the thing and its form are identical), flesh and what it is to be flesh are

discriminated either by different faculties, or by the same faculty in two different states: for flesh necessarily involves matter and is like what is snub-nosed, a *this* in a *this*. Now it is by means of the sensitive faculty that we discriminate the hot and the cold, i.e. the factors [15] which combined in a certain ratio constitute flesh: the essential character of flesh is apprehended by something different either wholly separate from the sensitive faculty or related to it as a bent line to the same line when it has been straightened out.

Again in the case of abstract objects what is straight is analogous to what is snub-nosed; for it necessarily implies a continuum as its matter: its constitutive essence is different, if we may distinguish between straightness and what is straight: let us take it to be two-ness. [20] It must be apprehended, therefore, by a different power or by the same power in a different state. To sum up, in so far as the realities it knows are capable of being separated from their matter, so it is also with the powers of mind.

The problem might be suggested: if thinking is a passive affection, then if mind is simple and impassible and has nothing in common with anything else, as Anaxagoras says, [25] how can it come to think at all? For interaction between two factors is held to require a precedent community of nature between the factors. Again it might be asked, is mind a possible object of thought to itself? For if mind is thinkable *per se* and what is thinkable is in kind one and the same, then either (a) mind will belong to everything, or (b) mind will contain some element common to it with all other realities which makes them all thinkable.

(1) Have not we already disposed of the difficulty about interaction involving a common [30] mon element, when we said¹ that mind is in a sense potentially whatever is thinkable, though actually it is nothing until it has thought? What it thinks must be in it just as 430^a characters may be said to be on a writing-tablet on which as yet nothing actually stands written: this is exactly what happens with mind.

(2) Mind is itself thinkable in exactly the same way as its objects are. For (a) in the case of objects which involve no matter, what thinks and what is thought are identical; for speculative knowledge and its object are identical. (Why mind is not always thinking we must consider later.)² (b) In the case of

those which contain matter each of the objects of thought is only potentially present. It follows that while *they* will not have mind in them (for mind is a potentiality of them only in so far as they are capable of being disengaged from matter) mind may yet be thinkable.

5

[10] Since in every class of things, as in nature as a whole, we find two factors involved, (1) a matter which is potentially all the particulars included in the class, (2) a cause which is productive in the sense that it makes them all (the latter standing to the former, as e.g. an art to its material), these distinct elements must likewise be found within the soul.

And in fact mind as we have described it³ is what it is by virtue of becoming all things, [15] while there is another which is what it is by virtue of making all things: this is a sort of positive state like light; for in a sense light makes potential colours into actual colours.

Mind in this sense of it is separable, impassible, unmixed, since it is in its essential nature activity (for always the active is superior to the passive factor, the originating force to the matter which it forms).

[20] Actual knowledge is identical with its object: in the individual, potential knowledge is in time prior to actual knowledge, but in the universe as a whole it is not prior even in time. Mind is not at one time knowing and at another not. When mind is set free from its present conditions it appears as just what it is and nothing more: this alone is immortal and eternal (we do not, however, remember its former activity because, while mind in this sense is impassible, mind as passive is destructible), [25] and without it nothing thinks.

6

The thinking then of the simple objects of thought is found in those cases where falsehood is impossible: where the alternative of true or false applies, there we always find a putting together of objects of thought in a quasi-unity. As Empedocles said that 'where heads of many a creature sprouted without necks'⁴ they afterwards by Love's power were [30] combined, so here too objects of thought which were given separate are combined, e.g. 'incommensurate' and 'diagonal': if the combination be of objects past or future the combination of thought includes in its content the

430^b date. For falsehood always involves a synthesis; for even if you assert that what is white is not white you have included not-white in a synthesis. It is possible also to call all these cases division as well as combination. However that may be, there is not only the true or false assertion that Cleon is white but also the true or false assertion that he *was* or [5] *will be* white. In each and every case that which unifies is mind.

Since the word 'simple' has two senses, i.e. may mean either (a) 'not capable of being divided' or (b) 'not actually divided', there is nothing to prevent mind from knowing what is undivided, e.g. when it apprehends a length (which is actually undivided) and that in an undivided time; for the time is divided or undivided in the same manner as the line. It is [10] not possible, then, to tell what part of the line it was apprehending in each half of the time: the object has no actual parts until it has been divided: if in thought you think each half separately, then by the same act you divide the time also, the half-lines becoming as it were new wholes of length. But if you think it as a whole consisting of these two possible parts, then also you think it in a time which corresponds to both parts together. (But what is [15] not quantitatively but qualitatively simple is thought in a simple time and by a simple act of the soul.)

But that which mind thinks and the time in which it thinks are in this case divisible only incidentally and not as such. For in them too there is something indivisible (though, it may be, not isolable) which gives unity to the time and the whole of length; and this is found equally in every continuum whether temporal or spatial.

[20] Points and similar instances of things that divide, themselves being indivisible, are realized in consciousness in the same manner as privations.

A similar account may be given of all other cases, e.g. how evil or black is cognized; they are cognized, in a sense, by means of their contraries. That which cognizes must have an element of potentiality in its being, and one of the contraries must be in it. But if there is anything that has no contrary, then it knows itself [25] self and is actually and possesses independent existence.

Assertion is the saying of something concerning something, e.g. affirmation, and is in every case either true or false: this is not always the case with mind: the thinking of the

definition in the sense of the constitutive essence is never in error nor is it the assertion of something concerning something, but, just as while the seeing of the special object of sight can never be in error, the belief that the white object seen is a man may be mistaken, so too [30] in the case of objects which are without matter.

7

431^a Actual knowledge is identical with its object: potential knowledge in the individual is in time prior to actual knowledge but in the universe it has no priority even in time; for all things that come into being arise from what actually is. In the case of sense clearly the sensitive faculty already was potentially what the [5] object makes it to be actually; the faculty is not affected or altered. This must therefore be a different kind from movement: for movement is, as we saw,¹ an activity of what is imperfect, activity in the unqualified sense, i.e. that of what has been perfected, is different from movement.

To perceive then is like bare asserting or knowing; but when the object is pleasant or painful, the soul makes a quasi-affirmation or negation, and pursues or avoids the object. To [10] feel pleasure or pain is to act with the sensitive mean towards what is good or bad as such. Both avoidance and appetite when actual are identical with this: the faculty of appetite and avoidance are not different, either from one another or from the faculty of sense-perception; but their being is different.

To the thinking soul images serve as if they [15] were contents of perception (and when it asserts or denies them to be good or bad it avoids or pursues them). That is why the soul never thinks without an image. The process is like that in which the air modifies the pupil in this or that way and the pupil transmits the modification to some third thing (and similarly in hearing), while the ultimate point of arrival is one, a single mean, with different manners of being.

[20] With what part of itself the soul discriminates sweet from hot I have explained before² and must now describe again as follows: That with which it does so is a sort of unity, but in the way just mentioned, i.e. as a connecting term. And the two faculties it connects, being one by analogy and numerically, are each to each as the qualities discerned are to one another (for what difference does it make whether

¹ Cf. 417^b 2-16.

² 426^b 12-427^a 14.

er we raise the problem of discrimination between disparate or between contraries, e.g. [25] white and black?). Let then C be to D as A is to B : it follows *alternando* that $C : A :: D : B$. If then C and D belong to one subject, the case will be the same with them as with A and B ; A and B form a single identity with different modes of being; so too will the former pair. The same reasoning holds if A be sweet and B white.

The faculty of thinking then thinks the forms in the images, and as in the former case what is to be pursued or avoided is marked out for it, so where there is no sensation and it is engaged upon the images it is moved to pursue or avoidance. E.g. perceiving by sense that the beacon is fire, it recognizes in virtue of the general faculty of sense that it signifies an enemy, because it sees it moving; but sometimes by means of the images or thoughts which are within the soul, just as if it were seeing, it calculates and deliberates what is to come by reference to what is present; and when it makes a pronouncement, as in the case of sensation it pronounces the object to be pleasant or painful, in this case it avoids or pursues; and so generally in cases of action.

[10] That too which involves no action, i.e. that which is true or false, is in the same province with what is good or bad: yet they differ in this, that the one set imply and the other do not a reference to a particular person.

The so-called abstract objects the mind thinks just as, if one had thought of the snub-nosed not as snub-nosed but as hollow, one would have thought of an actuality without [15] the flesh in which it is embodied: it is thus that the mind when it is thinking the objects of Mathematics thinks as separate elements which do not exist separate. In every case the mind which is actively thinking is the objects which it thinks. Whether it is possible for it while not existing separate from spatial conditions to think anything that is separate, or not, we must consider later.

8

[20] Let us now summarize our results about soul, and repeat that the soul is in a way all existing things; for existing things are either sensible or thinkable, and knowledge is in a way what is knowable, and sensation is in a way what is sensible: in *what* way we must inquire.

Knowledge and sensation are divided to cor-

[25] and sensation answering to potentialities, actual knowledge and sensation to actualities. Within the soul the faculties of knowledge and sensation are *potentially* these objects, the one what is knowable, the other what is sensible. They must be either the things themselves or their forms. The former alternative is of course impossible: it is not the stone which is present in the soul but its form.

432^a It follows that the soul is analogous to the hand; for as the hand is a tool of tools, so the mind is the form of forms and sense the form of sensible things.

Since according to common agreement there is nothing outside and separate in existence from sensible spatial magnitudes, the objects of thought are in the sensible forms, viz. both [5] the abstract objects and all the states and affections of sensible things. Hence (1) no one can learn or understand anything in the absence of sense, and (2) when the mind is actively aware of anything it is necessarily aware of it along with an image; for images are like sensuous contents except in that they contain no matter.

Imagination is different from assertion and [10] denial; for what is true or false involves a synthesis of concepts. In what will the primary concepts differ from images? Must we not say that neither these nor even our other concepts are images, though they necessarily involve them?

9

[15] The soul of animals is characterized by two faculties, (a) the faculty of discrimination which is the work of thought and sense, and (b) the faculty of originating local movement. Sense and mind we have now sufficiently examined. Let us next consider what it is in the soul which originates movement. Is it a single part of the soul separate either spatially or in [20] definition? Or is it the soul as a whole? If it is a part, is that part different from those usually distinguished or already mentioned by us, or is it one of them? The problem at once presents itself, in what sense we are to speak of parts of the soul, or how many we should distinguish. For in a sense there is an infinity of parts: it is not enough to distinguish, with [25] some thinkers,¹ the calculative, the passionate, and the desiderative, or with others the rational and the irrational; for if we take the dividing lines followed by these thinkers we shall find parts far more distinctly separ-

¹ Cf. *Plato, Republic*, 429-41.

ed from one another than these, namely those we have just mentioned: (1) the nutritive, which belongs both to plants and to all animals, and (2) the sensitive, which can not easily be classed as either irrational or rational; further (3) the imaginative, which is, 432^b in its being, different from all, while it is very hard to say with which of the others it is the same or not the same, supposing we determine to posit *separate* parts in the soul; and lastly (4) the appetitive, which would seem to be distinct both in definition and in power from all hitherto enumerated.

[5] It is absurd to break up the last-mentioned faculty: as these thinkers do, for wish is found in the calculative part and desire and passion in the irrational; and if the soul is tripartite appetite will be found in all three parts. Turning our attention to the present object of discussion, let us ask what that is which originates local movement of the animal.

The movement of growth and decay, being found in all living things, must be attributed to [10] the faculty of reproduction and nutrition, which is common to all: inspiration and expiration, sleep and waking, we must consider later:¹ these too present much difficulty: at present we must consider local movement, asking what it is that originates forward movement in the animal.

[15] That it is not the nutritive faculty is obvious; for this kind of movement is always for an end and is accompanied either by imagination or by appetite; for no animal moves except by compulsion unless it has an impulse towards or away from an object. Further, if it were the nutritive faculty, even plants would have been capable of originating such movement and would have possessed the organs necessary to carry it out. Similarly it cannot be the sensitive faculty either; for there are many animals which have sensibility but remain fast and immovable throughout their [20] lives.

If then Nature never makes anything without a purpose and never leaves out what is necessary (except in the case of mutilated or imperfect growths; and that here we have neither mutilation nor imperfection may be argued from the facts that such animals (a) can reproduce their species and (b) rise to completeness of nature and decay to an end), it [25] follows that, had they been capable of originating forward movement, they would have possessed the organs necessary for that

¹ Cf. *On Breathing*, *On Sleep and Sleeplessness*.

purpose. Further, neither can the calculative faculty or what is called 'mind' be the cause of such movement; for mind as speculative never thinks what is practicable, it never says anything about an object to be avoided or pursued, while this movement is always in something which is avoiding or pursuing an object. [30] No, not even when it is aware of such an object does it at once enjoin pursuit or avoidance of it; e.g. the mind often thinks of something terrifying or pleasant without enjoining the emotion of fear. It is the heart that is moved (or in the case of a pleasant object some other 433^a part). Further, even when the mind does command and thought bids us pursue or avoid something, sometimes no movement is produced; we act in accordance with desire, as in the case of moral weakness. And, generally, we observe that the possessor of medical knowledge is not necessarily healing, which shows that something else is required to produce action in accordance with knowledge; the knowledge alone is not the cause. Lastly, appetite too is incompetent to account fully for movement; for those who successfully resist temptation have appetite and desire and yet follow mind and refuse to enact that for which they have appetite.

10

These two at all events appear to be sources of movement: appetite and mind (if one may venture to regard imagination as a kind of [10] thinking; for many men follow their imaginations contrary to knowledge, and in all animals other than man there is no thinking or calculation but only imagination).

Both of these then are capable of originating local movement, mind and appetite: (1) mind, that is, which calculates means to an end, i.e. mind practical (it differs from mind speculative [15] live in the character of its end); while (2) appetite is in every form of it relative to an end: for that which is the object of appetite is the stimulant of mind practical; and that which is last in the process of thinking is the beginning of the action. It follows that there is a justification for regarding these two as the sources of movement, i.e. appetite and practical thought; for the object of appetite starts a movement and as a result of that thought gives rise to movement, the object of appetite being [20] to it a source of stimulation. So too when imagination originates movement, it necessarily involves appetite.

That which moves therefore is a single i.e.

ulty and the faculty of appetite; for if there had been two sources of movement—mind and appetite—they would have produced movement in virtue of some common character. As it is, mind is never found producing movement without appetite (for wish is a form of appetite; and when movement is produced according to calculation it is also according to [25] wish), but appetite can originate movement contrary to calculation, for desire is a form of appetite. Now mind is always right, but appetite and imagination may be either right or wrong. That is why, though in any case it is the object of appetite which originates movement, this object may be either the real or the apparent good. To produce movement the object must be more than this: it must be good that can be brought into being by action; and only what can be otherwise than as it is [30] can thus be brought into being. That then such a power in the soul as has been described, i.e. that called appetite, originates movement is clear. Those who distinguish 433^b parts in the soul, if they distinguish and divide in accordance with differences of power, find themselves with a very large number of parts, a nutritive, a sensitive, an intellectual, a deliberative, and now an appetitive part; for these are more different from one another than the faculties of desire and passion.

[5] Since appetites run counter to one another, which happens when a principle of reason and a desire are contrary and is possible only in beings with a sense of time (for while mind bids us hold back because of what is future, desire is influenced by what is just at hand: a pleasant object which is just at hand presents itself as both pleasant and good, without condition in either case, because of want of foresight into [10] what is farther away in time), it follows that while that which originates movement must be specifically one, viz. the faculty of appetite as such (or rather farthest back of all the object of that faculty; for it is it that itself remaining unmoved originates the movement by being apprehended in thought or imagination), the things that originate movement are numerically many.

All movement involves three factors, (1) that which originates the movement, (2) that by means of which it originates it, and (3) that which is moved. The expression 'that which originates the movement' is ambiguous: it may mean either (a) something which itself is unmoved or (b) that which at once moves

without itself being moved is the realizable good, that which at once moves and is moved is the faculty of appetite (for that which is influenced by appetite so far as it is actually so influenced is set in movement, and appetite in the sense of actual appetite is a kind of movement), while that which is in motion is the animal. The instrument which appetite employs to produce movement is no longer psychical but bodily: hence the examination of it falls within the province of the functions common to body and soul. To state the matter summarily at present, that which is the instrument in the production of movement is to be found where a beginning and an end coincide as e.g. in a ball and socket joint; for there the convex and the concave sides are respectively an end and a beginning (that is why while the one remains at rest, the other is moved): they are separate in definition but not separable [25] spatially. For everything is moved by pushing and pulling. Hence just as in the case of a wheel, so here there must be a point which remains at rest, and from that point the movement must originate.

To sum up, then, and repeat what I have said, inasmuch as an animal is capable of appetite it is capable of self-movement; it is not capable of appetite without possessing imagination; and all imagination is either (1) calculative or (2) sensitive. In the latter all animals, and not only man, partake.

11

We must consider also in the case of imperfect animals, sc. those which have no sense but touch, what it is that in them originates movement, 434^a ment. Can they have imagination or not? or desire? Clearly they have feelings of pleasure and pain, and if they have these they must have desire. But how can they have imagination? Must not we say that, as their movements are indefinite, they have imagination and desire, but indefinitely?

[5] Sensitive imagination, as we have said, is found in all animals, deliberative imagination only in those that are calculative: for whether this or that shall be enacted is already a task requiring calculation; and there must be a single standard to measure by, for that is pursued which is *greater*. It follows that what acts in this way must be able to make a unity out of several images.

[10] This is the reason why imagination is held not to involve opinion, in that it does not

involve opinion based on inference, though opinion involves imagination. Hence appetite contains no deliberative element. Sometimes it overpowers wish and sets it in movement: at times wish acts thus upon appetite, like one sphere imparting its movement to another, or appetite acts thus upon appetite, i.e. in the condition of moral weakness (though by nature the higher faculty is *always* more authoritative and gives rise to movement). Thus *three* [15] modes of movement are possible.

The faculty of knowing is never moved but remains at rest. Since the one premiss or judgment is universal and the other deals with the particular (for the first tells us that such and such a kind of man should do such and such a kind of act, and the second that *this* is an act of the kind meant, and I a person of the type intended), it is the latter opinion that really [20] originates movement, not the universal; or rather it is both, but the one does so while it remains in a state more like rest, while the other partakes in movement.

12

The nutritive soul then must be possessed by everything that is alive, and every such thing is endowed with soul from its birth to its death. For what has been born must grow, reach maturity, and decay—all of which are impossible without nutrition. Therefore the [25] nutritive faculty must be found in everything that grows and decays.

But sensation need not be found in all things that live. For it is impossible for touch to belong either (1) to those whose body is uncompounded or (2) to those which are incapable of taking in the forms without their matter.

[30] But animals must be endowed with sensation, since Nature does nothing in vain. For all things that exist by Nature are means to an end, or will be concomitants of means to an end. Every body capable of forward movement would, if unendowed with sensation, perish and fail to reach its end, which is the aim of 434^b Nature; for how could it obtain nutriment? Stationary living things, it is true, have as their nutriment that from which they have arisen; but it is not possible that a body which is not stationary but produced by generation should have a soul and a discerning mind without also having sensation. (Nor yet even if it were not produced by generation. Why should it not have sensation? Because it were

soul? But clearly it would not be better for either: the absence of sensation will not enable the one to think better or the other to exist better.) Therefore no body which is not stationary has soul without sensation.

But if a body *has* sensation, it must be either simple or compound. And simple it cannot be; [10] for then it could not have touch, which is indispensable. This is clear from what follows. An animal is a body with soul in it: every body is tangible, i.e. perceptible by touch; hence necessarily, if an animal is to survive, its body [15] must have tactual sensation. All the other senses, e.g. smell, sight, hearing, apprehend through media; but where there is immediate contact the animal, if it has no sensation, will be unable to avoid some things and take others, and so will find it impossible to survive. That is why taste also is a sort of touch; it is relative to nutriment, which is just tangible body; whereas sound, colour, and odour are innutritious, and further neither grow nor de- [20] cay. Hence it is that taste also must be a sort of touch, because it is the sense for what is tangible and nutritious.

Both these senses, then, are indispensable to the animal, and it is clear that without touch it is impossible for an animal to be. All the other senses subservise well-being and for that very reason belong not to any and every kind [25] of animal, but only to some, e.g. those capable of forward movement must have them; for, if they are to survive, they must perceive not only by immediate contact but also at a distance from the object. This will be possible if they can perceive through a medium, the medium being affected and moved by the perceptible object, and the animal by the [30] medium. Just as that which produces local movement causes a change extending to a certain point, and that which gave an impulse causes another to produce a new impulse so that the movement traverses a medium—the first mover impelling without being impelled, the last moved being impelled without impelling, while the medium (or media, for 435^a there are many) is both—so is it also in the case of alteration, except that the agent produces it without the patient's changing its place. Thus if an object is dipped into wax, the movement goes on until submersion has taken place, and in stone it goes no distance at all, while in water the disturbance goes far beyond the object dipped: in air the disturbance is propagated farthest of all, the air acting and being

broken unity. That is why in the case of reflection it is better, instead of saying that the sight issues from the eye and is reflected, to say that the air, so long as it remains one, is affected by the shape and colour. On a smooth surface the air possesses unity; hence it is that it in turn sets the sight in motion, just as if the impression on the wax were transmitted as [10] far as the wax extends.

13

It is clear that the body of an animal cannot be simple, i.e. consist of one element such as fire or air. For without touch it is impossible to have any other sense; for every body that has soul in it must, as we have said,¹ be capable of touch. All the other elements with the exception of earth can constitute organs of sense, but all of them bring about perception only through something else, viz. through the media. Touch takes place by direct contact with its objects, whence also its name. All the other organs of sense, no doubt, perceive by contact, only the contact is mediate: touch alone perceives by immediate contact. Consequently no animal body can consist of these other elements.

[20] Nor can it consist solely of earth. For touch is as it were a mean between all tangible qualities, and its organ is capable of receiving not only all the specific qualities which characterize earth, but also the hot and the cold and all other tangible qualities whatsoever. That [25] is why we have no sensation by means of bones, hair, &c., because they consist of earth. 435^b So too plants, because they consist of earth, have no sensation. Without touch there can be no other sense, and the organ of touch cannot consist of earth or of any other single element.

¹ 434^b 10-24.

It is evident, therefore, that the loss of this one sense alone must bring about the death of [5] an animal. For as on the one hand nothing which is not an animal can have this sense, so on the other it is the only one which is indispensable necessary to what is an animal. This explains, further, the following difference between the other senses and touch. In the case of all the others excess of intensity in the qualities which they apprehend, i.e. excess of intensity in colour, sound, and smell, destroys not [10] the animal but only the organs of the sense (except incidentally, as when the sound is accompanied by an impact or shock, or where through the objects of sight or of smell certain other things are set in motion, which destroy by contact); Havour also destroys only in so far as it is at the same time tangible. But excess of intensity in tangible qualities, e.g. [15] heat, cold, or hardness, destroys the animal itself. As in the case of every sensible quality excess destroys the organ, so here what is tangible destroys touch, which is the essential mark of life; for it has been shown that without touch it is impossible for an animal to be. That is why excess in intensity of tangible qualities destroys not merely the organ, but the animal itself, because this is the only sense which it must have.

All the other senses are necessary to animals, [20] as we have said,² not for their being, but for their well-being. Such, e.g. is sight, which, since it lives in air or water, or generally in what is pellucid, it must have in order to see, and taste because of what is pleasant or painful to it, in order that it may perceive these qualities in its nutriment and so may desire to be set in motion, and hearing that it may have [25] communication made to it, and a tongue that it may communicate with its fellows.

² 434^b 24.

SHORT PHYSICAL TREATISES