ARISTOTLE

DE

SENSU

AND

DE

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ARISTOTLE
DE SENSI AND DE MEMORIA

TEXT AND TRANSLATION
WITH INTRODUCTION AND COMMENTARY

BY

G. R. T. ROSS, D.PHIL. (Edin.)

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PREFACE.

In the following pages I have attempted to give an adequate translation of the first two tractates belonging to the Parva Naturalia and I have appended a commentary which, I hope, will elucidate the many difficulties occurring in the interpretation of the text.

As regards the text I have been fortunate in having to my hand the admirable edition prepared for the Teubner series by the late W. Biehl. Before its appearance many of the difficulties seemed absolutely hopeless, but now there are but few passages where emendation seems to be desirable or, at least, where any alteration that can come nearer to the ipsissima verba of Aristotle may be successfully devised.

As my interest in preparing this edition was not mainly textual, I have refrained from discussing variant readings at great length unless they were of importance in determining the actual doctrine of the treatise. My purpose was to give a rendering of the Greek which should be accurate and should meet the needs of students of philosophy who, not being expressly classical scholars, have hitherto had no adequate means of becoming acquainted with these two important works. I have not prepared an apparatus criticus, but simply reproduce Biehl's text, indicating at the foot of the page little else than the alterations I have made. For
full information as to the ms. sources of our text I refer to Biehl’s introduction. Suffice it to say that the mss. fall into two main classes, L S U and E M Y; the former, though often agreeing with the excerpts found in Alexander’s commentary and drawn from a source of high antiquity, yet seem to be specimens of an ‘improved’ version in which the crabbedness of the original text has been smoothed down, though often with a loss of the significance which a more thorough-going interpretation might have found in the concise and often awkward phrasing of the authentic statements. The E M Y group (of which Paris E—10th century—is the most important), though full of misspellings and inaccuracies, seem to have suffered less from editorial tampering, and thus apparently give us hints as to the genuine reading; they are often supported by the ancient Latin translation of William de Moerbeka used by Thomas Aquinas. Unfortunately the commentators generally have followed the mss. of the former group, especially Vatican L (14th century), and often expend great pains on explaining passages where their version is hopeless.

In my commentary I have tried not only to give such explanations of ordinary words and expressions as a student not yet versed in the Aristotelian philosophy will find useful, but to contribute an adequate elucidation of the undoubted difficulties which continually arise. In dealing with these I have derived much assistance from M. Rodier’s monumental edition of the De Anima. Many of the ἀπορίαι in the De Sensu arise also in connection with the larger psychological treatise and, as a result of M. Rodier’s labours, the path is now much clearer than formerly. Mr Beare’s work on Greek Theories of Elementary Cognition came to hand just after I had finished the correction of the proofs of the present volume. Though I notice some points in which we
are not in agreement, I see many more in which I should have been able to profit by his great learning if the result of his researches had been accessible at an earlier date.

It should be stated that the present work originally formed a thesis, for which the University of Edinburgh awarded me, in April, 1904, the degree of Doctor of Philosophy. Since that date it has been revised and slightly enlarged.

It remains for me to thank the Syndics of the Cambridge University Press for undertaking the publication of this volume, and to express my gratitude also to the Press Reader and Staff for their valuable assistance. I am much indebted also to Mr J. A. Smith, of Balliol College, Oxford, for many important criticisms and suggestions. Above all my thanks are due to Mr W. D. Ross, of Oriel College, Oxford, who has read the whole work both in proof and in manuscript and whose counsels and criticisms have guided me at every turn.

G. R. T. ROSS.

May, 1906.

NOTE. I should like to point out to readers that though I have used Bekker's paging for purposes of reference, it has been found necessary to take a larger number of lines than he requires for the printing of each of his columns. Hence there is a tendency towards a discrepancy (which increases as we approach the foot of the Bekker page) between the number of the line in which a word or passage stands in this edition and its line-number in Bekker's text.

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INTRODUCTION

SECTION I. THE PARVA NATURALIA.

The two treatises styled briefly the De Sensu and the De Memoria form the initial members of that collection of tractates on separate psychological topics known to the Latin commentators as the Parva Naturalia. The full list of these 'opuscles' is not found in De Sensu, ch. 1, but practically the whole of the topics to be discussed are there set forth. They are essays on psychological subjects of very various classes, and there is so much detail in the treatment that, if incorporated in the De Anima, they would have detracted considerably from the unity of the plan of that work. Consequent on the separateness of the subjects in the Parva Naturalia, the method of treatment is much more inductive than in the De Anima. There, on the whole, the author is working outwards from the general definition of soul to the various types and determinations of psychic existence, while here, not being hampered by a general plan which compels him to move continually from the universal to the particular, he takes up the different types of animate activity with an independence and objectivity which was impossible in his central work.

Some plan, of course, there must be in any coherent scientific exposition, and Aristotle seems to proceed from a discussion of those activities which are ἰδιαί to animals, i.e. belong to animals quâ animate, to those which are κοιναί, viz. affections which, though found in animals, are not
uniquely a feature of animate existence; to the former category belong sensation and memory etc., to the latter evidently such phenomena as νεότης καὶ γῆρας, ζωὴ καὶ θάνατος. I have selected the first two treatises of the former class, on Sense and on Memory, for translation and comment. They have perhaps more importance for general psychological doctrine than any of the others, and in them certain metaphysical problems of unusual interest are raised.

SECTION II. THE DE SENSU.

The περὶ αἰσθήσεως καὶ αἰσθητῶν—Sense and its Objects, is not merely a treatise on the subjects referred to in the title but takes in also an account of the organs of sensation, not an account of each organ in detail but of the general character and ultimate constituents of the sensitive members. This occurs in chapter 2, and thereafter the objects of the special senses are discussed not merely as relative to sense but in their own proper nature as modifications of external reality. It is this which distinguishes the account of sense given here from that in the De Anima; there the objective physical nature of that which stimulates the sense organ is only glanced at. The treatment of taste and odour is particularly minute, and here we get involved in the details of the Aristotelian physics which now-a-days seems so crude and remote from our habits of thought. In fact, in the whole of this treatise we seem to be immersed in detail, and there is less of the wide generalisation and speculative insight which characterise Aristotle's chief psychological work.

In the treatment of the special sense objects there are notable omissions. Not a word is said about touch, while the physical process involved in hearing has little more than a reference made to it. In chapters 6 and 7 Aristotle goes on to discuss certain problems which have arisen in the course of the

1 In ch. 6, 445 b 3 sqq.
discussion, problems lying at the root of all perceptive process. First, do the objects of perception have any part too minute to be perceived? Are there any imperceptible magnitudes? The answer is no; but this is not stated without an important reservation. Considered separately the minute parts of an object are only potentially perceptible, though taken in conjunction with the other parts that go to make up the total object, they do make an impression on the sense and hence are actually perceptible. The simple converse of this proposition is proved at the end of chapter 7. Every sensible object has magnitude; whatever has magnitude has parts and there is no atomic object of sensation. If you suppose an object to be so far removed as, while yet remaining visible, to be perfectly indivisible to the eye, it must occupy a mere point in space; any further removal from us would render it invisible, while any nearer approach would give it magnitude. It then occupies a point where the distance at which it is invisible and that at which it is visible meet; but, since a point is an absolute numerical identity and is without parts, the object occupying this point must be simultaneously visible and invisible—an absurd conclusion.

In the second part of chapter 6 Aristote raises points about the process involved in the stimulation of sense by a distant object, deciding that in the case of sight it is instantaneous. In chapter 7, he inquires about the principle of coordination in sense perception. He decides that, except in the case of sensations which fuse, we cannot account for the simultaneous perception of two objects unless we assume that there is some unitary principle over and above the special senses which, though numerically a unit like a point, yet has a double aspect, like the point, which may be regarded as the terminus of each of the two lines which it separates; or again the unity of the central sensitive principle may be regarded on the analogy of that of the self-identical object which yet may have diverse attributes. This central sense is λόγος or

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1 446 a 22 sqq.
\( \tau \dot{\omega} \) \( \varepsilon \nu \alpha \iota \nu \alpha \iota \) plural, though it is \( \varepsilon \nu \ \dot{\alpha} \rho \iota \mu \iota \). Its organ is localised in the heart, and to it other functions as well as those of coordination are ascribed\(^1\).

**SECTION III. THE DE MEMORIA.**

The full title of this treatise is \( \pi \rho \iota \ \mu \nu \eta \mu \eta \ \kappa \alpha \lambda \ \dot{\alpha} \nu \alpha \mu \nu \eta \iota \varepsilon \iota \varepsilon \iota \) (Memory and Recollection), and the two subjects occupy respectively the first and second of the two chapters which the book contains.

Memory (\( \mu \nu \eta \mu \eta \)) depends upon the retention of a sense stimulation after the object producing it has ceased to affect us. The stimulus appears to persist in the heart and is then known as an image (\( \phi \alpha \nu \tau \alpha \sigma \mu \alpha \)). Memory consists in regarding this \( \phi \alpha \nu \tau \alpha \sigma \mu \alpha \) as the image of the absent object and not merely as an object of consciousness that does not refer to a reality other than itself. The condition to be fulfilled, if the image of an object is to be regarded as objective, is the union with it of the image representing the time which has elapsed since the experience took place\(^2\).

Memory may occur either through the persistence of the original sense stimulation or through its reinstatement by another process which has been originally experienced in connection with it. This latter process of reinstatement it is which Aristotle distinguishes by the term \( \dot{\alpha} \nu \alpha \mu \eta \iota \sigma \iota \). In its most typical meaning it is the purposive revival of a previous experience by a process of active search among the contents of mind, but apparently involuntary recollection is also grouped along with the voluntary\(^3\). In describing the process Aristotle formulates definitely for the first time the three well-known laws of the Association of Ideas, the laws of Similarity, Contiguity, and Contrast. With some subsidiary discussions, e.g. that which shows the dependence of

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1. De Mem. and Section IX. below.
2. De Mem. ch. 2, 452 b 26 sqq.
INTRODUCTION

memory and recollection on bodily processes, the treatise on memory closes. On the whole this treatise is on a higher level and contains more suggestive thoughts than the previous one.

SECTION IV. ARISTOTLE'S PHYSIOLOGY.

In order to understand the relation in Aristotle of the Physiology to the Psychology of sense and memory we must go back to the De Anima and seek the sources of our discussion there. The common terms for the phenomena belonging to both faculties alike are πάθος—modification, and κίνησις—change or process. But the question is, of what are they the changes or modifications? They are πάθη of the soul, but all the πάθη (with the exception of νοῦς) are common to soul and body alike (De An. I. ch. 1) and are as much affections of the body as of the soul. The true φυσικός—scientist—who studies the phenomena of life must not leave out of account the material embodiment of the psychic processes. Sight is, as it were, the soul of the eye but it cannot be studied apart from the eye; and this holds good of all psychical phenomena generally. At the same time Aristotle does not lose sight of the superiority of the mental aspect of the facts. The soul generally is an ἐνέργεια or ἐντελέχεια; that is to say, in manifesting soul the body realises its proper end and fulfils its proper function. ἐντελέχεια means perfection and properly (like ἐνέργεια) refers to something mental. Aristotle illustrates the relation of soul to body, by that existing between a manufactured article (an axe) and the idea realised in it. Here once more the ἐνέργεια or εἴδος is something mental (though of course the cases are different, as the εἴδος of an axe is not an immanent motive principle regulating the existence of the thing through a series of changes, as the soul of a man maintains his bodily life). Similarly an act of perception which is a πάθος—a passive affection, in so far as it involves

1 De An. II. ch. 1, 413 a 7.
a bodily affection, is, as an act of mind, an ἐνέργεια and not a mere πάθος or κίνησις. Just as in the act of perception or knowledge the passive bodily determination serves as the instrument for the realisation of a mental act; so in the passive alteration which must be experienced in building up a state of knowledge there is involved a transition which is not ἀλλοκωσία—qualitative change, in the usual acceptation, but is the realisation of a determinate state of mind the existence of which alone makes the processes of transition intelligible. We may generalise then and say that only in so far as they are bodily affections are mental phenomena processes or passive modifications; mind as such is ἀπαθής; in thinking we are not passively affected.

This is especially true of the highest faculty of consciousness, νοῦς or νόησις, the apprehension of concepts, but the question need not be raised here whether in the human soul this impassivity or pure spontaneity of thought is anything that has a separate existence. Aristotle’s answer in his special discussion of the subject in De An. III. ch. 5, leaves no room for doubt that in his view it is not so. The human νοῦς is παθητικός, i.e. it is merely the cognitive aspect of a process ultimately material.

Thus Aristotle’s theory of the relation of mind and body may in a way be designated as a doctrine of psychophysical parallelism. But this should not blind us to the fact that with him the mental aspect of the process is no epiphenomenon. Mind occupies the higher place in the scale. It is the important member of the pair of correlatives, is the end for which the bodily changes exist and has all the dignity implied in the epithets ἐνέργεια, εἶδος and ἐντελέχεια. Having made this reservation we may be quite untroubled at finding in his account of sensation and memory what looks like the crudest materialism. Objects exist in the physical world external to and in relation with an organism; they, whether when in contact with it, or at a distance, act upon this.

1 De An. II. ch. 5 passim.
2 Cf. De An. II. ch. 5, 417 b 8; cf. also 1. ch. 3, 407 a 32.
organism and produce changes, whether mechanical (mere \( \phi ρά \)), or qualitative (\( αλλόωσις \)), in certain of its members. The reception of these changes in the sense organ is perception. But why should the mere production of a process in a bodily part be an apprehension of the object which causes it? We must remember what Aristotle says about sense being \( δεκτική \) \( τού \) \( εἰδούς \), and what he affirms about the sense holds equally of the sense organ. In fact, he frequently talks of a sense and its organ without discrimination of the two\(^1\). Evidently then what gets inside the organ must be the \( εἰδος \) of the external object. If we think of the \( εἰδος \) or knowable character of the object as existing independently in the external world, then the \( εἰδος \) which is present in the sensorium cannot be numerically the same; it will be only specifically identical with it or analogous to it. With regard to the subjective processes persistent in the central sensorium and representative of absent objects this seems to be the view held\(^2\). Again with sense a similar position seems at times to be taken up. The eye is transparent and receives the light which exists in the external medium\(^3\), and similarly the movement of the air which sound is, is something \( αλλότριος \), and merely sets in activity a corresponding movement in the air of the internal ear. But from another point of view it seems erroneous to talk of the \( εἰδος \) in the object and that in the organ as being numerically different. You may not talk of the same concept when realised in two distinct individuals as being numerically different; it is rather the individuals that are numerically distinct, while in concept, \( i.e. \) specifically, they are one. Thus it is in \( εἰδος \) that the object and the organ are one. The \( εἰδος \) of the object is its \( ενέργεια \). Hence the \( ενέργεια \) of the object and that of the sense organ are one; it is only in respect of particular existence (\( τῶ \) \( εἶναι \)) that they can be regarded as distinct\(^5\).

\(^1\) De Sens. ch. 2, 438 a 13 note; cf. De An. III. ch. 2.
\(^2\) De Mem. ch. 2, 452 b 16 note.
\(^3\) De Sens. ch. 2, 438 b 11.
\(^4\) De An. II. ch. 8, 420 a 17.
\(^5\) Cf. De An. III. ch. 2, 426 a 15 and 425 b 27.
A grave difficulty\(^1\) arises here; the object as it is for knowledge will, on this showing, only exist in the act of perception; it will have merely potential existence before this. Such is the view taken in *De An.* III. ch. 2, and *Metaph.* IV. ch. 5, 1010 b 30 sqq.; but there Aristotle is quite sure that though the sense object as such only exists in perception yet its \(\upsilon\)ποκει\(\mu\)ε\(\nu\)ον (substrate) exists independently. There is, however, no way of characterising this substrate if all the qualities given in sensation are abstracted from it, and yet it is clear that, when Aristotle talks of the \(\upsilon\)ποκει\(\mu\)ε\(\nu\)α of sense objects, he cannot mean the mere undifferentiated \(\pi\)ρ\(\omega\)τ\(\tau\)\(\iota\) \(\upsilon\)\(\lambda\)\(\eta\). He cannot, on the other hand, mean by them objects with geometrical and kinetic qualities only, the subterfuge by which atomistic physics avoids the difficulty of the independence of the external object; Aristotle did not believe in atoms. Accordingly we continually find expressions which imply that the \(\epsilon\)\(\nu\)\(\epsilon\)ρ\(\gamma\)ε\(\iota\)α or \(\epsilon\)\(\nu\)τ\(\epsilon\)λ\(\epsilon\)χ\(\epsilon\)\(\iota\)α already exists as realised in some way in the external object\(^2\). In truth, the fact that the external object is the agent in perception and transmits its character to the sense, shows that it must already possess that character\(^3\). It is from this point of view that Aristotle discusses the physiology of the sense organs.

It is obvious that, if the sensoria are to be capable of receiving the same \(\epsilon\)\(\iota\)\(\delta\)\(\omicron\)ος as that existing in the external object, they must consist of the same \(\upsilon\)\(\lambda\)\(\eta\); if, on the other hand, the subjective affection were merely an \(\alpha\)\(\nu\)\(\alpha\)λ\(\alpha\)\(\omicron\)\(\omicron\)\(\omicron\) of the external as is suggested in *De Mem.* ch. 2, 452 b 17 it would hardly be necessary for the \(\upsilon\)\(\lambda\)\(\eta\) to be identical. The latter, of course, is the modern conception. Molecular disturbances in the brain correspond one by one to different transferences of energy in the external world; every event in the universe can have an appropriate and more or less adequate symbolisation in the human brain. But one would

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\(^1\) Cf. below, Sec. x. of Introduction, for a further discussion of the objectivity of objects of sense.

\(^2\) e.g. *De An.* II. ch. 5, 418 a 3.

\(^3\) This is implied in *De An.* loc. cit. 417 a 6 sqq.
hardly say that the formula of the neural process (if it could be found) was the same as that which expressed the production of a red light or the flight of a projectile, nor would the oscillation of particles in the brain be in the least like those external phenomena. Aristotle, on the other hand, tried to think of the subjective κίνησις as occurring in pari materia with the external event, and probably where he refers to the subjective εἴδος as an ἀνάλογον of the external he does so because he is thinking of the processes in the central organ involved in memory; the heart, probably to be identified as the organ of memory, is not of the same character as the external transparent medium; but the eye, the organ of the special sense of sight, is.  

Section V. Physiology of the Special Senses.

The qualitative identity of the organ with the vehicle or medium in which the objective sensuous quality is generated is most conspicuous in the case of sight and hearing. The συμφυής ἀὴρ of the ear² and the transparent pupil accept, in the one case the impulsive movement set up in the external air, in the second the light which is the basal principle of all specific modifications of colour. The primary constituent of the visible εἴδος of things is light. Light is the activity of a transparent element which penetrates all bodies in differing degrees and, at the extremity of solid bodies, shows as colour. This colour is either positive or negative, black or white, and all other colours are mixtures of those two elements in different proportions³. The visible form of a thing is therefore the determinate mixture of these two constituents and, when we see, this (by a propagative process said to be not a transition in time⁴) gets, as it were, stamped upon the sense-organ⁵. We hear that it is the

1 De Sens. ch. 2, 438 b 7 sqq.
2 De Sens. ch. 2, 438 b 21; De An. ii. ch. 8, 420 a 3.
3 De Sens. ch. 3, 439 b 19 sqq. ⁴ Cf. De Sens. ch. 6, 446 b 31.
5 De An. iii. ch. 12, sub fin., and De Mem. ch. 1, 450 a 33; also De An. ii. ch. 12, 424 a 19.
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colour which stimulates the medium\(^1\) and consequently the sense, and one would thus suspect that the colour was something different from the process which it produces. But that can hardly be so; the colour or modification of light must be the visible form of the object, and it is that or something qualitatively identical with it which enters the eye. The process of transition in the medium which results in the establishment of vision, or indeed of any of the mediated acts of sense perception, seems to be conceived as consisting in a pushing forward of this sensuous character until it actually gets embedded in the percipient organ. In the case of hearing this process is mere \(\phi θ\)ρα—change in place, whereas in smell it is a continuous qualitative change—\(\alphaλλοιωσις\), and in sight something still higher, something not a transition at all in the sense of occupying time\(^2\). There must be, however, some object which originates the process, which itself does not move. This is, we must suppose, the \(\upsilon\tau\omega\varepsilon\mu\varepsilon\nu\varepsilon\) of the sensuous character. It is, however, Aristotle’s practice to allude both to the object which causes sensation and to its sensuous character, the sound or colour, by the single word \(το\ \alphaισθητόν\).

It had been the ambition of the earlier psychologists to identify each sense organ with one of the four elements. On the theory that like is perceived by like each organ will perceive the qualities of that element with which its nature is identical. Aristotle shows that, prior to perception, the organ must be unlike the quality perceived. The sense organs are not all composed of a single element. As we have seen two are (the eye and the ear); but the organ of smell consists of both air and water, or perhaps one element in some animals, the other in others, while \(π\theta\rho\), if present anywhere, enters into all and \(γ\gamma\) into that of touch\(^3\). But we do not by any organ perceive the qualities actually possessed by the substance composing it. The qualities possessed by any of the elements are tactual, while those apprehended by the

\(^1\) De An. ii. ch. 7, 418 a 31.

\(^2\) Cf. De Sens. ch. 6, 446 b 30 and also De An. iii. ch. 12, 434 b 30 sqq.

\(^3\) Here I follow the account in De An. iii. ch. 1, 425 a 3 sqq.
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senses of sight, hearing, and smell are not tactual. The organ fulfils its function in being the vehicle or neutral receptacle of qualities existing in a vehicle of the same nature outside it. In being neutral in this way the organ will be capable of receiving the opposite determinations which characterise the contents of each sense. In the case of the qualities apprehended by touch, the organs, being composed of the various elements, must show a μεσότης of the various tactual qualities; this must mean a combination in equal proportions of those qualities in order that something neutral and capable of registering the variations on this side and that of the mean point may be formed. This organ would naturally be the flesh, which is a composite formed from all the elements, and we should expect that its λόγος τῆς μίξεως was the μεσότης in question, but though at times this is his doctrine, in the De Anima Aristotle apparently will not have it so, probably, however, meaning only that the external surface of the body is not the sensorium but rather the medium which communicates tactual impressions, the real organ or ἐσχάτον αἰσθητήριον being the heart. This, however, is after all a fleshly organ, and in fact, on the analogy of the senses of sight and hearing, the medium must be of the same nature as the receptive organ, for it has to be capable of transmitting the stimulus which ultimately reaches the organ and so causes perception. Evidently he conceives of the exterior flesh of the body transmitting the tactual properties of things, heat, cold, hardness, softness, etc., by a progressive qualitative alteration like the propagation of odour in the air, or, in a way, of light in the transparent medium. Since in this case the organ and the medium alike are bodily members and they receive and transmit the differentiae of other elements than earth, they cannot consist of one element alone; they cannot be the hard

1 For confirmation of this view cf. De Part. Animal. ii. ch. 8, 653 b 24. Talking of the flesh he says: ταύτης (ἀφής) δ’ αἰσθητήριον τὸ τοιοῦτον μόριον ἐστιν, ἀπὸ τὸ πρῶτον ὥσπερ ἡ κόρη τῆς ὀξύως, ἡ τοῦ δὲ οὐ συνειλημένον, ὥσπερ ἂν εἶ τὴν προσλάβοι τῇ κόρῃ τὸ διαφαινέσ πῶς. The flesh functions both as organ and as medium, cf. Bäumker, Des Aristoteles Lehre von den Aussern und Innern Sinnesvermögen, pp. 55, 56.
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parts of the body, e.g. bone, etc., which must be referred to earth\(^1\), and hence there is nothing left for them to be but the flesh.

The eye consists of water; though air would have served, being also transparent, yet water is more easily retained in position\(^2\). The material out of which it is constructed is derived from the brain, which Aristotle describes as an organ with an excess of moisture\(^3\). The material of the organ of hearing is simply a \(\sigma\upsilon\mu\phi\nu\varsigma\ \varepsilon\alpha\iota\rho\). The ultimate organ of touch seems, as we have seen, to be the heart, and consists of flesh, a compound of all the elements. Yet, though not consisting of \(\gamma\eta\) alone, the flesh, as something \(\sigma\omega\mu\alpha\tau\delta\delta\varepsilon\varsigma\), i.e. solid, seems to contain a preponderance of \(\gamma\eta\), that element which is most characteristically a \(\sigma\omega\mu\alpha\).\(^4\) This fact may lend some countenance to a statement made at the end of the second chapter of the De Sensu\(^5\), according to which the organ of touch consists of earth. This assertion as it stands without qualification is in flat contradiction with the teaching in the De Anima, and it is noteworthy that it occurs in a passage where Aristotle is not stating his own final opinions, but is discussing in a tentative way some possible working interpretation of the theory which assigns a special element to each organ\(^6\). Aristotle there tries to combine with it his own theory that the organ is, before perception, only potentially of the nature of the determination which it perceives. But this will conflict with the doctrine that the organ of touch actually consists of \(\gamma\eta\); for, in order to perceive the qualities of \(\gamma\eta\), it will need to be only potentially of that nature, and is, in fact, Aristotle says, warm, being connected with the heart, the seat of the animal heat, and \(qu\acute{a}\) hot it must have the character opposite to \(\gamma\eta\) (which is cold).

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2 De Sens. ch. 2, 438 a 15.
3 De Sens. ch. 2, 438 b 30, and De Gener. Animal. II. ch. 6, 744 a 5 sqq.
4 Cf. De Part. Animal. II. ch. 1, 647 a 19 sqq. and ch. 8, 653 b 29, and cf. also notes to De Sens. ch. 5, 445 a 20 sqq.
5 438 b 32.
Similarly the organ of smell will be only potentially warm, if the nature of odour lies in heat. This will accord with a derivation of the sensorium of smell, like that of vision, from the watery substance of the brain. But, though heat is required for the diffusion of the odorous principle, it is not that principle, and consequently the theory breaks down once more. His own doctrine, as we have seen, is that the organ consists both of air and of water or of either one or the other.

The organ of taste is the tongue, though, as in the sense of touch, there is a reference back to a still more primary organ—the heart. Aristotle regards taste as a subvariety of touch, evidently on the ground both that contact with the object is necessary in each alike and that taste discriminates in an indirect way the tactual properties of things which go to make up their nature as the possible constituents of nutriment. A certain independence, however, is allowed to the tongue, and, since tastes only exist in humid matter, the tongue must have a neutral humidity,—once more the doctrine that the sense organ shows a μεσότης of opposite determinations. In this case, however, the parallel to the other senses cannot be consistently worked out. The opposite determinations in taste are not excess and deficiency of ύπότης but rather τὸ γλυκό and its negative τὸ πικρόν, which are ultimately reduced to τὸ κούφον and τὸ βαρύ respectively. Again, in the passage from De An. II. ch. 10 referred to above, Aristotle confuses two distinct conceptions; if the tongue is only potentially humid, as he says, it cannot be described as of a neutral humidity.

The above inconsistencies only show the enormous difficulty in giving any coherent account of the process of sense stimulation in terms of the ancient physics. They in no way detract from the value of the central principle involved—that the organ is of a nature capable of manifesting in itself the contrary determinations which characterise the objective qualities falling under any one specific sense; that apart

1 Cf. De Part. Animal. II. ch. 10, 656 a 29 and De Sens. ch. 2, loc. cit.
2 De Sens. ch. 4 passim.
3 De An. II. ch. 10, 422 a 34 sqq.
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from stimulation by an object the organ is perfectly neutral as regards these determinations, and hence may in certain cases (touch\(^1\) at any rate) be regarded as a \(\mu\varepsilon\sigma\omicron\ \upsilon\tau\eta\varsigma\), for the mean is neutral as regards opposite determinations and hence is \(\kappa\rho\iota\tau\iota\kappa\varsigma\omicron\nu\).\(^2\)

SECTION VI. THE PHYSIOLOGY OF THE SO-CALLED COMMON SENSE.

In addition to the special senses there is an unifying or central function of sense by means of which we perceive the \(\kappa\omega\nu\alpha\ \alpha\iota\sigma\theta\nu\tau\alpha\), \(i.e\). the determinations of number, unity, figure, magnitude, and change involved in the apprehension of the special sensations of colour, sound, hardness, etc. Figure and magnitude are perceived at least by two senses, viz. sight and touch\(^2\), and unity seems to be an idea involved in the functioning of each single sense alike\(^3\). Again, the comparison and discrimination of qualities belonging to different senses require a unifying principle in some way over and above the particular sense organs\(^4\). Indeed, the simultaneous discrimination of qualities given by the same sense seems to require the existence of such a principle\(^5\). Lastly, to this also is to be ascribed the self-consciousness that accompanies all perception, \(e.g\). the perception that we see, hear, and feel, etc.\(^6\)

This central function of sense\(^7\) is localised in an internal

\(^1\) The explicit references are only to touch (De An. II. ch. 11, 424 a 4, III. ch. 13, 435 a 21, Meteor. IV. ch. 4, 382 a 19) and the discrimination of pleasure and pain (De An. III. ch. 7, 431 a 11).

\(^2\) Cf. De Sens. ch. 4, 442 b 8.

\(^3\) Cf. De An. III. ch. 1, 425 a 20 and De Sens. ch. 7, 447 b 27. It is specific unity which is perceived by the functioning of a single sense.

\(^4\) De An. III. ch. 2, 426 b 12 sqq.

\(^5\) Cf. De An. loc. cit. infra and III. ch. 7, 431 a 17 sqq.; also De Sens. ch. 7, 449 a 1 sqq. and notes.

\(^6\) Cf. De Somno, ch. 2, 455 a 15 sqq.; De An. III. ch. 2, 455 b 12 sqq.

\(^7\) It is well to note that the mere fact of talking about ‘the common sense’ or ‘the central sense’ may give a wrong impression of the way in which Aristotle conceived this faculty to exist. Aristotle, in fact, does not talk except in one instance (De Mem. ch. 1, 450 a 12) of \(\kappa\omega\nu\alpha\ \alpha\iota\sigma\theta\nu\tau\alpha\) but usually of \(\tau\alpha\ \kappa\omega\nu\alpha\)
organ, and that is universally admitted to be the heart. But great difficulties arise when we attempt to determine whether it is the heart as a whole which is the organ, or only some part of or constituent in it. Great uncertainty also surrounds the question as to how the central and the peripheral organs are connected, and similarly what is the exact relation between the inner faculty and the special senses. As to the physiology of the central organ there is but little said in the two treatises which we are discussing (the passages, De Mem. ch. 1, 450 b, and ch. 2, 453 a 16, do not help us much), while as to the connection between central and end organ there is not a word. Accordingly a full discussion of this subject belongs rather to a treatise dealing with the De Somno, De Insomniis, and De Juvent., De Resp., etc. At present it will be sufficient to examine the main contentions of Neuhäuser as to the subject in question in so far as they derive confirmation or the reverse from passages in our text.

Neuhäuser maintains (1) that, though many passages would lead us to believe that the perception of the special sense qualities is localised in the end organs, this is not really so. The stimulation communicated from the external objects or the medium to the end organ is continued right up to the heart. Perception does not result unless the heart is in a

\[\textit{a}ι\alpha\theta\eta\gamma\alpha\ \text{and} \ \tauο\ \kου\nuο\ \alphaι\alpha\theta\eta\gamma\eta\rhoι\nuον.}\]  
It is not a sense functioning in independence of the special senses, as any one of these may function in independence of the others; as such it would require to have a special organ independent of the other sense-organs—a doctrine against which he argues in De An. III. ch. 1, 425 a 13-21. The common sense is, in fact, that common function which all the special senses possess, namely that of discrimination, which, as common to all, is contrasted with the special receptivity which each has for the separate kinds of objective quality, e.g. sound, colour, etc. It is this function of discrimination which requires the coordination of the stimuli received by the special sense organs in a central or common sensorium. Perhaps then, in strictness, we should talk not about a common sense but about the common discriminative function of sense. Cf. section X. below and Neuhäuser, Aristoteles Lehre von den sinnlichen Erkenntnisvermögen, pp. 30 sqq.

1 Cf. De Juvent. ch. 3, 469 a 10, ch. 4, 469 b 3. De Gener. Animal. 11. ch. 6, 743 b 25, De Part. Animal. 11. ch. 10, 656 b 24 etc.
2 Aristoteles Lehre von den sinnlichen Erkenntissvermögen und seinen Organen, pp. 30-132.
3 Cf. Bäumker, pp. 79, 80.
condition in which it can function\(^1\), hence it is the presence of the \(\kappa\iota\nu\acute{\eta}\sigma\epsilon\iota\) in the central organ that constitutes perception. Secondly (2), the medium of communication between the peripheral and central organs consists of \(\pi\omicron\rho\omicron\omicron\iota\)—canals (in the case of the three senses of sight, hearing, and smell), which are filled with a substance identical with that which composes the end organs themselves\(^2\). This he extracts from statements\(^3\) (\(a\)) that these organs are in connection with the heart, (\(b\)) that \(\pi\omicron\rho\omicron\omicron\iota\) from them extend into the veins of the brain, (\(c\)) that the organs of hearing and smell are themselves really \(\pi\omicron\rho\omicron\omicron\iota\) full of air\(^4\) (\(\sigma\omicron\u'\mu\phi\upsilon\upsilon\omicron\tau\omicron\upsilon\nu\omicron\pi\omicron\nu\epsilon\omicron\alpha\mu\alpha\))\(^5\), and (\(d\)) that in the case of the eye its substance has issued through the \(\pi\omicron\rho\omicron\omicron\iota\) from the brain\(^6\); finally (\(e\)), it is neither the blood nor any bloodless part which is the organ of sensation, but a structure created out of the blood. Thirdly (3), the central organ of sensation is not the heart itself, but a substance found in its middle chamber and designated by Aristotle\(^6\) \(\tau\omicron\delta\ \kappa\alpha\lambda\omicron\upsilon\omicron\mu\epsilon\nu\omicron\nu\omicron\ \theta\epsilon\epsilon\mu\omicron\upsilon\omicron\) and also \(\pi\nu\epsilon\omicron\alpha\mu\). We hear as well that this substance is analogous to the element found in the stars (\(\acute{\alpha}n\omicron\upsilon\lambda\omicron\lambda\omicron\omicron\omicron\upsilon\omicron\nu\sigma\pi\omicron\tau\omicron\upsilon\omicron\iota\nu\omicron\nu\omicron\ \tau\omicron\omicron\ \tau\omicron\upsilon\nu\omicron\ \acute{\alpha}\omicron\upsilon\acute{\tau}\omicron\rho\omicron\omicron\upsilon\omicron\acute{\sigma}\omicron\upsilon\iota\chi\epsilon\upsilon\omicron\nu\)\), yet it is not \(\pi\upaup\rho\upsilon\), though we generally identify \(\tau\omicron\delta\ \acute{\alpha}n\upsilon\omicron\ \sigma\omega\omicron\mu\alpha\)—the aether, with fire, and we hear elsewhere\(^7\) that the \(\psi\upsilon\upsilon\chi\omicron\nu\) is \(\acute{\omega}\sigma\sigma\rho\epsilon\nu\epsilon\mu\pi\upsilon\pi\rho\epsilon\upsilon\mu\epsilon\mu\epsilon\nu\omicron\nu\omicron\)—suffused with fire. The point is that this substance is different from the elements of the sublunary world and seems to serve as a basis or substratum for terrestrial conscious life, just as the upper aether serves as the substratum for the psychical existence of the heavenly bodies. It is frequently named \(\tau\omicron\delta\ \phi\upsilon\omicron\sigma\mu\upsilon\kappa\omicron\upsilon\nu\omicron\ \theta\epsilon\epsilon\mu\omicron\upsilon\omicron\nu\omicron\), \(\tau\omicron\delta\ \sigma\omicron\u'\mu\phi\upsilon\upsilon\omicron\tau\omicron\upsilon\nu\omicron\\theta\epsilon\epsilon\mu\omicron\upsilon\omicron\nu\omicron\), and is to be identified with \(\tau\omicron\delta\ \sigma\omicron\u'\mu\phi\upsilon\upsilon\omicron\tau\omicron\upsilon\nu\omicron\\pi\nu\epsilon\omicron\alpha\mu\), of which we hear so much in the \(\pi\epsilon\rho\iota\ \zeta\acute{\omicron}\phi\omicron\nu\ \kappa\iota\nu\acute{\eta}\sigma\epsilon\iota\)\(^8\).

Neuhäuser seems to show pretty conclusively\(^9\) that the

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1. *De Somno*, ch. 2, 455 a 33 and b 11.
7. *De Juventut.* ch. 4, 469 b 6–17; *De Resp.* ch. 8, 474 b 12, ch. 16, 478 a 29.
heart is properly characterised as the place in which the central organ or faculty of perception is situated, not as the organ itself (except surely in the case of the sense of touch\(^1\)); again, if the organ of consciousness is not the heart as a whole but only some constituent in it, the seat of this organ is probably the middle chamber\(^2\) of the heart.

Now these contentions may all be just, but the question arises whether this element or anything of the nature of a substance will serve as a counterpart of that principle of unity which, according to Aristotle, the common sense must be. This \( \sigmaυμφυτον \ \thetaερμον \) or \( \sigmaυμφυτον \ \piνευμα \) must be a substance and hence quantitative. Aristotle tells us that the primary organ of sensation or that which perceives must be a magnitude\(^3\). It is the sense or its concept which is non-quantitative. Now in the *De Anima*, III. ch. 2, 427 a 1 sqq., he likens the principle of unity to something for which the only analogue is a point, the point which, while remaining indivisibly one, has yet a double reference as the end of the two segments respectively of a line which it divides. This is also the doctrine to be extracted from *De An*. III. ch. 7, 431 a 19 sqq. and *De Sens*. ch. 7, 448 b 19—449 a 22\(^4\). In the latter passage he takes up the supposition that different qualities could be simultaneously discriminated by an organ which, while not atomic, was yet atomic in the sense of being completely continuous. Such a description would fit, if not the heart, that supposed internal substance of celestial affinities which it contains\(^5\). The hypothesis is negated, and Aristotle passes on to the conclusion of the *De Anima*—that that which accounts for the holding of different sensations in unity must be actually a perfect unity, though in aspect diverse. It is true that he also compares the unity of this psychic principle

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1 In the passage in *De Part. Animal*. II. ch. 1, 647 a 28, where he talks of a \( \muοριον \) (evidently the heart) being capable of receiving all sense-qualities he is probably referring to tactual \( \alphaισθητα \).

2 Neuhäuser, *op. cit.* p. 86.

3 *De An*. II. ch. 12, 424 a 17 sqq.

4 Cf. notes ch. 7, below *loc. cit.*

5 The heat in the heart is \( \kappaαθαρωτατη \); *De Gen. Animal*. II. ch. 6, 744 a 29.
to the unity of an object with diverse qualities\textsuperscript{1}. But, as we shall see, this involves no difference of theory; the ascription of two attributes to one spatial thing involves a reference to an identity which is itself not spatial.

Hence we come to the conclusion that Aristotle in accounting for ‘apperception’ has to make reference to a unity that cannot be described as a material organ. It is true that in consonance with his general psycho-physical parallelism he should be forced to try to think of it as an organ, but it has that characteristic which nothing corporeal can possess; it is \( åτομον τι \).\textsuperscript{2} Hence we cannot conceive both the soul and its immediate substrate (numerically the same as the central organ of sensation) as unity\textsuperscript{3}.

It is naturally just here that the parallelism of mind and body, \( αἰσθησις \) and \( αἰσθητήριον \), should break down. It is just in coordinating and distinguishing the contributions of the senses that the \( ἐνέργεια \) of a typical act of mind comes in. It is as referred to a unity that sensations are anything for mind. Now \( \varphiι \varepsilonνεργεία, \ i.e. \varphiι \varepsilonνεργεία \), mental, a psychical phenomenon is nothing passive and nothing to be ascribed to body. Mind in its proper nature is \( \alpha\piαθης \), and hence, if we were to ascribe the function of apperception of sensations to anything, it would need to be assigned to the \( νοῦς \), which is \( \alpha\piαθης \), and “comes in from outside\textsuperscript{4}.” The essence of my contention is, that it is impossible to ascribe to an organ that which, not being an instance of \( πάσχειν \)—passive alteration, it is the function of nothing corporeal to account for. Unless Aristotle were to maintain that the substrate of the soul, the \( σύμφυτον \ θερμόν \) or \( πνεύμα \), were not extended (which would be the same as making it immaterial) he could not attribute to it the unification of consciousness. As facts are, he says or implies in \textit{De An.}\ II. ch. 12 \textit{ad init.} that the organ is a \textit{μέγεθος}.

At the same time this psychical substance may very well

\textsuperscript{1} Both here and in \textit{De An.}

\textsuperscript{2} I note that Neuhäuser, p. 110, agrees with me in thinking that \( \tau\varphi \varepsilonνον \kappaα\varepsilonχάτω \), \textit{De Mem.}\ ch. 2, 451 a 28, refers to the organ of sensation.

\textsuperscript{3} Neuhäuser, p. 104.

\textsuperscript{4} \textit{De Gen. Animal.}\ II. ch. 3, 736 b 28 τὸν νοῦν \( μ\upsilonν \) \( \theta\varrhoαθεν \varepsilonπεισιέναι \).
be the organ which accounts for the *plurality* of impressions which are united in one act by the mind. It may be this which is the delicate structure capable of receiving and retaining the multitude of impressions which function in memory. In our treatise (the *De Memoria*) there is nothing which bears this out. We hear about processes in τὸ ἀισθητικὸν being interfered with by the too great pressure of the parts above them¹, and of defects of memory being due to excessive fluidity or hardness of the receptive structure². This last description would surely suit the heart as a whole better than the mysterious πνεῦμα which it contains. It really does not matter which was Aristotle’s theory; anything extended will suffice, so far as space goes, for the reception of a plurality.

On the subject of the connection between central and end organ there are, in our treatises, no materials to enable us to come to a decision. We hear³ of affections going on καὶ ἐν βίθει καὶ ἐπινολής, *i.e.* both in the central and the end organ, and we hear that it is the κίνησις going on in the eyes which causes us to have light sensations still when we turn aside out of the sun into the dark. Of course it may still be the case that perception does not occur until the κίνησις reach the heart, but it is not necessary to believe that the medium of communication was, according to Aristotle, qualitatively the same as that of the end organ, and that the process transmitted to the heart was hence qualitatively the same as that realised in the end organ⁴. An impression in the central organ is known as a φάντασμα⁵; the question is whether an ἀισθημα is, as Neuhäuser maintains, numerically the same as and only in aspect different from a φάντασμα. Without committing ourselves to an answer it might be profitable to point out that a possible solution is that,

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¹ *De Mem.* ch. 2, 453 b 1.  
² Ch. 1, 450 b 1 sqq.  
³ *De Insom.* ch. 2, 459 b 7.  
⁴ Neuhäuser thinks that in maintaining this doctrine Aristotle anticipated the discovery of the nerves (due to Herophilus) or at least invented an analogue to them.  
⁵ Cf. *De Mem.* ch. 1, 450 a 11.
though consciousness cannot arise unless the central organ be stimulated, the stimulation reaching it might be only analogous\(^1\) to and not identical with the modification of the peripheral organs.

**SECTION VII. THE OBJECTS OF SPECIAL SENSATION.**

\((a)\) Colour. The ground-work of all colour phenomena is τὸ διαφανὲς, which is a κοινὴ φύσις, a common characteristic, of two of the four elements, namely air and water. We translate τὸ διαφανὲς as the transparent *medium*, but though it functions as a medium between the coloured object and the eye, it is not merely as a medium that Aristotle considers it. It is most frequently referred to simply as τὸ διαφανὲς without the further qualification that it is a medium. It is properly a vehicle or ground-work for the manifestation of colour. It penetrates all bodies to a greater or less degree\(^2\) (doubtless Aristotle means all composite bodies, which contain air and water in some proportion), and it is in so far as they are thus permeated by it that they are capable of showing colour. The colour of a solid body is the limit, *i.e.* the surface, not of the body itself but of the διαφανὲς in it\(^3\). That is the colour seen, but the same nature extends right through the body. Similarly bodies that are not opaque but consist of a diaphanous substance altogether (αὐτῶν τῶν διαφανῶν)\(^4\) show colour\(^5\). But that colour is light. This brings us to the consideration that it is not merely the existence of the transparent vehicle that causes colour or light phenomena to arise. In itself it is a mere δύναμις; it must be raised to the state of ἐνέργεια by the presence of fire in it\(^6\). Hence light is the ‘colour’ of the diaphanous quality in bodies and is due to some other determining cause (κατὰ συμβεβηκὸς); it is not anything self-existent. It is equally defined as the ἐνέργεια or ἐντελε-χεία τοῦ διαφανοῦς.

\(^1\) Cf. note to *De Mem.* ch. 2, 452 b 16, 17.  
\(^2\) *De Sens.* ch. 3, 439 b 9.  
\(^3\) 439 b 34 sqq.  
\(^4\) 439 b 13.  
\(^5\) 439 b 1.  
\(^6\) 439 a 20 sqq.
The presence of fire causes the existence of actual light, the positive determination of the transparent medium, its absence that of darkness, the privation of light. These are the contrasted determinations for substances typically transparent: in definitely bounded (opaque) bodies, in which, it is implied, ὅ διαφανές does not exist in the same degree or purity, the contrasted determinations are black and white. Thus far there is no particular difficulty in the Aristotelian conception; light and colour are determinations ultimately identical, of the type ἐνέργεια, affecting a material or vehicle which, apart from these determinations, is neutral to them. Light is to be perceived as an all-pervasive character of transparent substances equally and instantaneously present in every part. But when we come to consider the action of a coloured object upon the eye, and remember that it is said to affect the vision by means of a κίνησις through the medium, it seems natural to consider this κίνησις to be light. When, in De Sensu, chapter 6, Aristotle talks of light proceeding from the sun through the medium to the eye, it is evidently thought of as the stimulation which causes sight. Similarly, when in the latter part of the same chapter he affirms that all parts of the medium are affected at the same time, e.g. that light travels instantaneously (and hence is not really a κίνησις), he seems to be still thinking of it as an activity exerted by the object on the eye (τὸ γὰρ φῶς ποιεῖ τὸ ὀρᾶν). Yet in other passages it seems to be rather the indispensable condition of the operation of a coloured object on the eye. The colour stimulates the transparent medium which already is in a condition of actuality, i.e. is illuminated; objects are seen ἐν φωτείᾳ. Again, in De Sensu, ch. 2, 438 b 4, light is referred to as possibly itself the medium. It is the κίνησις through the medium, whether that be light or air (in a state of illumination), that causes vision. Hence from this point of view light is not the activity exerted by the object on the sense organ but merely the condition of the exertion of this

1 De Sens. ch. 3, 439 b 17.  
2 Ch. 2, 438 b 5.  
3 Ch. 6, 446 a 30 sqq.  
4 446 b 30 sqq.  
5 447 a 10.  
6 De An. II. ch. 7, 419 a 7 sqq.
activity. When in chapter 6 Aristotle denies that light is a κίνησις (equally whether that κίνησις be of the type φορά—spatial transference, or ἀλλοίωσις—qualitative alteration) he is still thinking of it as an activity, and the substance of his contention is, that that ἐνέργεια, which was elsewhere treated as the indispensable condition of that activity, is itself the activity which accounts for vision. It is very difficult to get the two conceptions to blend. The transference of the ἐιδος of the object to the sense organ can only be thought of as a κίνησις, i.e. a process involving time. The activity as such is caused by the coloured object, whereas the ἐνέργεια is caused by the presence of the illuminating fire. Yet Aristotle, misled by the apparent instantaneousness of light, wished to conceive as not a κίνησις that which could only be a κίνησις and to raise it to the rank of an ἐνέργεια, i.e. something not physical at all.

The fundamental colour-tones are black and white, and Aristotle thinks to account for all other tints by the mixture of these two. He apparently wishes to make out that a mixture or rather chemical union of the substances which are black and white will give the chromatic tints. One might have thought that common observation would have refuted this, and it is true that he does not say exactly this but merely “when substances unite so do their colours.” True union of any two substances is one in which the original character of the component substances is lost and a third distinct qualitative character emerges as characterising every minutest part of the compound. To our modern chemical theory this holds true only if we stop our subdivision of the composite at the molecule. Any further analysis is supposed to give us parts which are not qualitatively identical, i.e. the molecule is supposed to split into atoms which have the qualities of the diverse component substances. But to Aristotle this was not so; the minutest conceivable subdivision of a true compound would still yield parts which were qualitatively identical with the whole. The compound

1 Cf. notes ch. 6 ad loc.  
2 Cf. De Sens. ch. 3, 440 b 15 sqq.
was ὀμοιομερές. Of such a sort was the mixture of black and white resulting in the chromatic tones supposed to be. Mere juxtaposition of the minute parts of differently coloured substances resulted only in the production of an indeterminate neutral tint which varied with the acuteness of our perception and our remoteness from the object. It is noteworthy that, if one were to define black and white in the modern way as the capacity of a surface to reflect none or all of the light cast upon it, one could still describe the chromatic tints as intermediate between these, as diverse aptitudes for reflecting one portion and absorbing the rest of the total light. But of course nothing like this is to be found in Aristotle. What is suggestive in his theory is his contention that the difference of the composite tones depends upon the different proportions of the ingredients entering into them. This is an attempt to assimilate the theory of colours to that of harmonies; the pleasantest colours are those in which the proportions are simplest. This idea, if erroneous, is interesting as showing his readiness to recognise that mathematical relations enter into the constitution of reality. These relations are arithmetical; from mere geometrical characteristics you cannot derive any new quality, but, given a pair of opposed fundamental sensuous attributes, you can by a proportionate combination of the two account for the intermediate qualities. The same theory is worked out also in connection with flavour.

1 Cf. notes to ch. 3, 440 a 34 sqq.
2 In *Metaph.* x. ch. 7, 1057 b 8 sqq. white and black are distinguished as τὸ διακριτικὸν χρώμα and τὸ συγκριτικὸν χρώμα, and one might suspect that this implied some theory that white was the active and black the passive element in colour mixture in conformity with the principle in *Meteorol.* iv. ch. 1, 378 b 22 τὸ γὰρ συγκριτικὸν ὀπερ ποιητικὸν τι ἵστιν. But from various passages in the *Topics*, e.g. iii. ch. 5, 119 a 30, iv. ch. 2, 123 a 2, we find that it is white which is τὸ διακριτικὸν χρώμα. It is also said to be διακριτικὸν ὑψως. I suppose the fact alluded to by this term is that it dissipates and exhausts the energy of the sense organ. If indeed the term is properly Aristotelian and not simply taken by way of illustration from some current popular theory, it is to be connected with the doctrine referred to in *De An.* iii. ch. 13, 435 b 13 and elsewhere, that excessive stimulation destroys the sense organ, and white being the purest and most characteristic colour will tend to this extreme.
(b) Sound is not treated at length in the De Sensu, and the theory of taste and smell involves to a still greater degree than that of light the crudities of the Aristotelian psychics. Not that we should speak with entire disrespect of the generalisation which assigned the constituents of all things to but four ultimate elements. The grouping of substances together according as they were dry, fluid, gaseous, or manifested warmth, implied something more than a mere universal of sense in each case. The distinctions reappear in modern science not as the designations of different primitive substances but as marking distinct states in which all matter can exist. At least τὸ ἕρων or γῆ, τὸ υγρὸν or ὕδωρ, and ὁ ἄρη correspond to the solid, the liquid, and the gaseous states, and in the celestial fire—τὸ ἀνω σῶμα—which though not identical with is yet analogous to πυρ, Aristotle in a way shadows forth the conception of the ether.

(c) Flavour is, according to the De Sensu, a qualitative\(^1\) affection of liquid by dry substance. This modification is effected by the agency of heat (heat is the cooperating cause—συναίτιον), and the process by which it is produced is a sort of solution of the dry in the liquid (πλυσίς, ἐναποπλύνεται\(^2\)). Knowing Aristotle's theory of the qualitative modification of one substance by another\(^3\), we shall, however, refuse to regard this as a diffusion of the particles of the solid in the liquid. It is no mechanical diffusion, but what we should call a chemical union of the dry with the moist; it is, in fact, a union more intimate than our chemical union is supposed to be. If it were not so, then really the particles of the solid would stimulate the sensation, and there would be some ground for the Democritean theory that it was the different shapes of these particles that produced the different flavours. This Aristotle entirely rejects\(^4\); though taste is a tactual sense, that does not mean that it is acted upon by the spatial and mechanical properties of the minute parts of bodies,

\(^{1}\) ποῦν τι τὸ υγρὸν παρασκευάζει, ch. 4, 441 b 21.
\(^{2}\) De Sens. 441 b 17, cf. also ch. 5, 445 a 15.
\(^{3}\) Cf. above in connection with colour mixture.
\(^{4}\) Ch. 4, 442 a 31 sqq.
analogous to those properties discerned by touch when the bodies have an appreciable mass. It is not the particle impinging on the tongue that causes the taste, but the qualitative modification of the liquid medium which is identified as the flavour. If we lived amidst this vehicle\(^1\), surrounded by it as we are by the air, then it would act as a medium just exactly as the air does in odour or sound, and the sense of taste would be a mediated one. In assigning the sense of taste as a subvariety of touch\(^2\), Aristotle no doubt has in mind the fact that, as things are, it is only effected by contact with a portion of the substance in which the qualitative modification known as flavour subsists; he also, of course, has in view his theory that the fundamental qualities of flavour, sweetness and bitterness, are really indices of the tactual properties of food which go to determine its value as nutrient. The sweet—τὸ γλυκὸν—is identified with the light—τὸ κούφον, i.e. with that light substance which can be raised up by the supposed vital heat operative in digestion and so get incorporated in the organism. The bitter—τὸ πικρὸν—being heavy, sinks down and passes away as excrement\(^3\).

Those actual properties, be it noted, are not spatial or dynamical according to Aristotle, but qualities given by the special sensations of touch, and it is upon such tactual attributes of objects that their value or hurtfulness for our organisms depends\(^4\).

All other tastes than sweet and bitter are composites of those two qualities in different proportions, exactly as the chromatic tones are compounds of black and white\(^5\).

\((d)\) For odour to exist we require the prior production of flavour; we must already have τὸ ἐγχυμὸν ὑγρὸν, i.e. liquid modified by flavour, or, what is the same thing\(^6\), τὸ ἐγχυμὸν ἕνηρ, dry substance which has produced a qualitative modification on liquid. The further solution of this flavoured substance in either air or water is, it seems, that which

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1 De Sens. ch. 6, 447 a 8.
2 Ch. 4, 441 a 3.
3 441 b 26 sqq.
4 De An. 1111., ch. 13, 435 b 4 sqq.
5 Cf. above \((a)\) on colour.
6 Cf. notes to ch. 5, 442 b 31.
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produces odour\(^1\). The diffusing agency is again heat\(^2\), but it must be a fresh diffusion of the rapid substance which produces odour; if not, odour to creatures living in water would be identical with taste, whereas Aristotle distinctly assigns the sense of smell as such to them\(^3\). Similarly odour to animals that respire is not simply the presence in air of exactly the same thing that in liquid causes taste; it is a 'diffusion' in the air of the flavour itself, not of the cause of the flavour. But, since flavour is the basis of odour, differences in the latter correspond to the varieties of the former\(^4\), and the scents derive their names from those distinguishing the tastes to which they correspond, owing to the similarity of the actual sensations\(^5\).

Animals that respire perceive odour by means of the air in which it is 'diffused' entering the nostrils. The characteristic which modifies the air seems to be thus transferred to the organ, which Aristotle probably thought was composed of air alone in respiring animals\(^6\). The air in entering the organ displaces a membrane\(^7\) and so effects communication. But in animals which dwell in water, the organ (probably consisting of water) is uncovered, just as the eyes also of fishes have no protecting covering; though the manner of perception is different the sense is still the same, for it is the same objective quality which affects them as in us causes smell\(^8\).

Thus far odours are strictly parallel to flavours, and serve as an index to the character of the food from which they proceed. But we can classify them in a different way and not according to the taste to which they correspond; or rather, as Aristotle says, there are two different varieties or groups of odour. As we saw, heat is required in the propagation of all\(^9\), i.e. the δύναμις or φύσις of odour contains the heat. Now in man\(^10\) this heat entering the nostrils tempers the cold

\(^1\) De Sens. ch. 5, 443 b 7.
\(^2\) 443 b 17.
\(^3\) 443 a 4, 444 b 21.
\(^4\) 443 b 9.
\(^5\) Cf. De An. ii. ch. 9, 421 b 1.
\(^6\) Cf. De An. i. ch. 1, 425 a 5 (θατέρου τούτων sc. ἰέρος καὶ ἰδατος) and cf. section v. above.
\(^7\) De Sens. ch. 5, 444 b 24.
\(^8\) Cf. notes to 444 b 21.
\(^9\) Cf. 444 a 27.
\(^10\) Ch. 5, 444 a 19 sqq.
which is supposed to prevail in the brain and its neighbourhood. Odours then appear to have a direct effect upon health and to be regarded as pleasant or the reverse in proportion as their action is beneficial or not. It is thus that Aristotle accounts for the appreciation felt by man for the scents of flowers and perfumes which have no association with edible things, an appreciation not felt by the lower animals. In the latter the brain, not being nearly so large in proportion to their size, does not apparently need this tonic influence. Thus Aristotle assigns to what we should call an aesthetic satisfaction a purely physiological and naturalistic explanation.

**Section VIII. Perception as Quantitative.**

In chapters 6 and 7 of the *De Sensu* Aristotle raises the question (1) whether all perception is of a quantum\(^1\) and (2) whether all quanta are perceptible\(^2\). Both are answered in the affirmative; the reasons for maintaining the former principle we have already seen\(^3\). Spatial quantity is to be identified as the continuous (τὸ συνεχές), and the continuous is just that in which there is no least part, in which you never come to the indivisible; objects of perception may, however, appear to be indivisible and therefore non-quantitative\(^4\). What this admission amounts to we must now discuss. In raising the problem whether there are an infinite number of perceptible parts in any object (*e.g.*, whether all quanta are perceptible), Aristotle points out that the different species of qualities belonging to any one sense must form a limited number\(^5\). They can all be arranged in a linear series with the simple qualities most opposed to each other forming the extreme points and the others arranged in proximity to the two poles in accordance with the preponderance of the one or the other element respectively in them. But though thus arranged in linear fashion, they do not form a continuum, *i.e.*, in analysing the whole of which they are constituent parts, you come

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1. *De Sens.* ch. 7, 449 a 22 sqq.
2. Ch. 6, 448 b 3 sqq.; cf. also ch. 7, 448 a 21 sqq.
3. Sec. II. above.
4. Ch. 7, 448 b 17.
5. Ch. 6, 445 b 24.
ultimately to units which cannot be subdivided, i.e. you come to the indivisible. Hence there must be a finite number of parts or steps between the ends of the scale. This is a general proposition that holds good equally of a series of cognate qualities and of the number of middle terms to be interposed between subject and predicate in the proof of any proposition\(^1\). It is true equally of any finite magnitude. There must be a finite number of assignable parts (equal, \(\sigma\), cf. ch. 6, note ad loc.) between point A and point B, or else Achilles can never overtake the tortoise\(^2\). What then becomes of the assertion that all quantities are perceptible, i.e. that no matter how far you analyse the object the parts obtained are still something for sense? Aristotle solves the difficulty by pointing out that it is one thing for a part to be perceived by itself and another as in the whole. We come to a limit at which a part ceases to be \(\textit{per se}\) actually (\(\textit{etereyea}\)) an object of perception. The very minute parts of bodies are in their individuality only potentially (\(\textit{dunamei}\)) perceptible. As taken along with the others and going to compose the whole they are, no doubt, actually perceptible. They do produce an effect upon the sense, but taken in their individuality they do not; in fact, if a very minute part of any substance is actually isolated from the whole it is altered qualitatively and reduced to the nature of the new medium in which it is placed\(^3\). The conclusion of the whole doctrine is, that the sum of distinct objects of consciousness into which any total can be divided is limited, and that, for explicit consciousness, such units are indivisible. All specific existences are as such indivisible, and the mind can grasp absolute unity. This must be the truth underlying the statements that sense objects can appear indivisible; as objects of mind they may be indivisible, though, as existences in the physical world and hence continuous, they cannot really be so\(^4\).

\(^1\) Cf. notes, \(\textit{De Sens.}\) ch. 6, 445 b 24.

\(^2\) Cf. \(\textit{Physics.}\) vi. ch. 9, 239 b 14 sqq.

\(^3\) \(\textit{De Sens.}\) ch. 6, 446 a 8 sqq.

\(^4\) Cf. \(\textit{Metaph.}\) x. ch. 3, 1054 a 27 where it is pointed out that \(\tau\delta\ \pi\lambda\theta\delta\sigma\) and \(\tau\delta\ \textit{diaireton}\) is \(\mu\alpha\lambda\lambda\nu\ a\iota\sigma\theta\eta\tau\nu\), and unity and the indivisible only known by opposition to these.
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Aristotle's distinction between the actual and the potential perceptibility of a sense object may throw some light upon the conception of the subconscious existence of ideas which is so much in evidence in modern psychology. To many writers it seems to be the case that ideas or sensations may go on diminishing in intensity until they reach a zero point—the threshold of consciousness, after which they pass over into the subconscious region and go on existing as 'petites perceptions' with a separate individuality just as good as that which they had before. They are not 'unconscious mental modifications,' i.e. they are still in some way present to consciousness, for, it appears, they may go on diminishing still further in intensity until they reach a zero of total oblivion. Now such a conception of an intermediate subconscious zone interposed between the conscious and the unconscious is quite self-contradictory. A sensation in its individuality is either an object of consciousness or it is not; if it is not you may call it subconscious if you like, meaning by that that in conjunction with others it produces an effect upon the mind, but in its individuality it is not an object of consciousness of any grade whatsoever. The subconscious 'region' should then be defined, not as a region, but as that state of an object in which, as a separate thing, it cannot be distinguished, but still in conjunction with others helps to produce a total psychical disposition. Whether the object can ever become a distinct element in consciousness per se depends upon circumstances. Sometimes by straining the attention or banishing other stimuli we can detect separate sensations hitherto unnoticed; sometimes sensations which, we know, must to a more acute sense appear distinct, are known to us only in the total volume which they produce. So too with ideas and memories, some can be aroused in their individuality by recollection, while others are real only in so far as by their former existence they modify our total present mood.

Aristotle's doctrine of the infinite divisibility of sensation

1 This is what Lewes (Aristotle, p. 253) seems to have in mind in criticising Hamilton's theory of 'latent' knowledge. He by no means, however, makes his point clear.
(as above explained) fits in well with his general polemic against the atomic theory. With his expressly physical objections to atoms we are not here concerned. What his teaching amounts to is, that, though the characters of the minute parts called atoms are supposed to explain the sensational quality of the total substance which they compose, they themselves as occupying space will have parts and hence will want explaining by the nature of their minute parts and so on *ad infinitum*. Merely mathematical or mechanical qualities will not explain the special differentiae perceived by sense, and the atoms themselves, if corporeal, cannot be thought of as having merely mathematical and mechanical properties. To think of them we must invest them with the attributes known to us by sense. Hence instead of assuming that the sense-quality of an appreciable object is due to the configuration alone of its parts, it is as well to suppose that those parts have qualitative affections which, if not identical with those of the whole, are yet like them sensuous and contribute in some way to the resultant nature of the total object.

Section IX. Apperception.

Apperception is, of course, a term not corresponding to any expression in Aristotle, but by it we may designate that function of sense in which it judges (*κρίνει*) and by so doing coordinates in the same indivisible act different objects. The physiology of the matter we have already dealt with; Aristotle localises the function in a central organ and hence it may be held to correspond to what is known to modern science as the action of the higher centres as opposed to the stimulation of end organ and lower ganglia merely. The latter affection does not result in perception of the typically human kind, which requires that higher coordination which has often been referred to by the current psychological term ‘apperception.’ The term *αἰσθάνεσθαι* with Aristotle includes discrimination (*κρίνειν*), and though in the discussion
in the *De Sensu* he almost invariably employs the former term, whereas in the *De Anima* the latter emerges more conspicuously, he does not mean to distinguish two different functions by the different expressions. *Aισθάνεσθαι* implies both receptivity and discrimination, and would not be *αισθησίς* without discrimination. Accordingly, when Aristotle asks how perception of two objects at the same time is possible, he is not asking how two impressions may be received at the same time; the sense organ, being a *μέγεθος* and having an indefinite plurality of parts within it, can easily account for that—the different parts may be differently modified. What he wants to find out is how the different determinations can be simultaneously discriminated, for that requires simultaneous existence in the same individual entity, not merely in different parts of it. Discrimination and coordination go together; as he shows in the *De Anima*¹, the consciousness which discriminates must be single. The objects perceived must not be present in separate moments² or to a divided consciousness.

In chapter 7 of the *De Sensu*, Aristotle without first hinting at his theory of how an indivisible unit of consciousness is possible, and thus leaving the field free for any other theory, asks whether discrimination of different sense elements in an indivisible moment can be effected. He distinguishes the cases of (1) perception of opposite qualities belonging to the same sense, e.g. black and white, and (2) determinations due to different senses—sweet and white. If, he says, such discrimination were likely to occur, it would be most natural to expect it in the case of the *ἐναντία*³—contrary determinations of one single sense,—*μᾶλλον γιὰρ ἀμα ἡ κίνησις τῆς μίας*—⁴ for the modifications due to black and white colour being localised in the same organ are more ‘together’ than those caused by sweetness and whiteness (which exist in different organs), and hence they have more chance of being coordinated. But, as it turns out, when

¹ *Ivi.* ch. 2, 426b 17 sqq. ² *De Sens.* ch. 7, 448a 21 sqq. ³ 447b 23. ⁴ 447b 9.
two modifications occur together one either drives out the other or modifies it in some way, and, in the latter case, it is so modified in return that a third and new modification arises in which the individuality of the component elements is lost. Two equal and contrary determinations might completely annul each other¹, but when we get qualities belonging to the same sense simultaneously presented, what does occur is μίξις, a fusion of the two elements, as in the case of harmony; they form one thing, a compound, and though they are, as forming such a thing, present to consciousness, their individuality is lost and hence they cannot be discriminated. In an obscure passage² which Biehl has had to reconstruct almost entirely, Aristotle rejects the theory that this discrimination can be effected by the determination in different ways of the different parts of an organ which are yet continuous with each other. This leads up to his own theory that, if either contrary or diverse qualities are to be simultaneously perceived there must be an absolutely indivisible psychical unity which can yet be viewed in two different ways at the same time. Its nearest analogue is, as has been said³, the mathematical point, or the unity of an object which possesses diverse attributes. It has been debated whether those two solutions of the difficulty are the same, or whether the latter, if satisfactory for the case of qualities like white and sweet, belonging to different senses, will not be insufficient to account for the harder⁴ case of contrary modifications like black and white. A passage in the De Anima⁵ might make us think so, but, as Rodier in his elucidation of De An. III. ch. 7⁶ points out, there is no real discrepancy between the two theories. Opposed qualities—ἐναντία—though existing in different parts of the same total object must (if between them they cover the whole extent of the ground) meet in a common indivisible point if they are still to be ascribed to the same object, and diverse characters (ἐτέρα) like white and sweet, which do not exist in different parts of the substance, must be deemed (as

¹ De Sens. ch. 7, 447 a 27.
² 448 b 19 sqq.
³ Section VI.
⁴ Cf. notes to 449 a 4 sqq.
⁵ III. ch. 2, 426 b 28 sqq.
as the substance has those qualities) to belong equally to its minutest parts, i.e. to be held together in a unity which, like the point, is absolutely indivisible. Of such a nature, then, is the psychic faculty involved in discrimination. It would be natural, if we followed out the parallelism between mind and body mechanically, to imagine that there was some corporeal organ which had the same properties, and there is a passage in the *De Memoria*, where, having evidently the organ of consciousness in mind, Aristotle refers to it as atomic; hence there is some countenance for Neuhäuser's theory that this organ is the mysterious vital heat of heavenly or transcendent origin. But as we have seen, nothing corporeal can fulfil the functions of an absolute indivisible unity; the unity of apperception is generally styled εν τι τῆς ψυχῆς, and perhaps the emphasis is on the latter word. We might have expected that it would have been in some way affiliated with the operation of νοησις, which is non-spatial and has a really transcendent origin. The account of the activity of νοησις in *De An.* III. ch. 6, is almost entirely parallel to his description of the higher function of sense. However, the tendency of Aristotle to treat νοησις simply as the highest of the intellectual faculties—that of pure conceptual thought—prevents us from making this identification; but, on the other hand, his refusal to see in discrimination of any kind mere passivity or determination by what is foreign to one's own being, leads us to surmise that the faculties of Sense and of Reason must be in essence one. This no doubt is his real belief but, as usual, it is veiled by his cautious manner of presenting the subject.

**SECTION X. MEMORY AND RECOLLECTION.**

The text of the treatise on Memory and Recollection presents some difficulties in interpretation which are perhaps still greater than those met with in the *De Sensu*. The worst

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1 Ch. 2, 451 a 28. Cf. above, Section vi.
2 Cf. *De Sens.* ch. 7, 449 a 10, 448 b 23.
of these occur in passages where (e.g. 452a 18 sqq., 452b 16 sqq.) symbols are employed, and in one case at least it is not claimed that a perfectly satisfactory explanation has been arrived at.

The main results of the treatise now claim our attention.

(1) Memory (μνήμη) is used in a very restricted sense, one much narrower than that assigned to it in modern psychology. It does not comprise retention: that rather is an element present in the general faculty of Imagination, of which Memory is a special determination. A sense impression which persists as a psychic change resulting from an actual perception¹ is an image (φάντασμα); it is the ascription of this image to some object existing in past time which is memory in the proper sense. In φάντασία generally (though not apparently always²) the object which has produced the originating sense-impression is not present, but that fact does not constitute the mental state a memory. The sense of time, either determinate or indeterminate, must enter into the apprehension before we can be said to remember. Thus Memory is relatively a high mental function, and though it is not denied of several of the lower animals, it is nothing which need emerge in that assimilation of present to past which must be found in any consciousness which profits by experience.

(2) Aristotle thus thinks that a mental image may be used and become an object of thought without the reference to historical reality which memory implies. It was quite natural that he should do so. As we have already seen, the κίνησις in the body reproduces some κίνησις which has existed in the external world, and the tendency of his thought is to ascribe as nearly as possible identity of nature to the two; at least his whole theory of sense-perception implies this. Hence, if a bodily κίνησις give knowledge of external reality in sense perception, there is no reason why it should not do so when the source of sense stimulation is no longer present. Certainly it is only when we remember

¹ De An. iii. ch. 3, 429a 1, 428b 11 sqq.
² Cf. De Mem. ch. 1, note to 449b 32.
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in the strict sense, that the bodily *κίνησις*, which functions as *νόημα* or *θεώρημα*—an object of thought, gives us knowledge of the external object which caused the perception to which it is due; nevertheless it has an objective character, just as the animal in a picture has a definite nature as an object of consciousness independent of the reference to the actual living model from which it was copied or which suggested it. From this account of the matter it might appear that Aristotle believed that the physiological modification in our bodies was the object of our thought when we imagined anything. So it is in a way, but it is only physiological *per accidens*; it is the same *εἴδος* whether existing in the external world or in the human body. To our minds the disparateness between the physiological and the merely physical seems extreme and we can think of the physiological process only as being some very remote symbolization of the external; not so was it to Aristotle, by whom the complexity of organic structures was very inadequately comprehended. It is noteworthy that the difference of the physiological and the physical seems to have been much more clearly realised by the time of Spinoza, who, when defining mind as 'idea corporis,' avoids the objection we have instanced above by explaining that our ideas involve the nature both of the external bodies and of the human organism; he holds, however, that in perceiving the external we perceive also the nature of our own body. Nevertheless, the fact that no thought is the thought of the physiological process occasioning it, but is rather the consciousness of that which this process symbolizes, need not conflict with Aristotle's definition of memory or his account of the objective nature of a *φάντασμα* apart from memory. Just as the animal in a picture has an existence *καθ' αὐτό*—*quid* animal, and not merely as a certain arrangement of paint devised to represent a living animal, so the *φάντασμα* may have an objective character without referring to the particular event or object to which it owes its origin.

When it does so refer and is used as an εἰκών or μνήμην, the representation of the object is coincident with a representation (either definite or vague) of the time which has elapsed since it was present to sense, and it is this coincidence alone which gives memory in the true sense.

To modern thought it may seem strange that Aristotle should regard a φάντασμα, a mere alteration in the bodily organs, as something objective. But one must remember that this κίνησις was to him something of a definite pattern, as definite as that of any object external to the human organism, and that the knowledge of the one would not differ from that of the other in point of 'objectivity.' The stimulation of the sense organs by an external object might originally cause the κίνησις. But this stimulation is nothing else than the communication of the εἴδος of the external object to the human organism. It is this εἴδος which forms the content of thought, and whether existing in the external physical object or in the sense organ it is equally objective. The psychological problem as to how we perceive and remember and think is never for Aristotle the question of how mind knows a real object. This latter, a metaphysical difficulty, is quite distinct. That real objects existed and could be known was the assumption from which he started. Knowing was a fact which must be accepted, but how a corporeal organism could manifest this function wanted explanation. The presence of the actual fact thought of in the body of the thinking being and at the moment of thought was the only solution he could offer. It is for modern physiology to discover a better. But his was an attempt in the right direction and a very natural answer also, for his question was, not how mind thinks, but how we—embodied creatures—think.

If it be asked: 'Is Aristotle's a theory of representative knowledge or perception?' we must answer no, at least it is not so in the modern sense of such a theory. In a sense, no doubt, there is representation; between the individual and a

1 De Mem. 451 a 3.  
2 ch. 2, 452 b 26.
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body external to his organism the κίνησις in the sense organs mediates, but between ‘mind’ and its object nothing interposes, and our apprehension of an external object is direct,—the immediate awareness of an objective, real character of things. Hence Aristotle could think of a φάντασμα which was not due to an object at the moment stimulating the senses, but was merely retained in the organs, as having objectivity apart from memory. This was so because the εἶδος or character it had was equally real whether in the body or out of it. Memory in fact adds nothing to the objectivity of the φάντασμα involved in it. It is merely the union of the κίνησις caused by lapse of time and the φάντασμα originated by an external thing.

(3) The characteristic of involving continuous quantity, spatial or temporal, which cleaves to sense perception\(^1\) infects also imagery, and hence memory. Thus memory must be assigned to the faculty of sense and its organ; it is not a function of pure thought\(^2\). The function of pure thought (νοῦς) is the apprehension of concepts apart (κεχωρισμένα) from this continuity which forms their ὑλή νοητή; the concept (νόημα) is to the image as the equation to a curve is to the curve in which it is realised. But memory, the apprehension of time, which is a continuum, can thus never belong to pure thought as such. Hence we may conclude (indeed, if my interpretation of ch. 1, 450a 20 be correct, we find it stated) that higher beings whose activity is purely intellectual do not share in memory.

(4) Differences in powers of memory Aristotle accounts for by the condition of the bodily organ (which is identical with the central organ of sensation). In language suggested largely by a passage in the Theaetetus\(^3\) of Plato he describes the causes of variation between different individuals and the different ages of life. Generally speaking too great ‘fluidity’ of the receptive structure causes impermanence of the impression; too great ‘density’ occasions a difficulty in getting

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1 Cf. De Sens. ch. 6, 445 b 32.
2 De Mem. ch. 1, 450 a 12 sqq. and notes.
3 Theaetetus, 191 c sqq.
any experience ever impressed. Similarly in the process of recollection (which we shall next proceed to discuss) bodily conditions influence the recall of ideas either by impeding\(^1\) the series of changes which occur in the central sensorium or by causing it to diffuse and so cause emotional disturbance\(^2\).

(5) Recollection (\(\Delta ν\alpha\mu\nu\varsigma\iota\varsigma\)) is to be distinguished from memory, the ascription of an image to some event in the past, which may be due either to the persistence\(^3\) of a sense-impression or to its reinstatement afresh; \(\Delta ν\alpha\mu\nu\varsigma\iota\varsigma\) is just that process of reinstatement and is so to be defined. It must, however, be carefully distinguished from the process involved in learning (which was identified with it by Plato). We may actually have reproduced in us by learning some knowledge previously possessed which might have been recalled but has totally passed into oblivion; under those circumstances the process is quite different from recollection; the latter process is self-conducted, while, for the former, we require instruction. Again, the basis from which we start is different in the two cases; much more than the meagre knowledge required in order to be capable of receiving instruction will be necessary, if we are to recall the previous idea unaided.

The objects to be recalled are twofold; they are either those which have a necessary connection with one another, like the concepts and judgments in mathematical science, or again they may be contingently related. The former are easily remembered, the latter not so, but in both cases the order of recall depends upon the experienced connection of the facts\(^4\), and the connection is either that of like with like, or of things contiguous or opposed. The ease with which an idea may be recalled depends upon the frequency of the repetition of the particular series of connections by which it is reinstated. Frequent repetition due to custom produces a natural disposition\(^5\) which tends to actualisation just like any other \(\delta\nu\nu\alpha\mu\nu\varsigma\) or \(\phi\upsilon\varsigma\iota\varsigma\). Here,

\(^1\) De Mem. ch. 2, 453 b 1.
\(^2\) 453 a 16 sqq.
\(^3\) 451 b 1 sqq.
\(^4\) 451 b 32.
\(^5\) 452 a 29 sqq.
however, just because the disposition is due to custom, it is liable to be interfered with, just as any tendency in nature may be thwarted, only more so.

The laws of Association here formulated by Aristotle (Contiguity, Similarity, and Contrast) are obviously merely principles governing the reinstatement of ideas previously experienced. Hence their scope is much narrower than that assigned to them by modern psychology. Aristotle certainly held no 'Associationist Theory of Knowledge,' but for that the most recent theorists are hardly likely to blame him. There are, however, other psychical operations like 'complication,' his αἰσθησις κατὰ συμβεβηκός, which many writers would rank generally under 'association' but which he left unaffiliated to the process involved in recollection. This discreteness in his treatment of mental functions is no doubt due to his empirical way of approaching his data and his caution in all but the widest generalisations.

(6) Finally we hear that recollection is a higher activity than mere memory. It is peculiar to man. Though it may operate involuntarily it is typically a purposive operation and is to be regarded as a kind of search, like the search for the middle term in demonstration or for the means to effect the fulfilment of an end in practical deliberation. Its purposiveness seems to argue to its higher nature; it is in this way illustrative of the ἀνάθεωμα which belongs to mind per se. In recollecting the soul seems to be active, producing an activity which proceeds towards the organs of sense. Apart from the aspect of activity we must, however, recognise that, in recollection, there is a process going on in the organs of sense or rather in the central sensorium. The various ideas which reinstate one another are all to be described as κινήσεις, and the end of a process of recollection seems to be attained when one particular κίνησις is produced which seems to constitute a terminus to the series—namely the

\[1 \text{ De Mem. ch. 2, 453a 1.} \]
\[2 \text{ De Mem. ch. 2, 451b 26.} \]
\[3 \text{ Cf. Prof. Laurie's Institutes of Education, p. 233 sqq.} \]
\[4 \text{ Cf. Section iv. above ad init.} \]
\[5 \text{ De An. 1. ch. 4, 408b 17.} \]
κίνησις corresponding to the idea to be recalled. It is throughout implied that these κινήσεις, prior to the act of recollection, are dormant; that is to say they are not, until revived, κινήσεις. What then persists or what is the κίνησις when it is dormant? Aristotle talks of the impression on the organ being like an imprint—τύπος, and, no doubt, he must have thought of the impression left by an experience as being some kind of structural modification of the organ. He talks of the subjective affections involved in apprehending magnitudes as being σχῆματα\(^1\) like the objective magnitudes themselves. He does not work out his theory of the persistence of impression, but doubtless the dormant impression is merely something of the nature of a σχῆμα (at least in the case of the perception of magnitude), while the affection whether when first experienced or when revived is of the nature of a κίνησις, though a κίνησις which still has a spatial configuration and can be represented by a motion passing along a determinate path—as in the construction of a triangle. At any rate we find no hint in Aristotle of that modern theory which would make psychical dispositions consist in the faint functionings of the same parts as are brought into play when an idea is explicitly realised.

\(^1\) Cf. *De Insom. ch. 3, 461 a 8 sqq.*
ΠΕΡΙ ΑΙΣΘΗΣΕΩΣ ΚΑΙ ΑΙΣΘΗΤΩΝ
Επει δε περὶ ψυχῆς καθ’ αὐτὴν διώρισται καὶ περὶ τῶν δυνάμεων ἐκάστης κατὰ μόριον αὐτῆς, ἐχόμενον ἐστὶν ποιήσασθαι την ἐπίσκεψιν περὶ τῶν ζώων καὶ τῶν ζωῆς ἐχόντων ἀπάντων, τινὲς εἰσὶν ἵδιαι καὶ τίνες κοινὰι 5 πράξεις αὐτῶν. τὰ μὲν οὖν εἰρημένα περὶ ψυχῆς ὑποκείσθω, περὶ δὲ τῶν λοιπῶν λέγομεν, καὶ πρῶτον περὶ τῶν πρώτων. φαίνεται δὲ τὰ μέγιστα, καὶ τὰ κοινὰ καὶ τὰ ἱδία τῶν ζώων, κοινὰ τῆς ψυχῆς ὑπάρχουσα καὶ τοῦ σώματος, οἰνὸν αἰσθήσεως καὶ μνήμης καὶ θυμὸς καὶ ἐπιθυμία καὶ ὀλως ὀρέξεις, καὶ πρὸς τούτους ἡδονή τε καὶ λύπη· καὶ γὰρ ταῦτα σχεδὸν ὑπάρχει πᾶσι τοῖς ζώοις. πρὸς δὲ τούτους τὰ μὲν πάντων ἐστὶ τῶν μετεχόντων ζωῆς κοινὰ, τὰ δὲ τῶν ζώων ἔνιοις. τυγχάνουσι δὲ τούτων τὰ μέγιστα τέτταρες συζύγιαι τὸν ἀριθμὸν, οἰνὸν ἐγρήγορσις καὶ ὑπνος, καὶ νεότης καὶ γηρας, καὶ ἀναπνοὴ καὶ ἐκπνοή, καὶ ζωή καὶ θάνατος· περὶ δὲν θεωρητέον, τί ποτέ ἐκαστὸν αὐτῶν, καὶ διὰ τίνας αἰτίας συμβαίνει. φυσικοὶ δὲ καὶ περὶ ὑγιείας καὶ νόσου τὰς πρῶτας ἐδείν ἀρχὰς· οὐτε γὰρ ὑγιειναὶ οὐτε νόσον οἰνὸν τε γίγνεσθαι τοῖς ἐστερημένοις ζωῆς. διὸ σχεδὸν τῶν περὶ φύσεως οἱ πλείστοι καὶ τῶν ιατρῶν οἱ φιλοσοφωτέρως τῆς τέχνην 436b μετίοντες, οἱ μὲν τελευτῶσιν εἰς τὰ περὶ ιατρικῆς, οἱ δ’
I

Now that we have given a definite account of soul in its essential nature and of each of its faculties individually, the next thing to do is to consider animals and all things possessed of life and to discover which activities are specific and which they have in common.

Assuming as a basis our exposition about the soul, let us discuss the remaining questions, beginning with those that are primary.

The most important of the characteristics of animals, both generic and specific, evidently belong to soul and body in common, e.g. sense-perception and memory, passion, desire and appetite generally, as well as pleasure and pain. These are found practically in all animals.

But further, certain of the phenomena in question are common to all things which participate in life, while others are shared by particular kinds of animals. Of these the most important fall into four pairs of correlatives, to wit, waking and sleep, youth and age, the inhalation and expulsion of breath, life and death. These phenomena call for discussion, and we must investigate both the nature of each and the reasons for its existence.

It falls within the province of the natural scientist to survey the first principles involved in the subject of health and disease, for to nothing lacking life can either health or sickness accrue. Hence pretty well the most of our investigators of nature do not stop until they have run on into medicine, and those of our medical men who employ their
ἐκ τῶν περὶ φύσεως ἀρχονταί περὶ τῆς ἰατρικῆς. ὅτι
dὲ τὰ λεχθέντα κοινὰ τῆς τε ψυχῆς ἐστὶ καὶ τοῦ σῶμα-
τος, οὐκ ἄδηλον. πάντα γὰρ τὰ μὲν μετ’ αἰσθήσεως
5 συμβαίνει, τὰ δὲ δὲ αἰσθήσεως· ἐνιαὶ δὲ τὰ μὲν πάθη
tαύτης οὖν τυγχάνει, τὰ δ’ ἐξεις, τὰ δὲ φυλακαὶ καὶ
σωτηρίας, τὰ δὲ φθοραὶ καὶ στερήσεις. ἡ δ’ αἰσθήσεως
οτι διὰ σῶματος γίγνεται τῆς ψυχῆς, δῆλον καὶ διὰ τοῦ
λόγου καὶ τοῦ λόγου χωρίς. ἀλλὰ περὶ μὲν αἰσθήσεως
καὶ τοῦ αἰσθάνεσθαι, τί ἐστι καὶ διὰ τί συμβαίνει τοῖς
ζῶοις τούτῳ τὸ πάθος, εἰρηται πρότερον ἐν τοῖς περὶ
ψυχῆς. τοῖς δὲ ζῶοις, ἢ μὲν ζῶον ἐκαστὸν, ἀνάγκη
υπάρχειν αἰσθήσειν· τούτῳ γὰρ τὸ ζῶον εἶναι καὶ μὴ
ζῶον διορίζομεν. ἡδία δ’ ἤδη καθ’ ἐκαστὸν ἢ μὲν ἄφη
15 καὶ γεῦσις ἀκολουθεῖ πάσιν εξ ἀνάγκης, ἢ μὲν ἄφη διὰ
tὴν εἰρημένην αὑτίαν ἐν τοῖς περὶ ψυχῆς, ἢ δὲ γεῦσις
diὰ τὴν τροφὴν· τὸ γὰρ ἦδυ διακρίνει καὶ τὸ λυπηρὸν
αὐτῆ περὶ τὴν τροφὴν, ὥστε τὸ μὲν φεῦγει τὸ δὲ διώκειν,
καὶ ὅλως ὁ χυμός ἐστὶ τοῦ θρεπτικοῦ πάθος. αἱ δὲ
20 διὰ τῶν ἐξωθεὶ ἀισθήσεις τοῖς πορευτικοῖς αὐτῶν, οἴον
δοφρήσις καὶ ἀκοῇ καὶ ὑψὶς, πάσι μὲν τοῖς ἔχουσι
σωτηρίας ἐνεκεν υπάρχουσιν, ὅπως διώκουσι ἐν προα-
θανόμενα τὴν τροφὴν καὶ τὰ φαῦλα καὶ τὰ φθαρτικὰ
437 α φεῦγοντι, τοῖς δὲ καὶ φρονήσεως τυγχάνουσι τοῦ εὖ
ἐνεκα· πολλὰς γὰρ εἰσαγγέλλουσι διαφοράς, ἔξ ὁν ἦ
τε τῶν νοητῶν ἐγγίνεται φρονήσις καὶ τῶν πρακτῶν.
αὐτῶν δὲ τούτων πρὸς μὲν τὰ ἀναγκαία κρείττων ἢ ὑψὶς
5 καθ’ αὐτὴν, πρὸς δὲ νοῦν καὶ κατὰ συμβεβηκὸς ἢ ἀκοῆ.
διαφοράς μὲν γὰρ πολλὰς καὶ παντοδαπᾶς ἡ τῆς ὑψος
ἀγγέλλει δύναμις διὰ τὸ πάντα τὰ σώματα μετέχειν
χρώματος, ὥστε καὶ τὰ κοινὰ διὰ ταύτης αἰσθάνεσθαι

436b 19 γευστικὸς L U Alex., ἡρεστικὸς etiam Bas. et Sylb. | post ἡρεστικὸς
addunt moron exceptis EMV et scripti et impressi, atque addit etiam τῆς ψυχῆς P
vet. tr., ἡρεστικὸς sine ullo additamento probant etiam Hayduck et Biehl.
art in a more scientific fashion, use as the first principles of medicine truths belonging to the natural sciences.

There is no lack of evidence that the phenomena we have mentioned are shared by both soul and body in common, for they all either occur in concomitance with sensuous experience or are due to it. Some are modifications, some permanent dispositions of sensuous experience, while some protect and preserve and others destroy and annul it.

That the psychical function of sensation depends upon the body is clear both a priori and apart from such evidence. However, the nature of sense and its function and the reason why this phenomenon is found in animals, have already been explained in the Psychology. Animals qua animal must possess sensation, for it is by means of this that we distinguish animate from inanimate.

To each animal in its own proper nature touch and taste must necessarily accrue, touch for the reason given in the Psychology, taste owing to the fact that it takes nutriment; for by taste the pleasant and unpleasant are distinguished in food, so that as a consequence the one is pursued and the other shunned; to put it generally, flavour is a determination of that which is nutritive.

In animals with the power of locomotion, are found the senses which are mediated by something external, to wit, smell, hearing, and sight. These exist uniformly for the purpose of the self-preservation of the animals possessing them, in order that they may become aware of their food at a distance and go in pursuit of it and that they may avoid what is bad and injurious. Where intelligence is found they are designed to subserve the ends of well-being; they communicate to our minds many distinctions out of which develops in us the intelligent apprehension alike of the objects of thought and of the things of the practical life. Of these three sight is per se more valuable so far as the needs of life are concerned, but from the point of view of thought and accidentally, hearing is the more important. The characteristics are many and various which the faculty of sight reports, because all bodies are endowed with colour;
μάλιστα (λέγω δὲ κοινὰ σχήμα καὶ μέγεθος, κίνησιν, 10 ἀριθμὸν). ὃ δὲ ἀκοὴ τὰς τοῦ ψόφου διαφορὰς μόνον, ὀλίγους δὲ καὶ τὰς τῆς φωνῆς. κατὰ συμβεβηκός δὲ πρὸς φρόνησιν ἢ ἀκοὴ πλείστου συμβάλλεται μέρος. ὁ γὰρ λόγος αἰτίος ἐστὶ τῆς μαθήσεως ἀκούστος έν, οὐ καθ’ αὐτὸν ἀλλὰ κατὰ συμβεβηκός. ἐξ ὀνομάτων γὰρ 15 σύγκειται, τῶν δ’ ὀνομάτων ἐκαστὸν σύμβολόν ἐστιν. διότερ φρονιμώτεροι τῶν ἐκ γενετῆς ἐστερημένων εἰσὺν ἐκατέρας τῆς αἰσθήσεως οἱ τυφλοὶ τῶν ἑνεὼν καὶ κωφῶν.

II

Περὶ μὲν οὖν τῆς δυνάμεως ἢν ἔχει τῶν αἰσθήσεων 20 ἐκάστη, πρότερον ἐφηται. τοῦ δὲ σώματος ἐν οἷς ἐγ- γίγνεσθαι πέφυκεν αἰσθητηρίοις, νῦν μὲν ζητοῦσι κατὰ τὰ στοιχεῖα τῶν σωμάτων· οὐκ εὑροῦντες δὲ πρὸς τέταρτα πέντ’ οὕσας συνάγειν, γλίσχοται περὶ τῆς πέμπτης. ποιοῦσι δὲ πάντες τήν ὦσιν πυρὸς διὰ τὸ 25 πάθος τινὸς ἀγνοεῖν τὴν αἰτίαν· θλιβομένου γὰρ καὶ κωνουμένου τοῦ ὀφθαλμοῦ φαίνεται πῦρ ἐκλάμπειν. τοῦτο δ’ ἐν τῷ σκότει πέφυκε συμβαίνειν, ἢ τῶν βλεφάρων ἐπικεκαλυμμένων· γίνεται γὰρ καὶ τότε σκότος. ἔχει δ’ ἀπορίαν τούτο καὶ ἔτεραν. εἰ γὰρ μὴ ἐστὶ λαυθάνειν 30 αἰσθανόμενον καὶ ὀρῶντα ὀρῶμενον τι, ἀνάγκη ἄρ’ αὐτὸν ἐαυτὸν ὀρᾶν τὸν ὀφθαλμόν. διὰ τί οὖν ἡμειώντη τοὺτ’ οὐ συμβαίνει; τὰ δ’ αἰτία τοῦτο, καὶ τῆς ἀπορίας καὶ τοῦ δοκεῖν πῦρ εἶναι τήν ὦσιν, ἐντεύθεν ληπτέον. τὰ γὰρ λεία πέφυκεν ἐν τῷ σκότει λάμπειν, οὐ μέντοι φῶς γε 437 β ποιεῖ, τοῦ δ’ ὀφθαλμοῦ τὸ καλούμενον μέλαν καὶ μέσου λείουν φαίνεται. φαίνεται δὲ τούτῳ κωνουμένου τοῦ ὀμ- ματος διὰ τὸ συμβαίνειν ὀστόν, γύγνεσθαι τὸ ἐν. τοῦτο δ’ ἡ ταχυτής ποιεῖ τῆς κινήσεως, ὡστε δοκεῖν 5 ἐτέρον εἶναι τὸ ὀρῶν καὶ τὸ ὀρῶμενον. διὸ καὶ οὐ
Thus by this sense especially are perceived the common sensibles (by these I mean figure, magnitude, motion, and number).

But hearing gives merely differences in sound and, in a few cases, in articulate utterance too. Hearing, however, has the greatest share in the development of intelligence, though this is an accidental function. Speech being audible is instrumental in causing us to learn; but this function it possesses not per se but accidentally, for speech is a complex of words, every one of which is a conventional symbol. A consequence is that of those who from birth have been without one or other of those two senses, the blind are more intelligent than deaf-mutes.

II

We have already given an account of each of the sense faculties. But each develops, according to the course of nature, in a bodily sense organ, and these we shall proceed to discuss.

Present-day investigators attempt to reduce them to the ultimate elements of all bodies; but, since the senses are five, they have a difficulty in reducing them to the four elements, and the fifth causes them anxious consideration.

Sight they all ascribe to fire owing to the misunderstanding of a certain phenomenon, viz. when the eye is pressed and moved, fire appears to flash out from it; and it is the nature of this phenomenon to occur in the dark, or when the eyelids are closed, for then, too, there is darkness.

But this theory—that sight is of the nature of fire—raises a fresh difficulty; for, if it is impossible for that which is conscious of and sees some object to be unaware that it does so, the eye will of necessity perceive itself. Why then is this not the case when the eye is at rest?

From the following considerations we shall discover the cause of this circumstance and of the apparent identity of fire and vision. It is the nature of smooth things to shine in the dark, but, nevertheless, they do not produce light; now what we call the "black" and "middle" of the eye has a smooth appearance and it shows on the eye moving, for the reason that this occurrence is a case of the reduplication of a single thing. The swiftness of the motion effects this, causing that which sees and that which is seen to appear to be distinct. Hence also if the motion is not swift and does not
γίγνεται, ἂν μὴ ταχέως καὶ ἐν σκότει τούτῳ συμβηκῇ·
tὸ γὰρ λείον ἐν τῷ σκότει πέφυκε λάμπειν, οἷον κεφαλαῖ
ιχθύων τυών καὶ ὁ τῆς σηπίας θολός· καὶ βραδεῖς
μεταβάλλοντος τοῦ ὄμματος οὐ συμβαίνει, ὡστε δοκεῖν
10 ἀμα ἐν καὶ δύο εἶναι τὸ θ' ὄργων καὶ τὸ ὄρμενον.
ἐκείνως δ' αὐτὸς αὐτὸν ὁ ὄφθαλμος, ὁσπερ καὶ ἐν
tῇ ἄνακλάσει, ἐπεὶ εἴ γε πῦρ ἦν, καθάπερ Ἐμπεδοκλῆς
φησὶ καὶ ἐν τῷ Τιμίω γέγραπται, καὶ συνεβαίνει τὸ
ὄραν εξίοντος ὁσπερ ἐκ λαμπτήρος τοῦ φωτός, διὰ τί
15 οὐ καὶ ἐν τῷ σκότει ἐῴρα ἂν ἡ ὄψις; τὸ δ' ἀποσβεν-
νυσθαι φάναι ἐν τῷ σκότει εξιόνσαν, ὁσπερ ὁ Τίμας
λέγει, κενόν ἐστι παντελῶς· τὸς γὰρ ἀπόσβεσις φωτός
ἐστιν; σβέννυται γὰρ ἡ ὑγρῆ ἡ ψυχρὰ τὸ θερμὸν καὶ
ξηρὸν, οἷον δοκεῖ τὸ τ' ἐν τοῖς ἀνθρακώδεσιν εἶναι πῦρ
20 καὶ ἡ φλόξ, ὅν τῷ φωτὶ οὐδέτερον φαίνεται ὑπάρχον.
εἰ δ' ἀρα ὑπάρχῃ μὲν ἄλλα διὰ τὸ ἡρέμα λανθάνει ἡμᾶς,
ἐδει μεθ' ἡμέραν τε καὶ ἐν τῷ ὑδατι ἀποσβεννυσθαι τὸ
φῶς, καὶ ἐν τοῖς πάγοις μᾶλλον γίνεσθαι σκότον· ἡ γοῦν
φλόξ καὶ τὰ πεπυρωμένα σώματα πάσχει τούτο· νῦν δ'
25 οὐδὲν συμβαίνει τοιοῦτον. Ἐμπεδοκλῆς δ' ἐοικε νομί-
ζοντι ὅτε μὲν εξίοντος τοῦ φωτός, ὁσπερ εἰρήται πρότερον,
βλέπειν· λέγει γοῦν οὔτως·

ὡς δ' ὅτε τις πρόδοσιν νόεον ὁπλίσσατο λύχνων,
χειμερίην διὰ νύκτα πυρὸς σέλας αἰθομένων,
ἀψα παντοῖον ἀνέμων λαμπτῆρας ἀμοργοὺς,
οἴ τ' ἀνέμων μὲν πνεύμα διασκίδνασιν ἀέντων,
πῦρ δ' ἔξω διαθρόσκον, ὅσον ταναότερον ἦν,
λάμπεσκεν κατὰ βηλὸν ἀτείρεσιν ἀκτίνεσιν·
ὡς δὲ τὸ τ' ἐν μῆκος ἐρευμένον ὦνγύγου πῦρ
438 a λεπτῆσιν ὥθονησι λοχάζετο κύκλοτα κούρην·
αἱ δ' ὑδατος μὲν βένθος ἀπέστεγον ἀμφίωντος,
pῦρ δ' ἔξω διαθρόσκον, ὅσον ταναότερον ἦν.

ὅτε μὲν οὕτως ὁρῶν φησίν, ὅτε δὲ ταῖς ἀπορροήασ ταῖς
5 ἀπὸ τῶν ὄρωμένων.
occur in the dark, the phenomenon does not take place. It is this nature of smooth things to shine in the dark, as e.g. the heads of certain fishes and the juice of the cuttle-fish. When the eye moves slowly, the effect—the apparent simultaneous identity and duality of that which sees and that which is seen—is not produced. But in the former case—that of swift movement—the eye sees itself as it does too when reflected in a mirror; this is so, for, if it really consists of fire, as Empedocles alleges and we read in the Timaeus, and if vision is produced by the issuing forth of light from the eye as it were from a lantern, why does not sight function in the dark as well as by day?

The explanation in the Timaeus, that the sight issuing from the eye is extinguished in the darkness, is quite without point, for what can the extinction of light mean? Heat and dryness are annulled by damp or cold, as we see in the case of the fire and flame in burning coals; but neither of these is a characteristic of light. If they are and we do not detect their presence owing to the smallness of their amount, light would of necessity be extinguished in broad daylight too, when it was wet, and darkness would increase in frosty weather. This at any rate, viz. extinction, is what happens to flame and burning bodies, but nothing of the kind occurs in the phenomenon in question.

Empedocles evidently holds the view at times, that we see upon the issuing of light from the eye, as we mentioned before. At any rate these are his words:

"As who a journey intendeth, himself with a candle equippeth
Thorough the blustering night with its fiery radiance gleaming,
And, to ward off every gust, in lantern-case fits it,
That this may part to this side and that the breath of the wild winds
While the fire pierces through, inasmuch as its nature is subtler,
And shines over the threshold with splendour that naught can conquer,
Thus too the world-old fire was confined in the delicate membranes
And lies hid 'neath the screens of the spherical-fashioned pupil;
These keep in check the ocean of water that circles around it,
But the fire pierces through, inasmuch as its nature is subtler."

Sometimes he says this is the way in which we see, but at other times he explains it by a theory of effluxes issuing from the objects seen.
ΑΡΙΣΤΟΤΗΛΕ" 

Δημόκριτος δ' ὁτί μὲν ὑδωρ εἶναι φησι, λέγει καλῶς, ὧτι δ' οἴεται τὸ ὁρᾶν εἶναι τὴν ἐμφασιν, οὐ καλῶς: τοῦτο μὲν γὰρ συμβαίνει ὃτι τὸ ὄμμα λεῖον, καὶ ἔστιν οὐκ ἐν ἐκείνῳ ἄλλῳ ἐν τῷ ὁρῶντι. ἀνάκλασις γὰρ τὸ πάθος. ἀλλὰ καθὸλον περὶ τῶν ἐμφαινομένων καὶ ἀνακλάσεως οὐδὲ πω δῆλον ἤ, ὡς ἐουκεν. ἀτομον δὲ καὶ τὸ μὴ ἐπελθεῖν αὐτῷ ἀπορησάτε διὰ τὸ ὁ ὀφθαλμὸς ὀρᾶ μόνον, τῶν δ' ἄλλων οὐδὲν ἐν οἷς ἐμφαίνεται τὰ εἰδώλα. τὸ μὲν οὖν τὴν ὄψιν εἶναι ὑδατος ἀληθὲς μὲν, οὗ μέντοι συμβαίνει τὸ ὁρᾶν ἢ ὑδωρ ἀλλ' ἢ διαφανές. 

καὶ ἐπὶ τοῦ ἀέρος κοινὸν ἔστιν. ἀλλ' εὐφυλακτότερον καὶ εὐπληττότερον τὸ ὑδωρ τοῦ ἀέρος. διότερ ἡ κόρη καὶ τὸ ὄμμα ὑδατός ἔστιν. τούτῳ δὲ καὶ ἐπ' αὐτῶν τῶν ἐργῶν δήλον. φαίνεται γὰρ ὑδωρ τὸ ἐκρέων διαφθειρομένων, καὶ ἐν τοῖς πάμπαν ἐμβρύνους τῇ ψυχρότητι ὑπερβάλλον καὶ τῇ λαμπρότητι. καὶ τὸ λευκὸν τοῦ ὄμματος ἐν τοῖς ἔχουσιν αἴμα πῶν καὶ λιπαρόν. ὅπερ διὰ τοῦτ' ἔστι, πρὸς τὸ διαμένειν τὸ ὕγρον ἀπηκτον. καὶ διὰ τοῦτο τὸν σώματος ἀρρηγώτατον ὁ ὀφθαλμὸς ἔστιν. οὔδεις γάρ πω τὸ ἔντος τῶν βλεφάρων ἐρρίγωσεν. 

τῶν δ' ἀναίμων σκληρόδερμοι οἱ ὀφθαλμοὶ ἔστιν, καὶ τοῦτο ποιεῖ τὴν σκέπην. ἀλογον δὲ ὀλως τὸ ἐξιόντι των τὴν ὄψιν ὅραν, καὶ ἀποτείνεσθαι μέχρι τῶν ἀστρων, ἡ μέχρι τυνὸς ἐξιόνσαν συμφύςεσθαι, καθάπερ λέγουσι τινες. τούτου μὲν γὰρ βέλτιον τὸ ἐν ἀρχῃ συμφύςεθαι 

τοῦ ὄμματος. ἀλλὰ καὶ τοῦτο εὐθές. τὸ τε γὰρ συμφυςεθαι τί ἐστι φωτὶ πρὸς φῶς; ἡ πῶς οὖν θ' ὑπάρχειν; 438 b οὐ γὰρ τῷ τυχόντι συμφύλεται τῷ τυχών. τῷ τ' ἐντὸς τῷ ἐκτὸς πῶς; ἡ γὰρ μὴν γε μεταξὺ ἔστιν. περὶ μὲν οὖν τοῦ ἀνευ φωτὸς μὴ ὅραν ἔρηται ἐν ἄλλοις. ἀλλ' εἴτε φῶς εἴτ' ἀρτι ἐστὶ τῷ μεταξὺ τοῦ ὁρώμενον καὶ τοῦ ὄμματος, ἡ διὰ τούτου κίνησις ἐστιν ἡ ποιοῦσα τὸ ὅραν, καὶ εὑλόγως τὸ ἐντὸς ἔστιν ὑδατος. διαφανὲς γὰρ τὸ
Democritus is in the right in saying that the eye consists of water, but his theory that sight is the mirroring of an object is wrong. This phenomenon indeed—the visibility of an object as in a mirror—occurs in the case of the eye because it is smooth, and exists not in it (the reflecting eye) but in the spectator; for the phenomenon is one of reflection. But he seems to have attained to no clear general theory of the mirroring and reflection of objects. It is ridiculous too that it never entered his head to ask why the eye alone sees and none of the other things in which images are mirrored.

Thus his theory is true that the sight-organ consists of water; but the eye functions not quid aqueous but quid transparent; this property it shares with air as well. But water is more easily kept in, being denser than air; and hence the pupil and the eye are composed of water.

The facts themselves make this clear; what issues from the eyes when they are seriously hurt is evidently water, and when they are quite in the embryonic stage it is excessively cold and brilliant. Further, in sanguineous animals the white of the eye is fat and oily; this is designed to keep the moisture unfrozen. Hence the eye is less liable to be chilled than any other part of the body; no one ever felt cold under the eye-lids. In bloodless animals, however, the eyes have a hard skin and this it is which protects them.

The theory is wholly absurd that sight is effected by means of something which issues from the eye and that it travels as far as the stars or, as some say, unites with something else after proceeding a certain distance.

Than this latter a better theory would be, that the union is effected in the eye—the starting point; but even this is childish. What can the union of light with light mean? How can it come about? The union is not that of any chance light with any other chance light whatsoever. Again how can the internal light unite with the external? The membrane of the eye divides them.

We have elsewhere stated that vision without light is impossible; but whether it is light or air that intervenes between the object seen and the eye, it is the motion propagated through this that produces sight. Thus, as our theory would lead us to infer, the interior of the eye consists
�δωρ. ὁ ἰδαίτερον ὦ ὁσπερ καὶ ἔξω ὑπὸ ἀνευ φωτός, ὑπὸς καὶ ἐντὸς. διαφανείς ἄρα δεὶ εἶναι. καὶ ἀνάγκη ὑδωρ εἶναι, ἐπειδή ὑπὸ ἀήρ. οὐ γὰρ ἐπὶ τοῦ ἐσχάτου ὦμματος ἢ ψυχὴ ἢ τῆς ψυχῆς τὸ αἰσθητικὸν ἐστὶν, ἀλλὰ δῆλον ὡς ἐντὸς. διόπερ ἀνάγκη διαφανεῖς εἶναι καὶ δεκτικὸν φωτὸς τὸ ἐντὸς τοῦ ὦμματος. καὶ τοῦτο καὶ ἐπὶ τῶν συμβαίνοντων δῆλον. ἢδη γὰρ τοις πληγεῖσιν ἐν πολέμῳ παρὰ τὸν κρόταφον ὦτως ὥστε ἐκτιμηθῆναι τοὺς πόρους τοῦ ὦμματος, ἐδοξεί γενέσθαι σκότος ὦσπερ λύχνων ἀποσβεσθέντος, διὰ τὸ οὗν λαμπτήρα τινα ἀποτεμηθῆναι τὸ διαφανὲς, τὴν καλομεῖνην κόρην. ὥστε ἐξερ τούτων τι συμβαίνει, καθάπερ λέγομεν, φανερὸν ὡς εἰ δεῖ τοῦτον τὸν τρόπον ἀποδιδόναι καὶ προσάπτειν ἐκαστοῦ τῶν αἰσθητηρίων εἰνὶ τῶν στοιχείων, τοῦ μὲν ὦμματος τὸ ὀρατικὸν ὑδατος ὑποληπτέον, ἀέρος δὲ τὸ τῶν ψόφων αἰσθητικῶν, πυρὸς δὲ τὴν ὀσφρησιν. ὃ γὰρ ἐνεργεία ἢ ὀσφρησις, τοῦτο δυνάμει τὸ ὀσφραντικόν· τὸ γὰρ αἰσθητὸν ἐνεργεῖν ποιεῖ τὴν αἰσθήσιν, ὥστε ὑπάρχειν ἀναγκαῖον αὐτὴν δυνάμει πρότερον. ἡ δὲ ὀσμὴ καπνώδης ἀναθυμίασις ἐστὶν, ἡ δ' ἀναθυμίασις καπνώδης ἐκ πυρὸς. διὸ καὶ τῷ περὶ τὸν ἐγκέφαλον τόπῳ τὸ τῆς ὀσφρήσεως αἰσθητήριον ἐστὶν ἰδιον· δυνάμει γὰρ θερμὴ ἢ τοῦ ψυχροῦ ὑλὴ ἐστὶν, καὶ ἡ του ὦμματος γένεσις τῶν αὐτῶν ἔχει τρόπον· ἀπὸ τοῦ ἐγκέφαλον γὰρ συνεστηκεν· οὕτος γὰρ ὑγρότατος καὶ ψυχρότατος τῶν ἐν τῷ σώματι μορίων ἐστὶν. τὸ δ' 439α ἀπτικον γῆς. τὸ δὲ γευστικὸν εἴδος τι ἀφῆς ἐστὶν. καὶ διὰ τοῦτο πρὸς τῇ καρδίᾳ τὸ αἰσθητήριον αὐτῶν, τῆς τε γεύσεως καὶ τῆς ἀφῆς· ἀντίκειται γὰρ τῷ ἐγκέφαλῳ αὐτή, καὶ ἐστὶ θερμότατον τῶν μορίων. καὶ

of water; for water is transparent. Just as we cannot see without the presence of light outside the eye, so without light inside the eye vision is impossible; this is the reason why the eye must be transparent, and since it is not air it must be water.

The reason for these contentions is that the consciousness, or the psychical faculty of sense perception, does not reside on the surface of the eye but evidently within; this is why the interior of the eye must be transparent and receptive of light. The facts make this plain; for there have been cases of people wounded in war by a blow grazing the temple in such a way that the passages of the eye were severed, to whom darkness seemed to ensue just as when a light is put out; this was because the transparency we call the pupil was severed like a lamp that has its wick cut.

Thus if our account is at all in accordance with fact and if, as in the fashion proposed, we should reduce the sensoria to the elements and correlate each of the former with one of the latter, it is clear we should ascribe the eye’s power of sight to water and the capacity of perceiving sounds to air and the sense of smell to fire.

This is because that which has the faculty of smell is potentially what smell is in actuality; for the object of sensation rouses the sense to activity, which hence necessarily is that which, before stimulation, it was potentially.

Now odour is a smoke-like fume and smoke-like fumes originate from fire; hence the organ of smell is appropriately located in the regions around the brain, as the substrate of that which is cold is potentially hot.

The origin of the eyes is of the same fashion; they derive their composition from the brain, the coldest and most watery of the bodily members.

The sense of touch is connected with earth; and taste is a species of touch. Hence the sensoria of both—taste as well as touch—are closely related to the heart, which has qualities contrary to those of the brain and is the warmest of the members.
Περί δὲ τῶν αἰσθητῶν τῶν καθ’ ἐκαστὸν αἰσθητήριον, οἷον λέγω χρώματος καὶ ψόφου καὶ ὅσμης καὶ χυμοῦ καὶ ἀφῆς, καθόλου μὲν εἰρήται ἐν τοῖς περὶ ψυχῆς, τὶ τὸ ἔργον αὐτῶν καὶ τὶ τὸ ἑνεργεῖν καθ’ ἐκαστὸν τῶν αἰσθητηρίων. τὶ δὲ ποτὲ δεῖ λέγειν ὀτιοῦν αὐτῶν, οἷον τὶ χρώμα ἢ τὶ ψόφον ἢ τὶ ὅσμην ἢ χυμόν, ὁμοίως δὲ καὶ περὶ ἀφῆς, ἐπισκεπτέον, καὶ πρῶτον περὶ χρώματος. ἔστι μὲν οὖν ἐκαστὸν διχῶς λεγόμενον, τὸ μὲν ἑνεργεία
tὸ δὲ δυνάμει. τὸ μὲν οὖν ἑνεργεία χρώμα καὶ ὁ ψόφος πῶς ἔστι τὸ αὐτὸ ἢ ἔτερον ταῖς κατ’ ἑνεργείαιν αἰσθή-
σεσιν, οἷον ὀράσει καὶ ἀκούσει, εἰρήται ἐν τοῖς περὶ
ψυχῆς. τὶ δὲ ἐκαστὸν αὐτῶν ὑπὸν ἴσον τῆς αἰσθησιν καὶ τῆς ἑνεργείας, νῦν λέγωμεν. ὅσπερ οὖν εἰρήται
20 περὶ φωτὸς ἐν ἑκέινοις, ὅτι ἔστι χρώμα τοῦ διαφανοῦς
cατὰ συμβεβηκός· ὅταν γὰρ ἐνῇ τὶ πυρῶδες ἐν διαφανεῖ,
ἡ μὲν παρουσία φῶς, ἡ δὲ στέρησις ἔστι σκότος· ὁ δὲ
λέγομεν διαφανεῖ, οὐκ ἔστων ἱδίον ἀέρος ἢ ὑδάτος οὐδὲ
ἀλλο τῶν οὐτω λεγομένων σωμάτων, ἀλλά τις ἔστι
25 κοινὴ φύσις καὶ δύναμις, ἡ χωριστὴ μὲν οὐκ ἔστων, ἐν
tούτοις δ’ ἔστι, καὶ τοῖς ἄλλοις σώμασιν ἐνυπάρχει,
tοῖς μὲν μᾶλλον τοῖς δ’ ἤππον· ὅσπερ οὖν καὶ τῶν
σωμάτων ἀνάγκη τι εἶναι ἐσχατον, καὶ ταύτης· ἡ μὲν
οὖν τοῦ φωτὸς φύσις ἐν ἄριστῳ τῷ διαφανεῖ ἔστων·
30 τοῦ δ’ ἐν τοῖς σώμασι διαφανοῦς τὸ ἐσχατὸν ὅτι μὲν εὖ
ἀν τι, δὴλον, ὧτι δὲ τοῦτ’ ἔστι τὸ χρώμα, ἐκ τῶν
συμβανόντων φαινόν. τὸ γὰρ χρώμα ἢ ἐν τῷ πέρατε
ἔστων ἢ πέρας· διὸ καὶ οἱ Πυθαγόρειοι τὴν ἐπιφάνειαν
χροιᾶν ἔκάλουν· ἔστι μὲν γὰρ ἐν τῷ σώματος πέρατι,
Let this be the way in which we discriminate the sensitive organs of the body.

III

In the Psychology we have given a general account of the objects corresponding to the particular sense-organs, to wit colour, sound, smell, flavour, and touch; we have stated what their function is, and described the mode of their operation in relation to the several sense-organs. But the nature we must ascribe to any one of these objects we have still to consider; we must ask, for instance, what is colour, or sound, or odour, or flavour? So, too, what is the object of touch? Let us begin our inquiry with colour.

Now we can regard each of these sense objects in two ways, as potentially or as actually existent. We have explained in the Psychology in what sense actual colour and sound are identical with or different from actual sense experience, e.g. sight and hearing; but now we are to discuss the nature of those sense objects in virtue of which they cause sensation and its activity.

It was stated in the work quoted above when we treated of light that it is the colour of the transparent medium contingently determined; for when anything of the nature of fire is found in the transparent medium its presence constitutes light, its absence darkness.

What we have spoken of as the transparent element is nothing which is found exclusively in air or in water or in any one of the substances of which transparency can be predicated; it is some sort of constitution and potency which they have in common, and which, not being an independent reality, finds its existence in these bodies and subsists in varying degrees in the rest of material substances. Thus, in so far as these bodies must have boundaries, this too must have its limits.

Now it is in the transparent medium apart from its limits that light has its being; but it is clear that the boundary of the transparent element which exists in bodies is something real. That this is colour the facts make plain, for colour either exists in the boundary or constitutes the boundary of a thing, and hence (a corroborating circumstance) the Pythagorean terminology identified the visible superficies with colour. This was plausible, for colour exists in the
35 ἀλλ' οὖ τὸ τοῦ σώματος πέρας, ἀλλὰ τὴν αὐτὴν φύσιν
439β δεὶ νομίζειν, ἢπερ καὶ ἔξω χρωματίζεται, ταύτην καὶ
evτός. φαίνεται δὲ καὶ ἄηρ καὶ ὑδάρ χρωματιζόμενα·
aὶ γὰρ ἡ αὐγὴ τοιοῦτον ἔστω. ἀλλά ἐκεί μὲν διὰ τὸ
ev ἀορίστῳ οὖ τὴν αὐτὴν ἐγγύθεν καὶ προσιόυσι καὶ
5 πόρρωθεν ἔχει χροιάν οὐθ' ὁ ἄηρ οὐθ' ἡ θάλαττα· ἐν
de τοῖς σώμασιν εὰν μὴ τὸ περιέχον ποιῆ τὸ μεταβάλλειν,
ὁρισται καὶ ἡ φαντασία τῆς χρόας. δὴλον ἄρα ὅτι τὸ
αὐτὸ κάκει κανθάδε δεκτικὸν τῆς χρόας ἐστῖν. τὸ ἄρα
dιαφανὲς καθ' ὅσον ὑπάρχει ἐν τοῖς σώμασιν (ὑπάρχει
dὲ μάλλον καὶ ἦττον ἐν πάσι) χρώματος ποιεῖ μετέχειν.
ἐπεὶ δ' ἐν πέρατι ἡ χρώα, τούτου ἄν ἐν πέρατι εἶη. ὅστε
χρώμα ἀν εἶη τὸ τοῦ διαφανοῦς ἐν σώματι ὀρισμένῳ
πέρας. καὶ αὐτῶν δὲ τῶν διαφανῶν, οἷον ὑδατὸς καὶ
eὶ τὶ ἄλλῳ τοιοῦτον, καὶ ὅσοι φαίνεται χρώμα ὑδιὸν
15 ὑπάρχειν κατὰ τὸ ἔσχατον, ὁμοίως πᾶσιν ὑπάρχει.
ἔστι μὲν οὖν ἐνεών ἐν τῷ διαφανεῖ τοῦθ' ὑπὲρ καὶ ἐν
17 τῷ ἀέρι ποιεῖ φῶς, ἔστι δὲ μῆ, ἀλλ' ἐστηρηθεῖαι.

17 Ὡσπερ οὖν ἐκεῖ τὸ μὲν φῶς τὸ δὲ σκότος, οὖτως ἐν τοῖς σώμασιν
ἐγγύθεται τῷ λευκῷ καὶ τῷ μέλαν. περὶ δὲ τῶν ἄλλων
20 χρωμάτων εἰδή διελομένους ποσαχῶς ἐνδέχεται γίγνεσθαι
λεκτέον. ἐνδέχεται μὲν γὰρ παρ' ἄλληλα τιθέμενα τὸ
λευκὸν καὶ τὸ μέλαν, ὡσθ' ἐκάτερον μὲν εἶναι ἀόρατον
diὰ σμικρότητα, τὸ δ' ἐξ ἀμφοῖν ὀρατῶν, οὖτω γίγνεσθαι.
tοῦτο γὰρ οὔτε λευκὸν οἷον τε φαίνεσθαι οὔτε μέλαν.
25 ἐπεὶ δ' ἀνάγκη μὲν τὶ ἔχειν χρώμα, τοῦτων δ' οὐδέτερον
δυνατόν, ἀνάγκη μικτὸν τί εἶναι καὶ εἰδός τι χρόας
ἐτερον. ἔστι μὲν οὖν οὖτως ὑπολαβέειν πλείους εἶναι
χρῶας παρὰ τὸ λευκὸν καὶ τὸ μέλαν, πολλὰς δὲ τῷ
λόγῳ· τρία γὰρ πρὸς δύο, καὶ τρία πρὸς τέτταρα, καὶ
30 κατ' ἄλλους ἀριθμοὺς ἐστὶ παρ' ἄλληλα κεῖσθαι, τὰ δ'
boundary, but it by no means is the boundary of the body; 35
nay, we must believe that internally there exists the same 439 b
constitution as externally displays colour. So both air and
water show tint; the sheen they have is a phenomenon of
this kind; but here, because it exists in something with no
definite boundaries, the colour both of the air and of the sea
is not the same when regarded from afar and from near at
hand. In solid bodies, however, unless the surrounding 5
medium cause it to change, the coloured appearance remains,
equally with the surface, fixed. It is therefore clear that in
both cases it is the same nature which is capable of being
endowed with colour: hence the transparent element in so
far as it is found in bodies (and it exists in all in varying
degrees) causes them to be endowed with colour. But since 10
it is in a bounding surface that colour is found, it is in the
surface of this—the transparent element—that colour exists.
Colour then is the limit of the transparent element in a
determinately bounded body; and it is found in all bodies
alike, both in transparent substances themselves, such as
water and anything similar to it, and in those which appear
to have a surface colour of their own. Consequently, that, 15
which in air causes light, may be present in the trans-
parent medium or it may not, i.e. may be awanting.

Thus, just as we can explain light and darkness re-
spectively by the presence or absence of this cause in the
air, so in the case of solid bodies we can account for the
existence of black and white colour. But the other colours
still await classification and an inquiry into the various ways 20
in which they may be produced.

Firstly, white and black may be juxtaposed in such a way
that by the minuteness of the division of its parts each is
invisible while their product is visible, and thus colour may
be produced. This product can appear neither white nor
black, but, since it must have some colour and can have
neither of the above two, it must be a sort of compound and 25
a fresh kind of tint. In this way, then, we may conceive that
numbers of colours over and above black and white may be
produced, and that their multiplicity is due to differences in
the proportion of their composition. The juxtaposition may
be in the proportion of three of the one to two of the other,
or three to four or according to other ratios. Others again 30
ολως κατά μὲν λόγον μηδένα, καθ’ ὑπεροχήν δὲ τινα καὶ ἐλλευψιν ἀσύμμετρον, καὶ τὸν αὐτὸν δὴ τρόπον ἐχειν ταύτα ταῖς συμφωνίαις· τὰ μὲν γὰρ ἐν ἁριθμοῖς εὐλογίστοις χρώματα, καθάπερ ἐκεῖ τὰς συμφωνίαις, τὰ 440 a ἡδιστά τῶν χρωμάτων εἶναι δοκοῦντα, οἴον τὸ ἀλουργὸν καὶ φοινικὸν καὶ ὀλύγ’ ἄττα τοιαύτα, δι’ ἤπιτερ αἰτίαν καὶ αἱ συμφωνίαι όλγαι, τὰ δὲ μὴ ἐν ἁριθμοῖς τάλλα χρώματα, ἥ καὶ πάσας τὰς χρώας ἐν ἁριθμοῖς εἶναι, τὰς 5 μὲν τεταγμένας τὰς δὲ ἀτάκτους, καὶ αὐτὰς ταὐτας, ὅταν μὴ καθαραὶ ὤσι, διὰ τὸ μὴ ἐν ἁριθμοῖς εἶναι τοιαύτας γίγνεσθαι. εἰς μὲν οὖν τρόπος τῆς γενέσεως τῶν χρω-
μάτων οὕτως, εἰς δὲ τὸ φαίνεσθαι δ’ ἄλληλων, οἴον ἐνίοτε οἱ γραφεῖς ποιοῦσιν, ἐτέραν χρόαν ἐφ’ ἐτέραν 10 ἐναργεστέραν ἐπαλείφουσιν, ὡσπέρ οὖταν ἐν οὐδατί τι ἦν ἀέρι βούλωνται ποιῆσαι φαύνομενον, καὶ οἴον ὁ ἔλεος καθ’ αὐτὸν μὲν λευκὸς φαύνεται, διὰ δ’ ἄξιός καὶ καπνοῦ φοινικοῦς. τολλαὶ δὲ καὶ οὕτως ἐσονται χρόα τοῦ αὐτοῦ τρόπου τῷ πρότερον εἰρημένω. λόγος γὰρ ἂν 15 εἰ ὑπ τῶν ἑπιστολῆς πρὸς τὰ ἐν βάθει, τὰ δὲ καὶ ὅλως οὐκ ἐν λόγῳ. [τὸ μὲν οὖν, ὡσπέρ καὶ οἱ ἄρχαῖοι, λέγεων ἀπορροίας εἶναι τὰς χρωίας καὶ ὁράσθαι διὰ τοιαύτην αἰτίαν ἄτοπον. πάντως γὰρ δ’ ἀφῆς ἀναγκαῖον αὐτοῖς ποιεῖν τὴν αἰσθήσιν, ὡστ’ εὐθὺς κρείττον φάναι τῷ 20 κινεῖσθαι τὸ μεταξὺ τῆς αἰσθήσεως ὑπὸ τοῦ αἰσθητοῦ γίνεσθαι τὴν αἰσθήσιν, ἀφῆ καὶ μὴ ταῖς ἀπορροίαις.] ἐπὶ μὲν οὖν τῶν παρ’ ἀλλήλα κειμένων ἀνάγκη ὡσπέρ καὶ μέγεθος λαμβάνειν ἄρατον, οὕτω καὶ χρόνον ἀναί-
σθητον, ἦν λάθωσιν αἱ κινήσεις ἀφικνούμεναι καὶ ἐν 25 δοκῆ εἶναι διὰ τὸ ἄμα φαίνεσθαι. ἑντάθα δὲ οὐδεμία ἀνάγκη, ἀλλὰ τὸ ἑπιστολῆς χρώμα ἀκίνητον ὄν καὶ κινοῦ-
μενον ὑπὸ τοῦ ὑποκειμένου οὐχ ὁμοίαν ποιήσει τὴν

440 a, 21 interpositis vers. 16—21 contextum interrumpi recte iudicat Thurol, cui assentitur Susemihl, Philol. 1855.
may be compounded in no commensurate proportion, with an excess of the one element and deficiency of the other which are incommensurable, and colours may, indeed, be analogous to harmonies. Thus, those compounded according to the simplest proportions, exactly as is the case in harmonies, will appear to be the most pleasant colours, e.g. purple, crimson, and a few similar species. (It is an exactly parallel reason that causes harmonies to be few in number.) Mixtures not in a calculable ratio will constitute the other colours. Or again, all tints may show a calculable proportion between their elements, but in some the scheme of composition may be regular, in others not, while when those of the latter class are themselves impure, this may be due to an absence of a calculable proportion in their composition.

This is one of the ways in which colours may be produced; a second is effected by the shining of one colour through another. This we may illustrate by the practice sometimes adopted by painters when they give a wash of colour over another more vivid tint, when, for example, they wish to make a thing look as though it were in the water or in the air. Again, we may illustrate by the sun, which in itself appears white, but looks red when seen through mist and smoke.

According to this account the multiplicity of the colours will be explained in the same way as in the theory mentioned before; we should have to suppose there was some ratio between the superficial and the underlying tints in the case of some colours, while in others there would be an entire lack of commensurate proportion.

[Thus we see that it is absurd to maintain, with the early philosophers, that colours are effluxes and that vision is effected by a cause of the efflux type. It was in every way binding on them to account for sensation by means of contact, and therefore it was obviously better to say that sensation was due to a movement set up by the sense object in the medium of sensation, and thus account for it by contact without the instrumentality of effluxes:]

According to the theory of juxtaposition, just as we must assume that there are invisible spatial quanta, so must we postulate an imperceptible time to account for the imperceptibility of the diverse stimuli transmitted to the sense organ, which seem to be one because they appear to be simultaneous. But on the other theory there is no such necessity; the surface colour causes different motions in the medium when acted on and when not acted on by an under-
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κύνησιν. Διὸ καὶ ἄτερον φαίνεται καὶ οὔτε λευκὸν οὔτε μέλαν. ὡστ' εἰ μὴ ἐνδέχεται μηδὲν εἶναι μέγεθος
30 ἀόρατον, ἀλλὰ πᾶν ἐκ τῶν ἀποστήματος ὅρατον, καὶ αὐτή τίς ἂν εἶναι χρωμάτων μίξις; κακείνως δ' οὐδὲν
κωλύει φαίνεσθαι των χρώμαν κοινὴν τοῖς πόρρωθεν·
ὅτι γὰρ οὐκ ἔστιν οὐδὲν μέγεθος ἀόρατον, ἐν τοῖς
ὑστερον ἐπισκεπτέον. εἰ δ' ἐστὶ μίξις τῶν σωμάτων
440 b μὴ μόνον τὸν τρόπον τοῦτον ὄντερ οἴσνται τινες, παρ'
ἀλληλα τῶν ἐλαχίστων τιθεμένων, ἀδήλων δ' ἡμῶν διὰ
τὴν αἰσθήσιν, ἀλλ' ὅλως πάντῃ πάντως, ὡσπερ ἐν τοῖς
περὶ μίξεως εἰρηται καθόλου περὶ πάντων· ἐκείνως μὲν
5 γὰρ μέγνυται ταῦτα μόνον ὡσα ἐνδέχεται διελεῖν εἰς τὰ
ἐλάχιστα, καθάπερ ἀνθρώπων ἵππους ἢ τὰ σπέρματα·
tῶν μὲν γὰρ ἀνθρώπων ἀνθρώπως ἐλάχιστος, τῶν δ' ἵππων ἵπποι· ὡστε τῇ τούτων παρ' ἀλληλα θέσει τὸ
πλήθος μέμικται τῶν συναμφότερων· ἀνθρώπων δὲ ἐνα
10 ἐν ἵππῳ οὐ λέγομεν μεμίχθαι· ὡσα δὲ μὴ διαφεῖται εἰς
tὸ ἐλάχιστον, τούτων οὐκ ἐνδέχεται μίξιν γενέσθαι τὸν
τρόπον τοῦτον ἀλλὰ τοῦ πάντῃ μεμίχθαι, ἀπερ καὶ
μάλιστα μέγνυσθαι πέφυκεν· πῶς δὲ τοῦτο γίνεσθαι
dυνατόν, ἐν τοῖς περὶ μίξεως εἰρηται πρότερον· ἀλλ' ὅτι
15 ἀνάγκη μιγνυμένων καὶ τὰς χρώσας μίγνυσθαι, δῆλον,
kai ταύτην τὴν αἰτίαν εἶναι κυρίαν τοῦ πολλάς εἶναι
χρώσας, ἀλλὰ μὴ τὴν ἐπιπόλασιν μηδὲ τὴν παρ' ἀλληλα
θέσιν· οὐ γὰρ πόρρωθεν μὲν ἐγγύθεν δ' οὐ φαίνεται
μία χρώσ τῶν μεμιγνυμένων, ἀλλὰ πάντοθεν. πολλαὶ δ' ἐν
20 ἐσονται χρώσι διὰ τὸ πολλοῖς λόγοις ἐνδέχεσθαι μίγνυ-
σθαι ἀλληλοις τὰ μιγνύμενα, καὶ τὰ μὲν ἐν ἀριθμοῖς
τὰ δὲ καθ' ὑπέροχην μόνον. καὶ τάλλα δὴ τῶν αὐτῶν
τρόπον ὄντερ ἐπὶ τῶν παρ' ἀλληλα τιθεμένων χρωμάτων
ἡ ἐπιπολής, ἐνδέχεται λέγειν καὶ περὶ τῶν μιγνυμένων.

440 a, 31 tis...miξes; Simon | tis...miξes. Biehl, Bek. et ceteri omnes.
lying tint. Thus it appears to be something different, and neither black nor white.

Therefore, if an invisible spatial quantity is an impossibility and every magnitude must be visible at some distance, we must dismiss the former theory and ask what sort of a colour mixture this latter also is. But, on the former theory as well, there is nothing to prevent distant objects appearing to have a uniform colour; for no magnitude is invisible, a problem to be discussed later on.

But let us premise that substances are mixed not merely in the way some people think—by a juxtaposition of their ultimate minute parts, which, however, are imperceptible to sense—but that they entirely interpenetrate each other in every part throughout; how this happens in all cases was explained in general terms in our dissertation on mixture. The former theory accounts for the mixture only of those things which can be resolved into ultimate least parts, e.g. men or horses or seeds. In a division of men, a man is the least part; in the case of horses, a horse; thus by the juxtaposition of these individuals the mixture produced is a mass consisting of both components, whereas we do not talk of mixing single man with single horse. On the other hand, things which cannot be resolved into least parts, cannot be mingled in this way; they must entirely interpenetrate each other; and these are the things which most naturally mix. We have already, in our treatment of mixture, explained how this is possible.

Now, all this being so, it is clear that when substances are mixed their colours too must be commingled, and that this is the supreme reason why there is a plurality of colours; neither superposition nor juxtaposition is the cause. In such mixtures the colour does not appear single when you are at a distance and diverse when you come near; it is a single tint from all points of view. The reason for the multiplicity of colours will be the fact that things which mix can be mixed in many different proportions, and some mixtures will show a numerical ratio, others only an incommensurable excess of one of the elements. So far indeed as other considerations go, the same account will apply to the juxtaposition or superposition of
25 διὰ τίνα δ’ αἰτίαν εἴδη τῶν χρωμάτων ἐστὶν ὁρισμένα καὶ οὐκ ἀπειρα, καὶ χυμῶν καὶ ψόφων, ὕστερον ἐροῦμεν.

IV

Τῇ μὲν οὖν ἐστὶ χρῶμα καὶ διὰ τήν αἰτίαν πολλαὶ χροιαὶ εἴσιν, εἴρηται· περὶ δὲ ψόφου καὶ φωνῆς εἰρηται πρότερον ἐν τοῖς περὶ ψυχῆς· περὶ δὲ ὀσμῆς καὶ χυμοῦν λεκτέων. σχέδου γάρ ἐστι τὸ αὐτὸ πάθος, οὐκ ἐν τοῖς αὐτοῖς δ’ ἐστὶν ἐκάτερον αὐτῶν. ἐναργέστερον δ’ ἐστὶν ἡμῖν τὸ τῶν χυμῶν γένος ἢ τὸ τῆς ὀσμῆς. τούτοις 441 a δ’ αἰτιον ὅτι χειρόστην ἔχομεν τῶν ἄλλων ζώων τὴν ὀσφρησιν καὶ τῶν ἐν ἡμῖν αὐτοῖς αἰσθήσεων, την δ’ ἀφὴν ἀκριβεστάτην τῶν ἄλλων ζώων. ἦ δὲ γεῦσις 4 ἀφὴ τις ἐστίν.

4 ‘Η μὲν οὖν τοῦ ύδατος ψύσις βούλεται 5 ἄχυμος εἶναι· ἀνάγκη δ’ ἢ ἐν αὐτῷ τὸ ύδωρ ἔχειν τὰ γένη τῶν χυμῶν ἀναίσθητα διὰ μικρότητα, καθάπερ Ἐμπεδοκλῆς φησίν, ἢ ὑλὴ τοιαύτην εἶναι οἶνον πανσπερμίαν χυμῶν, καὶ ἀπαντά μὲν εξ ὑδατος γίγνεσθαι, ἀλλὰ δ’ εἴς ἄλλου μέρους, ἡ μηδεμίαν ἔχουσα διαφορὰν 10 τοῦ ύδατος τὸ ποιοῦν αἰτίων εἶναι, οἶνον εἰ τὸ θερμὸν καὶ τὸν ἥλιον φαύς τις. τούτων δ’, ως μὲν Ἐμπεδοκλῆς λέγει, λίιαν εὐσύνοπτον τὸ ψεῦδος· ὁρῶμεν γάρ μεταβάλλοντα ύπὸ τοῦ θερμοῦ τοὺς χυμοὺς ἀφαιρουμένων τῶν περικαρπίων εἰς τὸν ἥλιον καὶ πυροποιῶν, ως 15 οὐ τῷ ἐκ τοῦ ύδατος ἐλκεῖν τοἰούτους γιγνομένους, ἄλλ’ εἰν αὐτῷ τῷ περικαρπίῳ μεταβάλλοντας, καὶ ἕξικμαξομένους δὲ καὶ κειμένους, διὰ τὸν χρόνον, αὐστηροὺς ἐκ γλυκέων καὶ πικρῶν καὶ παντοδαπῶν γιγνομένους, καὶ ἐψομένους εἰς πάντα τὰ γένη τῶν χυμῶν ὡς εἰπεῖν 20 μεταβάλλοντας. ὁμοίως δὲ καὶ τὸ πανσπερμία εἶναι

441 a, 14 πυροποιῶν conicio | πυροποιῶν Biehl, Bek. etc.
colours as to their mixture. The reason why they, and like-wise tastes and sounds, have definite species limited in number, will be given later on.

IV

We have defined colour and accounted for the multiplicity of its tints, while sound and articulate utterance have been treated in the Psychology; we are now to discuss smell and taste.

While as subjective phenomena they are practically identical, their vehicle is diverse; and tastes as a class are more vividly presented to human perception than odours. The reason for this is that our sense of smell is inferior to that of other animals, and is the poorest of the human senses. In delicacy of touch, however, we excel all other animals; now taste is a sort of touch.

To proceed to our discussion—water is characteristically of a flavourless nature; yet, either it must, tasteless as it is, be the receptacle in which the various flavours reside in amounts too minute to be detected—the Empedoclean theory—or it must be a material adapted to be the matrix, as it were, for the germs of all tastes. In this case all tastes will originate out of water, but different ones will arise from different parts of the matrix. Or we may hold that water is entirely undifferentiated, and impute the causality to that which acts upon it, for instance heat or the sun. A glance will suffice to show the falsity of the Empedoclean theory; for we can observe that the alteration in flavour is due to heat, when fruits are plucked, integument and all, and set in the sun and reddened. Their new flavour, then, cannot be extracted from water; nay, the change must take place within the fruit-covering itself. Through lying and drying fruits become, in time, harsh and bitter instead of sweet, and display all sorts of flavours; further, any kind of taste, so to speak, can be produced by subjecting them to the process of cooking.

Similarly water cannot possibly constitute the material of
τὸ ἕδωρ ὑλὴν ἀδύνατον· ἐκ τοῦ αὐτοῦ γὰρ ὅρωμεν ὡς τροφῆς γιγνομένους ἐτέρους χυμοὺς. λειπεῖ τοῦ τὸ πάσχειν τι τὸ ἕδωρ μεταβάλλειν. ὦτι μὲν τούπον οὐχ ὑπὸ τῆς τοῦ θερμοῦ δυνάμεως λαμβάνει ταύτην τὴν 25 δύναμιν ἣν καλοῦμεν χυμόν, φανερῶν· λεπτότατον γὰρ τῶν πάντων υγρῶν τὸ ἕδωρ ἐστὶ, καὶ αὐτοῦ τοῦ ἑλαιοῦ· ἀλλ' ἐπεκτείνεται ἐπὶ πλεῖον τοῦ ὑδάτος τὸ ἑλαιὸν διὰ τὴν γλυσχρότητά· τὸ δ' ἕδωρ ψαθυρὸν ἐστιν· διὸ καὶ χαλεπώτερον φυλάξαι ἐν τῇ χειρὶ τὸ ἕδωρ ἢπερ ἑλαιοῦ.

30 ἐπεὶ δὲ θερμαίνομεν οὐδὲν φαίνεται παχυνόμενον τὸ ἕδωρ αὐτὸ μόνον, δηλοῦν ὦτι ἐτέρα τις ἂν εἰ ἄιτια· οἱ γὰρ χυμοὶ πάντες πάχος ἔχουσι μάλλον· τὸ δὲ θερμὸν συναίτιον. φαίνονται δ' οἱ χυμοὶ ὀσοιπέρ καὶ

441 b ἐν τοῖς περικαρπίοις, οὕτως ὑπάρχοντες καὶ ἐν τῇ γῇ. διὸ καὶ πολλοί φασι τῶν ἄρχαιων φυσιολόγων τοιοῦτον εἶναι τὸ ἕδωρ δ' οίας ἂν γῆς πορεύσηται. καὶ τοῦτο δηλοῖν ἐστιν ἐπὶ τῶν ἀλμυρῶν ὑδάτων μάλιστα· οἱ γὰρ 5 ἄλες γῆς τι εἰδὸς εἰσιν. καὶ τὰ διὰ τῆς τέφρας διηθούμενα πικρᾶς οὐσις πικρῶν ποιεῖ τῶν χυμῶν. εἰςὶ τε κρῆναι πολλαί αἱ μὲν πικραί, αἱ δ' ὀξεῖαι, αἱ δὲ παντοδαποὺς ἔχουσιν χυμοὺς ἀλλούς. διὸ εὐλόγως ἐν τοῖς φυσικοῖς τὸ τῶν χυμῶν γίγνεται γένος μάλιστα. πά-

10 σχεῖν γὰρ πέφυκε τὸ υγρόν, ὡσπερ καὶ τάλλα, ὑπὸ τοῦ ἐναντίου· ἐναντίων δὲ τὸ ἕξηρον. διὸ καὶ ὑπὸ τοῦ πυρὸς πάσχει τι· ἔξηρα γὰρ ἢ τοῦ πυρὸς φύσις. ἀλλ' ὧδιον τοῦ πυρὸς τὸ θερμὸν ἐστὶ, γῆς δὲ τὸ ἕξηρον, ὡσπερ έἶρηται ἐν τοῖς περὶ στοιχείων. ἢ μὲν οὖν πῦρ 15 καὶ ἢ γῆ, οὐδὲν πέφυκε ποιεῖν καὶ πάσχειν, οὐδ' ἄλλο οὐδέν· ἢ δ' ὑπάρχει ἐναντίοτητι ἐν ἐκάστῳ, ταύτῃ πάντα καὶ ποιοῦσι καὶ πάσχουσιν. ὡσπερ οὖν οἱ ἐναποπλύνοντες ἐν τῷ υγρῷ τὰ χρῶματα καὶ τοὺς χυμοὺς τοιοῦτον ἐχεῖν ποιοῦσι τὸ ἕδωρ, οὕτως καὶ ἢ φύσις τὸ ἕξηρον

441 b, 8  διὸ εὐλόγως LSU | εὐλόγως δ' Biehl et Bek.
a universal matrix of flavors. It is a matter of observation that out of the very same water taken as nutriment, plants develop different flavors.

True, this leaves us with the theory that the water is acted on in some way, and changes in consequence. Now, plainly, it is not owing to the power resident in heat that it acquires the potency we call flavor; water is the thinnest of all liquids, thinner even than oil, though oil on the other hand spreads out more than water on account of its viscosity. Water, however, is non-cohesive, and hence is more difficult to keep in the hand without spilling than oil.

Since water by itself is the only substance which shows no thickening under the influence of heat, clearly something else must be the cause of the phenomenon in question, for all flavors tend to exhibit density. The heat is the cooperating cause.

It is a conspicuous fact that all the savours found in fruits exist also in the soil. Hence many of the early physical philosophers allege that water takes its character from the soil through which it passes. This is clearly so in the case of saline waters, for salt is a species of earth. Filtration through ash—a bitter substance—makes the taste bitter, and there are many springs, some of which are bitter, some acid, and others possessing manifold other tastes. Hence, as one would expect, it is principally in plants that flavors as a class develop.

The reason for this acquisition of a specific character by water is—it is the nature of humidity, as of everything else, to be acted on by its opposite; now its opposite is dryness. Hence fire too has an effect upon it, for fire by constitution is dry. But of fire heat is a peculiar property, of earth dryness, as we explained in discussing the elements.

Now, by constitution, fire quâ fire and earth quâ earth do not display activity and passivity, nor do any of the other elements per se; it is in so far as they have opposing qualities that the elements one and all react on each other. Thus, just as men by dissolving colours or savours in water communicate those qualities to the water, so nature acts upon that which is dry and earthy in character; by the aid of heat it causes liquid
20 καὶ τὸ γεώδες, καὶ διὰ τοῦ ξηροῦ καὶ γεώδους διηθοῦσα καὶ κινούσα τῷ θερμῷ ποιόν τι τὸ υγρὸν παρασκευάζει. καὶ ἐστὶ τούτῳ χυμὸς τὸ γεγυμνομένον ύπὸ τοῦ εἰρημένου ξηροῦ πάθος ἐν τῷ υγρῷ τῆς γεύσεως τῆς κατὰ δύναμιν ἀλλοωτικὸν εἰς ἐνέργειαν· ἀγεὶ γὰρ τὸ αἰσθητικὸν εἰς τοῦτο δυνάμει προοπάρχον· οὐ γὰρ κατὰ τὸ μαυθάνειν ἀλλὰ κατὰ τὸ θεωρεῖν ἐστὶ τὸ αἰσθάνεσθαι. ὅτι δὲ οὐ παντὸς ξηροῦ ἀλλὰ τοῦ τροφίμου οἱ χυμοὶ ἢ πάθος εἰσὶν ἢ στέρησις, δεῖ λαβεῖν ἐντεύθεν, ὅτι οὔτε τὸ ξηρὸν ἀνευ τοῦ υγροῦ οὔτε τὸ υγρὸν ἀνευ τοῦ ξηροῦ· τροφὴ
30 γὰρ οὐχ ἐν μόνῳ τοῖς ζύφοις, ἀλλὰ τὸ μεμιγμένον. καὶ ἔστι τῆς προσφερομένης τροφῆς τοῖς ζύφοις τὰ μὲν ἀπὰ τῶν αἰσθητῶν αὐξήσιν ποιοῦντα καὶ φθίσιν· τούτων μὲν γὰρ αὐτῶν ἢ θερμὸν καὶ ψυχρὸν τὸ προσφερόμενον· 442 α τὰῦτα γὰρ ποιεῖ καὶ αὐξήσιν καὶ φθίσιν· τρέφει δὲ ἡ γενστὸν τὸ προσφερόμενον· πάντα γὰρ τρέφεται τῷ γλυκεί, ἢ ἀπλῶς ἢ μεμιγμένως. δεῖ μὲν οὖν διορίζειν περὶ τούτων ἐν τοῖς περὶ γενέσεως, νῦν δὲ ὅσον ἀναγκαῖον 5 ἁμαρθαι αὐτῶν. τὸ γὰρ θερμὸν αὐξάνει καὶ δημιουργεῖ τὴν τροφήν, καὶ τὸ μὲν κούφων ἔλκει, τὸ δὲ ἀλμυρὸν καὶ πικρὸν καταλείπει διὰ βάρος. δὴ δὲ ἐν τοῖς ἔξω σώμασι ποιεῖ τὸ ἔξω θερμόν, τοῦτο τὸ ἐν τῇ φύσει τῶν ζῦφος καὶ φυτῶν· διὸ τρέφεται τῷ γλυκεί. συμμέ- 10 γνυνται δ' οἱ ἄλλοι χυμοὶ εἰς τὴν τροφήν τῶν αὐτῶν τρόπον τῷ ἀλμυρῷ καὶ ὀξεί, ἀντὶ ἡδύσματος. ταῦτα δὲ διὰ τὸ ἄντι πάντων λίαν τρόφιμον εἶναι τὸ γλυκὺ 13 καὶ ἐπιπολαστικῶν.

13 ὃσπερ δὲ τὰ χρώματα ἑκ λευκοῦ καὶ μέλανος μίξεῖς ἐστὶν, οὔτως οἱ χυμοὶ ἑκ γλυκέος καὶ 15 πικροῖ. καὶ κατὰ λόγον δὴ τῷ μᾶλλον καὶ ἦττον ἐκαστοὶ εἰσὶ, εἶτε καὶ ἀριθμοῦς τινας τῆς μίξεως καὶ

441 b, 30 οὐχ ἐν μόνῳ | οὔδεν αὐτῶν Biehl.
442 a, 12 ἀντὶ πάντων Biehl | ἀντιστὰν τῷ Bek. et reliqui edd.
to percolate and pass through dry and earthy substance, and thus gives it a definite quality. This is flavour, the modification which the said dry element produces in liquids, and which is capable of stimulating the sense of taste existing as a potentiality into active operation. This effect which it produces upon the sense-faculty has already potential existence in the sense-faculty, for sensation is parallel, not to learning, but to the exercise of knowledge.

It is not of all dry substance but of that which is nutritive that flavours are a modification positive or negative. The fact that neither does the dry apart from the humid nor liquidity apart from dryness yield savour, supplies us with a proof of this, for neither of these alone, but their mixture, furnishes nutriment to animals. In the food of animals it is the objects of tactual sensation that cause growth and decay; it is quid hot or cold that the food they eat is responsible for these phenomena, as heat and cold cause growth and decay. On the other hand it is in so far as it affects the taste that what is given to animals nourishes them, for they all thrive on that which is sweet, either pure or mixed with something else.

The full discussion of these facts which is entailed will be found in the work *On Generation*; at present we must touch on them only so far as is necessary. Heat causes growth; it is the active cause in the preparation of food, making the light elements rise and allowing the saline and bitter to fall on account of their weight. In fact, in plants and animals, their native heat performs the same function as that fulfilled by external heat in the case of external bodies; hence it is by sweet things that they are nourished. Other tastes are mingled with food for the same reason as the saline and acid; they serve as seasoning. This is necessary because the sweet is, in comparison with all other things, excessively nutritive, and tends to rise in the stomach.

Just as colours arise from a mixture of black and white, so tastes are a product of the sweet and the bitter. Proportion it is—a difference in the quantity of their components, that gives them individuality; and either the mixture and conse-
κυνήσεως, εἰτε καὶ ἀορίστως. οἱ δὲ τὴν ἡδονὴν ποιοῦντες μιγνύμενοι, οὕτωι ἐν ἄριθμοῖς. μόνος μὲν οὖν λιπαρὸς ὁ τῶν γυλκεός ἔστι χυμός, τὸ δὲ ἄλμυρὸν καὶ πικρὸν 
20 σχεδὸν τὸ αὐτό, ὁ δὲ αὐστηρὸς καὶ δριμύς καὶ στρυφνὸς καὶ ὄξυς ἀνὰ μέσον. σχεδὸν γὰρ ἵσα καὶ τὰ τῶν χυμῶν εἰδὴ καὶ τὰ τῶν χρωμάτων ἐστίν. ἐπτὰ γὰρ ἀμφοτέρως εἰδή, ἀν τις τιθῇ, ὦσπερ εὐλογον, τὸ φαινὸν μέλαν τι εἶναι· λείπεται γὰρ τὸ ἔξωθιν μὲν τοῦ λευκοῦ εἶναι 
25 ὦσπερ τὸ λιπαρὸν τοῦ γυλκεός, τὸ φωικοῦν δὲ καὶ ἄλμυρον καὶ πράσινον καὶ κυανοῦν ἀνὰ μέσον τοῦ λευκοῦ καὶ μέλανος, τὰ δὲ ἄλλα μικτὰ ἐκ τούτων. καὶ ὦσπερ τὸ μέλαν στέρησις ἐν τῷ διαφανεῖ τοῦ λευκοῦ, οὕτω τὸ ἄλμυρον καὶ πικρὸν τοῦ γυλκεός ἐν τῷ τροφίμῳ 
30 ὑγρῷ. διὸ καὶ ἡ τέφρα τῶν καομένων πικρὰ πάντων· 
31 εξίκμασται γὰρ τὸ πότιμον ἐξ αὐτῶν.

Δημόκριτος δὲ καὶ οἱ πλείστοι τῶν φυσιολόγων, ὁσοὶ λέγουσι περὶ αἰσθήσεως, 
442 b ἀτοπώτατον τι ποιοῦσιν· πάντα γὰρ τὰ αἰσθητὰ ἀπτὰ ποιοῦσιν. καίτοι εἰ καὶ τούτο οὕτως ἔχει, ὅρθον ὡς καὶ τῶν ἄλλων αἰσθήσεων ἐκάστη ἀφὶ τῖς ἐστίν· τοῦτο δ' ὅτι ἀδύνατον, οὐ χαλεπὸν συνιδεῖν. ἐτι δὲ τοὺς κοινοὺς 
5 τῶν αἰσθήσεων πασῶν χρωματίζει ὡς ιδίους· μέγεθος γὰρ καὶ σχῆμα καὶ τὸ τραχῦ καὶ τὸ λεῖον, ἐτι δὲ τὸ ὄξυ καὶ τὸ ἄμβλυ τὸ ἐν τοῖς ὀγκοῖς κοινὰ τῶν αἰσθήσεων ἐστίν, εἰ δὲ μὴ πασῶν, ἀλλ' ὤψεως γε καὶ ἀφῆς. διὸ καὶ περὶ μὲν τούτων ἀπατῶνται, περὶ δὲ τῶν ιδίων οὐκ 
10 ἀπατῶνται, οἷον ἡ ὤψις περὶ χρωματός καὶ ἡ ἀκοὴ περὶ ψόφων. οἱ δὲ τὰ ἱδία εἰς ταῦτα ἀνάγουσιν, ὦσπερ Δημόκριτος τὸ λευκὸν καὶ τὸ μέλαν· τὸ μὲν γὰρ τραχὺ φησιν εἶναι τὸ δὲ λεῖον, εἰς δὲ τὰ σχῆματα ἀνάγει τοὺς χυμοὺς. καίτοι ἡ οὐδεμιᾶς ἡ μάλλον τῆς ὄψεως τα. 
15 κοινὰ γνωρίζειν. εἰ δ' ἄρα τῆς γεύσεως μάλλον, τὰ
quent stimulus is in terms of some numerical ratio, or it varies indefinitely.

The mixtures, however, which produce pleasure are in a calculable proportion. Sweet flavours alone are oily; saline and bitter are practically the same; but sour, pungent, astringent, and acid occupy an intermediate position. The species of tastes and colours are practically equal in number. If, as is reasonable, one reckons grey to be a kind of black, there are seven of each, for there remain yellow—to be referred to white, as oily was to sweet—with crimson, purple, green, and blue intermediate between black and white; and all other colours are got by combining these. Just as black is absence of white in the transparent medium so salinity and bitterness are a deficiency of sweetness in nutritive liquid. Consequently the ashes of things which have been burned are bitter, for the scorching they have received has expelled their palatable fluid qualities.

Democritus and most of the physical philosophers who treat of sensation commit a most senseless blunder. They identify all sense qualities with the tactual. It is clear that if this were true each of the other senses would be a sort of touch; but it is not difficult to see that this is impossible.

In addition they treat the common sensibles as though they were the objects of a special sense; but this is erroneous, for magnitude, figure, roughness, and smoothness, as well as the sharpness and bluntness found in material bodies, are generic objects of sensation which, if not discerned by all the senses, are common to sight and touch at least. Hence we can explain the fact that we can make mistakes in perceiving the latter, but are never deceived as to the special sensibles; sight, for instance, makes no mistakes about colour, nor does hearing err in the matter of sounds.

These philosophers, however, reduce the special to the common, following the example of Democritus in the case of black and white. He identifies the one with the rough, the other with the smooth, and he reduces flavours to geometrical figures. But it falls to sight first, if to any sense, to discriminate
γοὺν ἐλάχιστα τῆς ἀκριβεστάτης ἐστὶν αἰσθήσεως δια-
κρίνειν περὶ ἐκαστὸν γένος, ὡστε ἔχρην τὴν γεῦσιν
καὶ τῶν ἄλλων κοινῶν αἰσθάνεσθαι μάλιστα καὶ τῶν
σχημάτων εἶναι κριτικωτάτην. ἔτι τὰ μὲν αἰσθητὰ
20 πάντα ἔχει ἐναντίωσιν, οἷον ἐν χρώματι τῷ μέλανι τὸ
λευκόν καὶ ἐν χυμοῖς τῷ γλυκεῖ τὸ πικρόν· σχῆμα δὲ
σχήματι οὐ δοκεῖ εἶναι ἐναντίον. τίνι γὰρ τῶν πολυ-
γώνων τὸ περιφέρεσ ἐναντίον; ἔτι ἀπείρων ὄντων τῶν
σχημάτων ἀναγκαίοι καὶ τοὺς χυμοὺς εἶναι ἀπείρους.
25 διὰ τί γὰρ ὁ μὲν ἀν ποιῆσειν αἰσθήσιν, ὁ δὲ οὐκ ἂν
ποιῆσεν; καὶ περὶ μὲν τοῦ γενοστοῦ καὶ χυμοῦ εἴρηται,
τὰ γὰρ ἄλλα πάθη τῶν χυμῶν οἰκείαι ἔχει τὴν σκέψιν
ἐν τῇ φυσιολογίᾳ τῇ περὶ τῶν φυτῶν.

V

Τὸν αὐτὸν δὲ τρόπον δεῖ νοῆσαι καὶ περὶ τὰς ὀσμάς·
30 ὁπερ γὰρ ποιεῖ ἐν τῷ ύγρῷ τὸ ἕχρόν, τούτῳ ποιεῖ ἐν
ἄλλῳ γένει τὸ ἐγχύμου ύγρόν, ἐν ἀέρι καὶ ὕδατι ὀμοίως.
κοινῶν δὲ κατὰ τούτων ὧν μὲν λέγομεν τὸ διαφανὲς,
443 a ἐστὶ δ’ ὀσφραντὸν οὐχ ἦ διαφανές, ἀλλ’ ἦ πλυντικὸν ἢ
ῥυπτικὸν ἐγχύμου ἔχρος, ἐπὶ ὅσον ἐν ἀέρι
ἀλλὰ καὶ ἐν ὕδατι τὸ ὑδάτι ὰσφρήσεως ἐστίν. δὴν οὔ
ἐπὶ τῶν ἱχθύων καὶ τῶν ἀπακοδέρμων· φαίνονται γὰρ
5 ὀσφρανόμενα οὔτε ἀέρος ὄντος ἐν τῇ ὑδάτι (ἐπιπολάζει
gὰρ ὁ ἁήρ, ὅταν ἐγγένεται) οὔτ’ αὐτὰ ἀναπνέοντα. εἰ
οὖν τις θεία καὶ τὸν ἁέρα καὶ τὸ ὕδωρ ἄμφω ὑγρά,
εἰς ἠν ἐν ύγρῷ τοῦ ἐγχύμου ἔχρον φύσις ὀσμή, καὶ
ὀσφραντὸν τὸ τοιοῦτον. οὕτως δ’ ἀπ’ ἐγχύμου ἐστὶ τὸ
10 πάθος, δὴν ἐκ τῶν ἐχόντων καὶ μὴ ἔχοντων ὀσμῆν·
tά τε γὰρ στοιχεία ἄσσμα, οὖν πῦρ ἁήρ γῆ ὕδωρ, διὰ
tο τά τε ύγρά καὶ ἔχρα αὐτῶν ἄχυμα εἶναι, ἃν μὴ τι
μεγνύμενον ποιῇ. διὸ καὶ ἡ θάλασσα ἔχει ὀσμῆν· ἔχει
the common sensibles; it is, at any rate, the function of the most delicate sense to discern the finest differences in its particular domain, and so, if it fall to taste first to perceive the common sensibles, taste would need to possess the finest discrimination of figure and be as well the best means of perceiving the other common sensibles.

A further objection is, that the objects of special sense all show contrariety in their determinations; for example, in colour black and white are opposed, in taste sweet and bitter. But there seems to be no opposition between one figure and another. To which of the polygons is the circle a contrary? Again, as figures are infinite in number, there must be an infinitude of tastes also, for why should one figure produce a taste and not another?

This is our account of flavour and its effect on taste. The other qualities which flavours present find their special treatment in the Natural History of Plants.

V

The theory to be accepted about odour also is the same as that about flavour. Precisely as dry substance produces an effect in liquid, liquid impregnated with flavour acts in a new field, operating in air and water alike.

We have just said that the transparent element is common to these two substances, but it is not quâ transparent that they affect the sense of smell; they do this in so far as they dissolve and absorb by erosion dry substance which possesses flavour; both substances form a medium for this sense, for smell is exercised not only in air but in water also. The case of the fishes and the testacea makes this plain; they evidently employ the sense of smell and yet neither is there air in the water (for it rises to the surface if ever it gets in) nor do these animals breathe.

Premising, then, the fact that air and water are both moist, we might define odour as the nature dry substance possessing flavour assumes in the moist, and the object of the sense of smell will be anything so qualified.

That this phenomenon issues from the possession of flavour, is clear on a review of those substances that are and those that are not odorous. The elements have no odour, to wit—fire, air, earth, and water, since they are flavourless—both those of them which are moist and those which are dry—except when forming a combination. Hence the sea too smells, for it has a taste and contains dry substance.
γὰρ χυμὸν καὶ ἐηρότητα. καὶ ἄλες μᾶλλον νῦτρον 15 ὀσμώδεις· δηλοὶ δὲ τὸ ἐξικμάζον ἐξ αὐτῶν ἔλαιον· τὸ δὲ νῦτρον γῆς ἐστὶ μᾶλλον. ἔτι λίθος μὲν ἀοσμον, ἄχυμον γάρ, τὰ δὲ ξύλα ὀσμώδη, ἐγχύμα γάρ· καὶ τούτων τὰ ὑδατώδη ἦττον. ἔτι ἐπὶ τῶν μεταλλευομένων χρυσῶς ἀοσμον, ἄχυμον γάρ, ὁ δὲ χαλκὸς καὶ ὁ σίδηρος 20 ὀσμώδη. ὅταν δ' ἐκκαυθῇ τὸ ύγρόν, ἀοσμότεραι αἱ σκωρίαι γίγνονται πάντων. ἄργυρος δὲ καὶ καττίτεροι τῶν μὲν μᾶλλον ὀσμώδη τῶν δ' ἦττον. ὑδατώδη γάρ. δοκεὶ δ' ἐνίοις ἡ κατνάθης ἀναθυμίασις εἶναι ὁσμή, οὕτα κοινή γῆς τε καὶ ἀέρος. [καὶ πάντες ἐπιφέρονται 25 ἑπὶ τούτῳ περί ὁσμῆς'] διὸ καὶ Ἰράκλειος οὕτως εἰρηκεν, ὡς εἰ πάντα τὰ ὄντα κατοικος γίγνοντο, ὅτι μένει ἄν διαγνοίειν. ἐπεὶ δὲ τὴν ὀσμὴν πάντες ἐπιφέρονται <ἐπὶ τούτῳ>, οἱ μὲν ὦς ἀτρύμδα, οἱ δ' ὦς ἀναθυμίασιν, οἱ δ' ὀς ἀμφο ταῦτα· ἐστὶ δ' ἡ μὲν ἀτρύμι ὑγρότης τις, 30 ἡ δὲ κατνάθης ἀναθυμίασις, ὥσπερ εἰρηται, κοινὸν ἀέρος καὶ γῆς· καὶ συνίσταται ἐκ μὲν ἐκείνης ὑδρῷ, ἐκ δὲ ταύτης γῆς τι εἶδος· ἀλλ' οὐδέτερον τοῦτων ἔουκεν· ἡ μὲν γάρ ἀτρύμι ἐστὶν ὑδατος, ἡ δὲ κατνάθης ἀναθυμίασις ἀδύνατος ἐν ὑδατὶ γενέσθαι· ὀσμάται δὲ καὶ τὰ ἐν τῷ 443 ὑδατὶ, ὥσπερ εἰρηται πρότερον· ἐτὶ ἡ ἀναθυμίασις ὁμοίως λέγεται ταῖς ἀπορροίαις· εἰ οὖν μηδ' ἐκείνη καλῶς, οὐδ' αὕτη καλῶς. ὥστε μὲν οὖν ἐνδέχεται ἀπολαύειν τὸ ύγρον καὶ τὸ ἐν τῷ πνεύματι καὶ τὸ ἐν τῷ 5 υδατὶ καὶ πάσχειν τι υπὸ τῆς ἐγχύμου ἐηρότητος, οὐκ ἄδηλον· καὶ γὰρ ὁ ἀὴρ ύγρὸν τὴν φύσιν ἑστὶν. ἐτὶ δ' εἰπερ ὁμοίως ἐν τοῖς ύγροῖς ποιεί καὶ ἐν τῷ ἀέρι οὖν ἀποπλυνόμενον τὸ χηρόν, φανερὸν ὅτι δεῖ ἀνάλογον εἶναι τᾶς ὁσμᾶς τοῖς χυμοῖς. ἄλλα μὴν τούτῳ γε ἐπ' ἐνίων 10 συμβέβηκεν· καὶ γὰρ δριμεῖαι καὶ γλυκεῖαι εἰςων ὁσμαί καὶ αὐστηραί καὶ στρυφναί καὶ λιπαραί, καὶ τοῖς πικροῖς

443 a, 24 καὶ...ὁσμῆς 25 damnum Thurot. 28 ἐπὶ τούτῳ om. codd. et edd., addidit Christ probat etiam Biehl.
Salt smells more than natron, as the oil extracted from it proves, while natron is more of the nature of earth. Moreover, stone is odourless, since flavourless; but woods, being possessed of taste, are scented, the watery ones less so. Again, among metals gold is odourless, having no taste; bronze and iron have a smell. The dross left, when the fluid element is smelted out of these metals, in every case possesses less odour than the ore itself. Silver and tin smell more than the one class and less than the other; for they are aqueous.

Some people think that the smoky variety of fume constitutes odour, since it is a joint product of earth and air. [All ascribe odour to this.] Hence too the saying of Heraclitus that "if all things were turned into smoke the nostrils would distinguish them." Now all ascribe odour to this phenomenon, some taking it to be steam, others a fume, while some again ascribe it to both.

Steam is a sort of moisture, and smoke-like fume is a joint product of air and earth, as has been said; out of the former water condenses, out of the latter some species of earth. But neither of these seems to be odour; for steam may be classed as water, while again smoke-like fumes cannot exist in water; but creatures living in water do employ the sense of smell, as already said. Further the theory of fumes is similar to that of effluxes and, if that theory was erroneous, so is this.

It is clear that moisture, both as it exists in the atmosphere and as it exists in water, can derive something from and be modified by dry substance which possesses flavour, for air too has moisture in its constitution. Moreover if the effect of the dry substance in liquids and in air, when it is, as it were, dissolved in them, is similar to its previous action in liquid alone, manifestly odours and tastes must be analogous to each other. Indeed in several cases this correspondence occurs; odours are pungent and sweet, harsh, astringent and
τάς σαπρᾶς ἄν τις ἀνάλογον εἴποι. διὸ ὥσπερ ἐκεῖνα δυσκατάποτα, τὰ σαπρά δυσανάπνευστα ἐστίν. δήλον ἀρα ὅτι ὥσπερ ἐν τῷ ὑδατὶ ὁ χυμός, τούτ' ἐν τῷ ἀέρι καὶ 15 ὑδατὶ ἡ ὅσμη. καὶ διὰ τούτο τὸ ψυχρὸν καὶ ἡ πῆξις καὶ τοὺς χυμοὺς ἀμβλύνει καὶ τὰς ὅσμας ἀφανίζει· τὸ γὰρ θερμὸν τὸ κίνων καὶ δημιουργοῦν ἀφανίζουσιν ἡ ψῦξις καὶ ἡ πῆξις.

Εἴδη δὲ τοῦ ὁσφραντοῦ δύο ἐστίν· ὦ γὰρ ὥσπερ 20 τινὲς φασίν, οὐκ ἐστίν εἴδη τοῦ ὁσφραντοῦ, ἀλλ' ἐστίν. διοριστέοι δὲ πῶς ἐστὶ καὶ πῶς οὐκ ἐστίν· τὸ μὲν γὰρ ἐστὶ κατὰ τοὺς χυμοὺς τεταγμένον αὐτῶν, ὥσπερ εἰπομεν, καὶ τὸ ἡδὺ καὶ τὸ λυπηρὸν κατὰ συμβεβηκὸς ἔχουσιν· διὰ γὰρ τὸ θρεπτικὸν πάθη εἶναι, ἐπιθυμοῦντων μὲν 25 ἤδειαι αἱ ὅσμαι τοῦτων εἰσὶ, πεπληρωμένοι δὲ καὶ μηδὲν δεομένοι οὖχ ἤδειαι, οὐδ' ὅσοις μὴ καὶ ἡ τροφὴ ἡ ἔχουσα τὰς ὅσμας ἤδειαι, οὐδὲ τοῦτοι. ὡστε αὕτη 30 δὲ καθ' αὐτάς ἤδειαι τῶν ὅσμῶν εἰσὶν, οἷον αἱ τῶν ἀνθέων· οὐδὲν γὰρ μᾶλλον οὐδ' ἤττον πρὸς τὴν τροφὴν παρακαλοῦσιν, οὐδὲ συμβάλλονται πρὸς ἐπιθυμίαν οὐδέν, ἀλλὰ τοῦνατίον μᾶλλον· ἀληθές γὰρ ὥσπερ Εὐρυπίδην σκόπτων εἰπε Στράττις, "ὅταν φακὴν ἔψητε, μὴ 'πιχεὶν 444 ἀμύρον.") οἱ δὲ νῦν μιγνύντες εἰς τὰ πόματα τὰς τοιαύτας δυνάμεις βιαζοῦται τῇ συνηθείᾳ τὴν ἡδονήν, ἐως ἅν ἐκ δυ' αἰσθήσεων γενηται τὸ ἡδὺ ὡς ἄν καὶ ἀπὸ μιᾶς. τούτῳ μὲν οὖν τὸ ὁσφραντὸν ἤδιον τῶν ἀνθρώπων ἐστίν, 5 ἥ δὲ κατὰ τοὺς χυμοὺς τεταγμένη καὶ τῶν ἄλλων ζῴων, ὥσπερ εἰρηταὶ πρὸτερον· κάκεινων μὲν, διὰ τὸ κατὰ συμβεβηκὸς ἔχειν τὸ ἡδύ, διήρηται τὰ εἴδη κατὰ τοὺς χυμοὺς, ταυτής δ' οὐκέτι, διὰ τὸ τὴν φύσιν αὐτῆς εἶναι καθ' αὐτὴν ἤδειαιν ἡ λυπηράν. αὐτίον δὲ τοῦ ἤδιον εἴναι 10 ἀνθρώπου τὴν τοιαύτην ὅσμην διὰ τὴν ἐξίν τὴν περὶ
oily, and we might regard fetid odours as corresponding to bitter tastes; this would explain the parallel unpalatability of the latter and noisomeness of the former. Thus it is clear that smell is in air and water precisely what flavour is in water.

It is for this reason that cold and frost blunt flavours and reduce odours to non-existence, for the heat which is the active and creative cause is nullified by the cooling and congelation.

There are two sorts of odorous qualities; it is not the case, as some allege, that there are not different species of odour. They do exist; but we must determine in what sense they are authentic and in what sense not.

The one set are in order parallel to the various flavours as we have explained. Their pleasantness and unpleasantness belong to them contingently, for, since they are qualities of that which forms our food, these smells are pleasant when we are hungry, but when we are sated and not requiring to eat, they are not pleasant; neither are they pleasant to those who dislike the food of which they are the odour. Hence, as we said, their pleasantness and unpleasantness are contingent and hence too they are common to all animals. But the other class of smells are per se pleasant, for example the scents of flowers. They have no influence either great or small in attracting us to our food nor do they contribute anything to the longing for it. Their effect is rather the opposite; there is a truth contained in Strattis's jibe at Euripides—"Pray perfume not the good pea-soup." Those who do as a fact mix such elixirs with their drink get a forced pleasure by accustoming themselves to it, so that the pleasantness arising from the two sensations becomes apparently the result of one. This sort of odorous quality is thus peculiarly the object of human sense, but that coordinate with the varieties of flavour is proper to the other animals as well, as said before. Those odours, because their pleasantness is contingently attached to them, are classified in species which correspond to the several flavours, but in the other group this feature disappears, as there agreeableness and the reverse attach to the essential nature of the odour.

The cause of the restriction of odour of this kind to human sense comes from the constitution of the body in the
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τον ἐγκέφαλον. ψυχροῦ γὰρ ὄντος τῆς φύσιν τοῦ ἐγκέφαλον, καὶ τοῦ αἴματος τοῦ περὶ αὐτῶν ἐν τοῖς φλεβίοις ὄντος λεπτοῦ μὲν καὶ καθαροῦ, εὐψύκτου δὲ (διὸ καὶ ἡ τῆς τροφῆς ἀναθυμίας ψυχομένη διὰ τὸν τόπον τὰ 15 νοσηματικά βέματα ποιεῖ), τοῖς ἀνθρώποις πρὸς βοήθειαν ὑγείας γέγονε τὸ τοιούτον έδος τῆς ὀσμῆς· οὐδὲν γὰρ ἀλλο ἔργον ἐστὶν αὐτῆς [ἡ τούτο]. τούτο δὲ ποιεῖ φανερῶς· ἡ μὲν γὰρ τροφή ἥδεια οὕσα, καὶ ἕξηρα καὶ ύγρά, πολλάκις νοσώδης ἐστὶν, ἡ δ' ἀπὸ τοῦ εὐώδους 20 ὀσμῆ ἦ καθ' αὐτὴν ἥδεια ὑποσώμων ἀφέλιμος ὡς εἰπεῖν αἰε. καὶ διὰ τὸ τοῦτο γίγνεται διὰ τῆς ἀναπνοῆς, οὐ πάσιν ἄλλα τοῖς ἀνθρώποις καὶ τῶν ἐναίμων οἷον τοῖς τετράποσι καὶ ὅσα μετέχει μᾶλλον τῆς τοῦ αέρος φύσεως· ἀναφερομένων γὰρ τῶν ὀσμῶν πρὸς τὸν ἐγκέφαλον διὰ τὴν ἐν αὐτοῖς τῆς θερμότητος κοινότητα υγιεινότερος ἔχει τὰ περὶ τῶν τόπων τούτων· ἡ γὰρ τῆς ὀσμῆς δύναμις θερμὴ τῆς φύσιν ἐστὶν. κατακεχρηται δ' ἡ φύσις τῆς ἀναπνοῆς ἐπὶ δύο, ὡς ἔργῳ μὲν ἐπὶ τὴν εἰς τὸν θώρακα βοήθειαν, ὡς παρέργῳ δ' ἐπὶ 30 τὴν ὀσμῆν· ἀναπνεόντος γὰρ ὡσπέρ ἐκ παρόδου ποιεῖται διὰ τῶν μυκτήρων τῆς κίνησιν· ἱδιον δὲ τῆς τοῦ ἀνθρώπου φύσεως ἐστὶ τὸ τῆς ὀσμῆς τῆς θυματηθῆς γένος διὰ τὸ πλείστον ἐγκέφαλον καὶ ύγρότατον ἔχει τῶν ἀλλών γεων ὡς κατὰ μέγεθος· διὰ γὰρ τοῦτο καὶ μόνον 35 ὡς εἰπεῖν αἰσθάνεται τῶν γεων ἀνθρώπου καὶ χαίρει ταῖς τῶν ἀνθῶν καὶ ταῖς τῶν τοιούτων ὀσμαῖς· σύμμετρος γὰρ 444 b αὐτῶν ἡ θερμότης καὶ ἡ κίνησις πρὸς τὴν ὑπερβολὴν τῆς ἐν τῷ τόπῳ ύγρότητος καὶ ψυχρότητος ἐστὶν. τοῖς δ' ἀλλοις ὅσα πλεύμονα ἔχει διὰ τοῦ ἀναπνείων του ἐτέρου γένους τῆς τῆς ὀσμῆς τῆς αἰσθήσεως ἀποδέδωκεν ἡ φύσις,

444 a, 17 ἡ τούτω leg. LSU Alex. vet. tr. et omnes edd. excepto Biehl. 18 ἡ ante ἔγρα legunt exceptis E M Y et Biehl omnes codd. et edd. 19 et 20 δ' ἀπὸ τῆς ὀσμῆς τῆς καθ' αὐτὴν (ἐστιν) L P U) εὐώδους (quibus verbis ἥδεια addunt I. S. U) habent omnes codd. et edd., text. recept. omisso ἥδεια Biehl. 444 b, 3 τὸ ἀναπνείων edd., τοῦ P U et Wilson.
region of the brain. The brain is of a cold nature and the blood around it in the veins is thin and pure and is easily chilled (this explains why the upward ascending fumes from food on turning cold owing to the nature of that region cause a morbid flow of rheum). Hence it is for man's benefit, for the preservation of his health, that this species of odour has come into existence. This is its only function and it evidently fulfils it. Food, though sweet, being both dry and moist, is frequently unhealthy; but the odour, per se pleasant, of a fragrant perfume, is beneficial to us in whatever state we are. It is for this reason that it is by means of respiration that smell takes place, if not in all animals, yet in man and, among sanguineous animals, in the quadrupeds and such as participate more largely in an aerial constitution. When scents are carried up to the brain, owing to the lightness of the warm element contained in them, the parts in this region have a healthier tone; this takes place because the power in odour to produce an effect is constituted by heat.

Nature employs respiration for two purposes; its chief function is to maintain the action of the chest, its secondary one subserves the ends of smell, secondary, for the passage of the breath through the nostrils is, as it were, a cursory contrivance.

The reason why the class of odours of this description is restricted to man, is, that his brain is larger and more humid than that of all other animals in proportion to his size. This is why he alone, so to speak, among the animals, perceives and also enjoys the odours of flowers and similar scented objects; they are pleasant because their heat and activity are proportionate to the excess of humidity and cold in that part of the body.

Among other animals, in those which have lungs, breathing is the means which nature has bestowed upon them for the
6 ὃπως μὴ αἰσθητήρια δύο τοὐθ᾽ ἀπόχρη γὰρ καὶ ἀναπνεοούσιν, ὥσπερ τοῖς ἀνθρώποις ἀμφοτέρων τῶν ὀσφραντῶν, τούτοις τῶν ἐτέρων μόνων ὑπάρχουσα ἡ αἰσθήσις. τὰ δὲ μὴ ἀναπνέοντα ὅτι μὲν ἔχει αἰσθήσιν τοῦ ὀσφραντοῦ, φανερῶν καὶ γὰρ ἰχθύες καὶ τὸ τῶν ἐντόμων γένος πᾶν
10 ἀκρίβως καὶ πόρρωθεν αἰσθάνεται, διὰ τὸ θρεπτικὸν εἶδος τῆς ὁσμῆς, ἀπέχοντα πολὺ τῆς οἰκείας τροφῆς, οἶνον αἱ τε μελιτταὶ καὶ τοῖς μικρῶν μυρμηκῶν γένοις, οὖς καλοῦσι τινὲς κυῖσας, καὶ τῶν θαλαττῶν αἱ πορφύραι, καὶ πολλὰ τῶν ἄλλων τῶν τοιούτων ζῴων ὄξεως
15 αἰσθάνεται τῆς τροφῆς διὰ τὴν ὁσμήν. ὅτω δὲ αἰσθάνεται, οὐχ ὀμοίως φανερῶν. διὸ κἂν ἀπορησεῖσι τις τῷν αἰσθάνεται τῆς ὁσμῆς, εἴπερ ἀναπνέουσι μὲν γίνεται τὸ ὀσμάσθαι μοναξίν (τοῦτο γὰρ φαίνεται ἐπὶ τῶν ἀναπνεοῦντων συμβαίνον πάντων), ἐκείνων δὲ οὐθέν ἀνά-
20 πνεῖι, αἰσθάνεται μέντοι, εἰ μὴ τις παρὰ τᾶς πέντε αἰσθητῆς ἑτέρα. τοῦτο δὲ ἀδύνατον· τοῦ γὰρ ὀσφραντοῦ ὀσφρῆσις, ἐκεῖνα δὲ τούτου αἰσθάνεται, ἀλλὰ οὗ τῶν αὐτῶν ἵδος τρόπου, ἀλλὰ τοῖς μὲν ἀναπνέουσι τὸ πνεῦμα ἀφαιρεῖ τὸ ἐπικείμενον ὥσπερ πῶμα τι (διὸ οὐκ αἰσθά-
25 νεται μὴ ἀναπνέοντα), τοῖς δὲ μὴ ἀναπνεοούσιν ἀφήνεται τοῦτο, καθάπερ ἐπὶ τῶν ὀφθαλμῶν τὰ μὲν ἔχει βλέφαρα τῶν ζώων, ὃν μὴ ἀνακαλυφθέντων οὐ δύναται ὥραν, τὰ δὲ σκληρόφθαλμα οὐκ ἔχει, διόπερ οὐ προσδεῖται οὐδὲν ὄς τοῦ ἀνακαλύφους, ἀλλὰ ὤρα ἐκ τοῦ δυνατοῦ ὄντος αὐτοῦν καὶ τῶν ἄλλων ζῴων οὕτως οὖν οὐδὲν δυσχεραίνει τῶν καθ᾽ αὐτὰ δυσοδῶν τὴν ὁσμήν, ἀν μὴ τί τύχῃ φθαρτικὸν ὄν. ὑπὸ τούτων δὲ ὀμοίως φθείρεται καθάπερ καὶ οἱ ἀνθρώποι ὑπὸ τῆς τῶν ἀνθράκων ἀτμίδος καρπαμοῦσι καὶ φθείρονται πολλάκις· οὕτως ὑπὸ τῆς

444b, 5 ἐπείπερ καὶ ὅσ ἀναπν. leg. exceptis E M Y et Biehl reliqui omnes et scripti et impressi, etiam Alex. et vet. tr. 29 ὄντος Biehl | ὀρὰν L S U Alex. et omnes edd., “a facultate existente” vet. tr. | αὐτοῦ E M Y Biehl, αὐτῷ reliqui et scripti et impressi.
perception of the other genus of odour. This was to avoid creating two sense-organs; for if creatures merely breathe, the sense of smell is sufficiently well provided for, in the case of the animals the perception of the one class of odorous qualities, the only one possessed by them, just as it is in man who perceives both kinds.

That non-respiring animals perceive odorous quality is a matter of observation. Fishes and the insect-tribe perceive quite accurately and at a distance by means of the species of odour connected with nutriment, even when they are far away from the things that form their special food. For example bees and the kind of small ants called knipes and, among marine creatures, the purple-murex and many similar animals, have a very acute perception of food by means of smell.

But the organ of perception is not so obvious and so one might raise a difficulty and ask, "what is the organ with which these animals perceive smell, if in all respiring animals the sensation occurs in one way only, viz. by respiration (as is evidently the case in all creatures that breathe), and none of these breathe but yet do perceive odour? Perhaps they do not smell but have a new sense over and above the five."

This, however, is impossible; it is smell that is the sense of that which smells and this they perceive. Yet perhaps the manner of perception is not the same; perhaps in the case of respiring animals the breath displaces a superficial structure which serves in a way like a lid to cover the sense-organ; (this will explain why when we do not inhale the breath we do not smell;) but in the non-respiring animals this is entirely lacking. A parallel for this is the eye; some animals have eyelids and, unless these are open, they cannot see; but hard-eyed animals, not possessing them, do not require anything to open them, but see an object directly out of the organ which itself has the capacity of vision.

Similarly in accordance with our previous distinction we must notice that none of the other animals are distressed by the smell of things per se malodorous, unless any of these chance to be destructive to life. These noxious odours have a destructive effect upon them, just as they have upon men too, in whom the gas arising from coal causes headache and frequently death. So too, sulphurous and bituminous fumes
35 τοῦ θείου δυνάμεως καὶ τῶν ἀσφαλτωδῶν φθείρεται
445 αὐτὴς δὲ καθ’ αὐτὴν τῆς δυσωδίας οὐδὲν φροντίζουσιν, καίτοι πολλὰ τῶν φυομένων δυσώδεις ἔχει τὰς ὁσμάς, έαν μὴ τι συμβάλληται πρὸς τὴν γεύσιν ἢ τὴν ἐδωδὴν αὐτοῖς. 5 ἔοικε δ’ ἡ αἰσθησίς ἢ τοῦ ὀσφραίνεσθαι περίττων οὐσῶν τῶν αἰσθήσεων καὶ τοῦ ἁρμημοῦ ἔχοντος μέσον τοῦ περιττοῦ καὶ αὐτὴ μέση εἰναι τῶν τε ἀπτικῶν, οἴον ἀφῆς καὶ γεύσεως, καὶ τῶν δ’ ἄλλων αἰσθητικῶν, οἴον ὄψεως καὶ ἄκοῆς. διό καὶ τὸ ὀσφραντὸν τῶν θρεπτικῶν ἐστὶ πάθος τι (ταῦτα δ’ ἐν τῷ ἀπτῷ γένει) καὶ τοῦ ἀκονστοῦ δὲ καὶ τοῦ ὅρατοῦ, διὸ καὶ ἐν ἀέρι καὶ ἐν ὑδατί ὅσμωνται. ὥστ’ ἐστὶ τὸ ὀσφραντόν κοινὸν τι τούτων ἁμφότερων, καὶ τῷ τε ἀπτῷ ὑπάρχει καὶ τῷ ἀκονστῷ καὶ διαφανεῖ. διὸ εὐλόγως παρείκασται ξηρό- 15 τητὸς ἐν ὑγρῷ καὶ χυτῷ οἶον βαφῇ τις εἶναι καὶ πλύσεις. πῶς μὲν οὖν εἶδη δεῖ λέγειν καὶ πῶς οὐ δεῖ 17 τοῦ ὀσφραντοῦ, ἐπὶ τοσοῦτον εἰρήσθω.

17 Ὅ δ’ ἐλέγουσι τινες τῶν Πυθαγορείων, οὐκ ἐστίν εὐλογον· τρέφεσθαι γάρ φασιν ἐνα ζῷα ταῖς ὁσμαῖς. πρωτὸν μὲν γὰρ ὄρῳ μεν ὧτι τὴν τροφὴν δεῖ εἶναι συνθέτην. καὶ γὰρ τὰ τρεφόμενα οὐχ ἀπλὰ ἐστίν, διὸ καὶ περίττωμα γίνεται τῆς τροφῆς, ὃ μὲν ἐν αὐτοῖς ὃ δὲ ἔξω, ὥσπερ τοῖς φυτοῖς. ἔτι δ’ οὐδὲ τὸ ὑδωρ ἔθελε αὐτὸ μόνον ἁμίκτων ὁν τρέφεων· σωματῶδες γὰρ τι δεῖ εἶναι τὸ συντησόμενον. ἔτι 20 πολὺ ἦττον εὐλογον τὸν ἀέρα σωματοῦσθαι. πρὸς δὲ τούτοις, ὃτι πᾶσιν ἐστὶ τοῖς ζῴοις τόπος δεκτικὸς τῆς τροφῆς, ἐξ οὗ ὅταν εἰσέλθῃ λαμβάνει τὸ σῶμα· τοῦ δ’ ὀσφραντοῦ ἐν τῇ κεφαλῇ τὸ αἰσθητήριον, καὶ μετὰ πνευματώδους εἰσέρχεται ἀναθυμιάσασθαι, ὥστ’ εἰς τὸν ἀναπνευστικὸν βαδίζοι ἄν τόπον. ὅτι μὲν οὖν οὐ συμβάλλεται εἰς τροφὴν τὸ ὀσφραντόν, ἢ ὀσφραντὸν.
have the power of causing death in the other animals and are shunned by them in consequence. But they reckon not at all of the essential unpleasantness of the smell (though many plants are malodorous) unless it make some difference to the taste and to eating.

The number of the senses is uneven and the sense of smell, since an uneven number has a middle term, seems itself to occupy the intermediate position between the senses which require contact, viz. touch and taste, and those where the perception is mediated by something else, to wit, sight and hearing. For this reason also odour is a quality both of that which is nutritive (which falls within the class of things tangible) and of the audible and the visible, and hence the sense of smell is exercised both in air and in water. Thus the object of smell is something common to both of these and is found in things tangible, things audible and things transparent.

We had, therefore, good reason in comparing it to an infusion and solution of dry substance in that which is liquid and fluid. This is the sum of our account of the sense in which it is correct and that in which it is incorrect to talk of species in odour.

The theory held by certain Pythagoreans that some animals live on odours is an irrational doctrine.

In the first place, food must be a composite substance; the creatures that it nourishes are themselves not simple in structure. Hence from food a waste residue is developed which in some is internal, in others—plants, external; secondly, water by itself alone and unmixed has no nutritive tendency; food which is to form a concrete body must have solidity. Much less reason is there for supposing that air can be solidified. Furthermore, in all animals there is a receptacle for food and out of this the body is supplied upon the entrance of nutriment. But the organ for perceiving smell is in the head; odour enters the body along with the waft of the air we breathe and so must pass into the organs of breathing.

It is clear, then, that the object of the sense of smell has,
δῆλον· ὅτι μέντοι εἰς ὑγίειαν, καὶ ἐκ τῆς αἰσθήσεως καὶ ἐκ τῶν εἴρημένων φανερῶν, ὡστε ὁπερ ὁ χυμὸς ἐν τῷ θρεπτικῷ καὶ πρὸς τὰ τρεφόμενα, τούτῳ ἐστὶ πρὸς 445 b ὑγίειαν τὸ ὀσφραντόν. καθ' ἐκαστὸν μὲν οὖν αἰσθητήριον διωρίσθω τῶν τρόπων τούτων.

VI

Ἀπορήσεις δʹ ἂν τις, εἰ πᾶν σῶμα εἰς ἄπειρα διατείται, ὅρα καὶ τὰ παθήματα τὰ αἰσθήτα, οἶδον χρώμα 5 καὶ χυμὸς καὶ ὁμή καὶ ψόφος καὶ βάρος καὶ ψυχρόν καὶ θερμὸν καὶ κούφων καὶ σκληρὸν καὶ μαλακὸν; ἡ ἀδύνατον· ποιητικὸν γάρ ἐστιν ἐκαστον αὐτῶν τῆς αἰσθήσεως· τῷ δύνασθαι γὰρ κινεῖν αὐτὴν λέγεται πάντα. ὡστ' ἀνάγκη τὴν τε αἰσθήσεως εἰς ἄπειρα διατ- 10 ῥεῖσθαι καὶ πᾶν εἶναι μέγεθος αἰσθητόν· ἀδύνατον γὰρ λευκὸν μὲν ὄραν, μη̃ ποσὸν δε. εἰ γὰρ μη̃ οὕτως, ἐνδέχουτ' ἄν εἶναι το σῶμα μηδὲν ἔχουν χρώμα μηδὲ βάρος μηδὲ ἄλλο τι τοιοῦτον πάθος. ὡστ' οὔδ' αἰσθητὸν ὅλως· ταύτα γὰρ τὰ αἰσθητά. τὸ ἀρ' αἰσθητὸν ἐσται 15 συγκείμενον οὐκ ἐξ αἰσθητῶν. ἀλλ' ἀναγκαῖοι· οὐ γὰρ δὴ ἐκ γε τῶν μαθηματικῶν. ἐτί τινι κρυνόμεν ταύτα ἥ γνωσόμεθα; ἥ τῷ νῷ. ἀλλ' οὐ νοητὰ, οὔδὲ νοεὶ ὁ νος τὰ ἐκτὸς μη̃ μετ' αἰσθήσεως. ἀμα δ' εἰ ταύτ' ἔχει οὕτως, ἐοικε μαρτυρεῖν τοῖς τὰ ἀτομα ποιοῦσι μεγέθη· 20 οὕτω γὰρ ἂν λύοιτι ὁ λόγος. ἀλλ' ἀδύνατα· εἰρηται δὲ περὶ αὐτῶν ἐν τοῖς λόγοις τοῖς περὶ κινήσεως. περὶ δὲ τῆς λύσεως αὐτῶν ἀμα δῆλον ἐσται καὶ διὰ τὶ πεπερανται τὰ εἰδή καὶ χρώματος καὶ χυμοῦ καὶ φθόγγων καὶ τῶν ἄλλων αἰσθητῶν. ὃν μὲν γὰρ ἐστὶν ἐσχατα, ἀναγκαίον 25 πεπεράνθαι τὰ ἐντός· τὰ δ' ἐναντία ἐσχατα. πᾶν δὲ τὸ αἰσθητὸν ἔχει ἐναντίωσιν, οἶδον ἐν χρώματι τὸ λευκόν
per se, nothing to do with nourishment. That it makes a
difference to health is, however, obvious; both the experience
of the sensation itself and our argument prove it. Hence we
may conclude that odour has precisely the same office in
relation to health as flavour has in food and in relation to
the creatures that food nourishes.

This finishes our account of the objects relative to the 445 b
several sense-organs.

VI

The question might be raised whether, if all bodies are
infinitely divisible, the same is the case with their sensuous
qualities also, e.g. colour, flavour, odour, sound, weight, cold, heat, lightness, hardness and softness. Or is this impossible?
Each of those phenomena is able to cause sensation; they are all styled sense-qualities owing to their power of stimu-
lating the sense. Consequently, on the former alternative sensation will be capable of infinite subdivision and, as well, every magnitude will be perceptible, since it is impossible to perceive anything white which is not a quantum.

If this were not so, body might exist which was totally
without colour or weight or any other similar attribute. Consequently it would be totally imperceptible, for the above
form the list of the sense-qualities. The object of sensation
must then be composed of things which are imperceptible.
But it must be composed of constituents which are sen-
sible; for it certainly cannot consist of mathematical entities. Further how should we distinguish them or be aware of
them? By means of thought? But they are not objects of
thought; thought does not think external objects unless
sense cooperates.

At the same time also, this, if true, seems to give evidence
in support of the theory of atomic magnitudes, since that
would furnish a solution of the problem. But atomic magni-
tudes are impossible, as was explained in our treatment of
motion.

The solution of this problem and the reason why the
species of colour, taste, sound, etc. are limited in number, will
become apparent at the same time.

Where extremes exist the internal parts must be deter-
minate. Now contraries are extremes and every object of sense exhibits contrariety, e.g. in colour black and white,
καὶ τὸ μέλαν, ἐν χυμῷ γλυκῷ καὶ πικρῶν. καὶ ἐν τοῖς ἄλλοις δὴ πᾶσιν ἔστιν ἑσχατα τὰ ἐναντία. τὸ μὲν οὖν 
συνεχές εἰς ἀπειρα τέμνεται ἄνισα, εἰς δὲ ἵστα πεπε-

30 ὁμοίως δὲ καὶ ἐν τοῖς ἄλλοις αἰσθητοῖς τὰ μικρὰ πάμπαν ἐναντία 

νυμάιει γὰρ ὅρατα, ἑνεργεία δ᾽ οὖν, ὅταν μὴ χωρὶς ἢ καὶ 

γὰρ ἐνυπάρχει δυνάμει ἡ ποδιαία τῇ δίσποδι, ἑνεργεία 

δ᾽ ἢδη διαιρεθείσα. χωριζόμεναι δ᾽ αἱ τηλικαῦται ὑπε-

ροχαὶ εὐλόγως μὲν ἄν καὶ διαλύσωτε εἰς τὰ περιέχοντα. 

10 ὡσπερ καὶ ἀκαριάδος χυμός εἰς τὴν θάλατταν ἐκχυθεῖσ. 

οὐ μὴν ἄλλ᾽ ἐπείδη οὔθ᾽ ἡ τῆς αἰσθήσεως ὑπεροχή καθ᾽ 

αὐτὴν αἰσθητὴ οὔδὲ χωριστή (δυνάμει γὰρ ἐνυπάρχει 

ἐν τῇ ἀκριβεστέρᾳ ἡ ὑπεροχή), οὔδὲ τὸ τηλικοῦτον 

αἰσθητῶν χωριστῶν ἔσται ἑνεργεία αἰσθάνεσθαι, ἀλλ᾽ 

15 ὁμοίως ἔσται αἰσθητῶν. δυνάμει τε γὰρ ἔστιν ἢδη, καὶ 

ἐνεργεία ἔσται προσγενόμενον. ὅτι μὲν οὖν ἦνα μεγέθη 

καὶ πάθη λανθάνει, καὶ διὰ τῶν αἰτίαν, καὶ πῶς αἰσθητὰ 

καὶ πῶς οὖ, εἴρηται. ὅταν δὲ δὴ ἐνυπάρχοντα οὕτω 

ἡδη πρὸς αὐτὰ ἢ ὦστε καὶ ἑνεργεία αἰσθητὰ εἶναι, καὶ 

20 μὴ μόνον ὅτι ἐν τῇ ὄλῳ ἄλλα καὶ χωρὶς, πεπερασμένα 

ἀνάγκη εἶναι τὸν ἀριθμὸν καὶ χρώματα καὶ χυμοὺς 

22 καὶ φθόγγοις. 

22 Ἑπορήσειε δ᾽ ἄν τις, ἃρ᾽ ἀφικνοῦνται ἡ τὰ 

αἰσθητὰ ἢ αἱ κυνήσεις αἱ ἀπὸ τῶν αἰσθητῶν, ὑποτέρως 

446 α, 6 μὴ χωρὶς ἢ 446 β, 6 χωρὶς ἢ 446 μ. τ. 7 ἢ 446 Ε Ἡ Ἔ Μ Υ 

18 ἐνυπάρχῃ τούτῳ τοσάτα Ἐ. Σ. Υ. Αλέξ., ἐνυπάρχοντα 

οὗτῳ πώς ἄστα ἢ Π τ. τ. Βεκ. Διδούτε ἐκδ. ἐκδ. Βιهى.
in taste sweet and bitter, and in the others every one the contrary qualities form extremes.

Now continuous quantity when divided falls into an infinite number of unequal parts but into a finite number of equal parts. On the other hand that which is not per se continuous, falls into a finite number of species. Thus, while on the one hand sense-qualities must be considered as species, but on the other hand universally present the aspect of continuity, we must, to solve the difficulty, bring in the distinction between potential and actual. It is by this means that we explain why the ten thousandth part of a visible grain of millet escapes notice although the sight has encountered it, and why a sound within a quarter-tone escapes detection, although the whole series of notes in which it exists, being continuous, is heard; the interval between the mean point and extremes is not discernible and so too it is with very minute fractions in other objects of sense; they are potentially perceptible but not actually so unless they be isolated. So even the one-foot measure has but potential existence in the two-foot rule but, from the moment bisection takes place, it is something actual.

But it is reasonable to believe that, when fractions so excessively minute are isolated, they are moreover resolved into the surrounding medium, just as a tiny drop of flavouring is lost when spilled in the ocean, and so escapes perception. However that may be, since not even in the perception of minute objects is the excessively minute sensation in its individuality appreciable or isolable (it has a potential existence in that which is more accurately discriminated), neither will it be possible to have actual perception of the similarly minute object of sense in its separateness. Nevertheless perceptible it is; for it already is so potentially and, when taken in union with the whole, it becomes actually perceptible. Thus certain magnitudes and their qualities escape detection; this is our account of them and of the reason why that is so and of the senses in which they are and are not perceptible. But when the constituents of anything are already so related among themselves as to be also actually perceptible and perceptible not merely in the whole but individually as well, the determinations of colour and flavour and sound must be finite in number.

It may be asked—Do the objects of sense or the motions which issue from sense-objects (whichever of the two theories perception involves), when acting on us penetrate the medium through which they pass, prior to causing sensation? This is
ποτε γίνεται ἡ αἰσθησις, ὅταν ἐνεργῶσιν, εἰς τὸ μέσον
25 πρῶτον, οἷον ἡ τε ὁσμὴ φαίνεται ποιοῦσα καὶ ὁ ψόφος·
πρῶτερον γὰρ ὁ ἐγγύς αἰσθάνεται τῆς ὁσμῆς, καὶ ὁ
ψόφος ύστερον ἀφικνεῖται τῆς πληγῆς. ἄρ’ οὖν οὐτω
καὶ τὸ ὄρωμενον καὶ τὸ φῶς; καθάπερ καὶ Ἐμπεδοκλῆς
φησίν ἀφικνεῖσθαι πρῶτερον τὸ ἀπὸ τοῦ ἥλιου φῶς εἰς
30 τὸ μεταξὺ πρὸς τὴν ὁψιν ἢ ἐπὶ τὴν γῆν. δόξειε
δ’ ἂν εὐλόγως τοῦτο συμβαίνειν· τὸ γὰρ κινούμενον
κινεῖται ποθέν ποι, ὡστ’ ἀνάγκη εἶναι τινα καὶ χρόνον
446b ἐν δ’ κινεῖται ἐκ θατέρου πρὸς θάτερον· ὁ δὲ χρόνος πᾶς
diaρετός, ὦστε ἢν ὅτε οὔπω ἔωράτο ἀλλ’ ἐτ’ ἐφέρετο
ἥ ἀκτὶς ἐν τῷ μεταξὺ. καὶ εἰ ἀπαν ἀμα ἀκούει καὶ
ἀκήκοε καὶ δλως αἰσθάνεται καὶ ἃσχηται, καὶ μὴ ἐστι
5 γένεσις αὐτῶν, ἀλλ’ εἰσὶν ἄνευ τοῦ γίγνεσθαι ὁμος οὐδὲν
ήττον, ὦστερ ὁ ψόφος ὧδη γεγενημένης τῆς πληγῆς οὔπω
πρὸς τῇ ἁκοῇ. δηλοὶ δὲ τούτο καὶ ἡ τῶν γραμμάτων
μετασχημάτισις, ὡς γιγνομένης τῆς φορᾶς ἐν τῷ μεταξύ·
οὐ γὰρ τὸ λεχθὲν φαίνονται ἀκηκοότες διὰ τὸ μετα-
10 σχηματίζοσθαι φερόμενον τὸν ἀέρα. ἄρ’ οὖν οὔτω καὶ
τὸ χρῶμα καὶ τὸ φῶς; οὐ γὰρ δὴ τῷ πως ἐχειν τὸ μὲν
ὄρα τὸ δ’ ὁρᾶται, ὦστερ ἵσα ἐστὶν· οὔθεν γὰρ ἄν ἐδει
ποὺ ἐκάτερον εἶναι· τοῖς γὰρ ὑπὸς γιγνομένους οὐδὲν
diaφέρει ἡ ἐγγύς ἡ πόρρω ἄλληλων εἶναι. ἥ περὶ μὲν
15 τὸν ψόφον καὶ τὴν ὁσμὴν τοῦτο συμβαίνειν εὐλογοῦν·
ὦστερ γὰρ ὁ ἁὴρ καὶ τὸ ὑδωρ, συνεχῇ μὲν, μεμέρισται
δ’ ἀμφοτέρων ἡ κίνησις. διὸ καὶ ἐστὶ μὲν ὡς τὸ αὐτὸ
ἀκούει ὁ πρῶτος καὶ ὁ ύστερος καὶ ὁσφραίνεται, ἔστι
δ’ ὡς οὐ. δοκεῖ δὲ τισιν εἶναι ἀπορία καὶ περὶ τοῦτων·
20 ἀδύνατον γὰρ φασί τινες ἀλλὰν ἄλλω τὸ αὐτὸ ἀκούειν
καὶ ὅραν καὶ ὁσφραίνεσθαι· οὐ γὰρ οἷον τ’ εἶναι πολλούς
καὶ χωρίς ὑπέσα ἀκούει καὶ ὁσφραίνεσθαι· τὸ γὰρ ἐν
χωρίς ἀν αὐτὸ αὐτοῦ εἶναι. ἦ τοῦ μὲν κινήσαντος
πρῶτου, οἷον τῆς κόσμων ἡ λιβανωτοῦ ἡ πυρός, τοῦ
evidently the case, e.g., with odour and sound; he who stands nearer perceives the odour earlier, and a sound reaches the ear after the blow is struck. Is the same thing true of the object of vision and light? Empedocles too had the very same theory; he says that the light coming from the sun penetrates the medium first before meeting our sight or reaching the earth. This looks like a reasonable account of the phenomenon, for when a thing moves it moves from starting point to terminus and hence there must be some lapse of time as well while it passes from the one point to the other. Now every lapse of time is divisible and so there was a moment when as yet the ray of light was not perceived but was still on its passage through the medium. Though, in every act, hearing and perception generally are complete as soon as exercised and there is no process in the establishment of the content of sense, yet sensation is not devoid of process on this account nor possesses it any the less; take for example the case of sound which does not meet the ear simultaneously with the striking of the blow. This is shown too by the distortion of the letters of a word when uttered, which is explained by their passage through the medium; we appear not to hear what has actually been said because the air in moving gets distorted. Does the same lapse of time in transmission occur in the case of colour and light? It is not, certainly, in virtue of some such modal determination as constitutes the relation of equality that subject and object in vision are related. If it were, they would not require both to be in a definite place; when things are equal it makes no difference to their equality whether they are near or far apart. In the case of sound and odour it is reasonable that this lapse of time during transmission should occur. Like the air and the water they are continuous, yet in both cases the motion of transmission falls into a number of parts. Hence too there is a sense in which it is the same thing which is heard by the person who stands nearest and by him who is farthest away and the same thing which is smelled by both; and there is a sense in which it is not. This seems to constitute a difficulty for some people; they say it is impossible that what is identical should be heard or seen or smelt by different persons and that they cannot hear and smell it because they are many and apart; if they could, what is one thing would itself become separated from itself.

The solution is, that all do perceive the numerically identical and self-same thing which is the originating cause of the movement, e.g: the bell, the frankincense, or the fire,
25 αὐτοῦ καὶ ἔνος ἀρίθμῳ αἰσθάνονται πάντες, τοῦ δὲ δὴ ἰδίου ἐγέρου ἀριθμῷ, εἰδεὶ δὲ τοῦ αὐτοῦ, διὸ καὶ ἄμα πολλοὶ ὄρωσι καὶ ὀσμῶνται καὶ ἀκούουσιν. ἔστι δὲ οὕτε σώματα ταῦτα, ἀλλὰ πάθος καὶ κίνησις τις (οὗ γὰρ ἀν τοῦτο συνεβαινεν), οὐδὲ ἄνευ σώματος. περὶ δὲ τοῦ φωτὸς ἀλλὸς λόγος· τῷ ἐνείναι γὰρ τι φῶς ἐστίν, ἀλλ’ οὐ κίνησις. ὅλως δὲ οὕτε ὀμοίως ἐπὶ τε ἀλλοιώσεως ἔχει καὶ φορᾶς· αἱ μὲν γὰρ φοραὶ εὐλόγως εἰς τὸ μεταξὺ πρῶτον ἀφικνοῦνται (δοκεῖ δ’ ὁ ψόφος εἶναι 447α) ψευδεμένου τινὸς κίνησις), οὐσα δὲ ἀλλοιώται, οὐκέτι ὀμοίως· ἐνδεχεται γὰρ ἀθρόον ἀλλοιώθησαι, καὶ μὴ τῇ ἡμισυ πρότερον, οἴδον τὸ ύδωρ ἀμα πάν πήγνυσθαι. οὐ μὴν ἀλλ’ ἂν ἢ πολὺ τὸ θερμανώμενον ἢ πηγνύμενον, 5 τὸ ἐχόμενον ὑπὸ τοῦ ἐχομένου πάσχει, τὸ δὲ πρῶτον υπ’ αὐτοῦ τοῦ ἀλλοιώτους μεταβάλλει, καὶ οὐκ ἀνάγκη ἄμα ἀλλοιώθησαι καὶ ἀθρόον. ἢν δ’ ἂν καὶ τὸ γενέσθαι ὡσπερ ἡ ὀσμή, εἰ ἐν ύδρῳ ἦμεν καὶ πορρωτέρῳ πρὶν θυγεῖν αὐτοῦ ἡσθανόμεθα. εὐλόγως δ’ ὡν ἐστὶ μεταξὺ 10 τοῦ αἰσθητηρίου, οὐχ ἄμα πάντα πάσχει, πλὴν ἐπὶ τοῦ φωτὸς διὰ τὸ εἰρημένον. διὰ τὸ αὐτὸ δὲ καὶ ἐπὶ τοῦ ὅραν· τὸ γὰρ φῶς ποιεῖ τὸ ὅραν.

VII

*Εστι δὲ τὶς ἀπορία καὶ ἀλλή τοιάδε περὶ αἰσθήσεως, πότερον ἐνδεχεται δυνεῖν ἄμα δύνασθαι αἰσθάνεσθαι εἰς 15 τῷ αὐτῷ καὶ ἀτόμῳ χρόνῳ, ἢ οὖ, εἰ δὴ ἂεὶ ἡ μείζων κίνησις τὴν ἐλάττων ἐκκρούει· διὸ τὸ ἐπιφερόμενον ἐπὶ τὰ ὀμματα οὐκ αἰσθάνονται, ἐὰν τὺχωσι σφόδρα τι ἐννοοῦντες ἢ φοβούμενοι ἢ ἀκούοντες πολὺν ψόφον. τοῦτο δὲ δὴ ὑποκείσθω, καὶ ὦτι ἐκάστου μᾶλλον ἐστὶν αἰσθά-
but yet the stimulus peculiar to each is numerically different though specifically the same. We can hence explain how many people may see and smell and hear the same thing and do this at the same time too. Here we are dealing not with bodies, but qualities and motions (if this were not so the latter phenomenon could not occur), though they do not exist apart from body.

About light a different account must be given. Light is due to the presence of something but is not a motion. Universally speaking there is not even similarity between qualitative alteration and spatial transference; motions of translation, as one would expect, penetrate the medium first before reaching us (sound seems to be a motion of something which travels). On the other hand with things that suffer alteration this ceases to be true; they may be altered in one mass, and not one half before the other; for example water freezes all at one time. However if what is heated or frozen is great in bulk, one part is acted on by that which is contiguous to it, the change in the first being due to the agent itself which is the cause of the alteration; and the alteration does not necessarily take place at the same time and over the whole. Taste would be like odour if we lived in water and perceived things at a distance before touching them. It is reasonable to believe that in those cases where the organ of perception employs a medium the effects are not all simultaneously produced; but we except the case of light for the reason given and, on the very same account, sight too, for it is light which causes vision.

VII

There is a certain other problem also connected with perception—Can we perceive two things in the same individual moment of time, or can we not? Not, if it is the case that a stronger stimulus displaces one which is more feeble. This is the reason why one does not see things that directly meet the eyes, when one is in a state of profound meditation or of terror or when hearkening to a loud sound.

Let us posit this as true, and likewise the fact that any
20 νεσθαι ἀπλοῦ ὄντος ἢ κεκραμένου, οίον οἶνον ἀκράτου ἢ κεκραμένου, καὶ μέλιτος, καὶ χρόας, καὶ τῆς νήτης μόνης ἢ ἐν τῷ διὰ πασῶν, διὰ τὸ ἀφανίζειν ἄλληλα. τούτῳ δὲ ποιεῖ ἐξ ὅν ἐν τι γίνεται. έι δὴ ἡ μείζων τῆς ἐλάττων κίνησιν εκκρούει, ἀνάγκη, ἄν ἀμα ὤσι, καὶ 25 αὐτὴν ἦττον αἰσθητὴν εἶναι ἢ εἰ μόνη ἢν· ἀφήρηται γάρ τι ἡ ἐλάττων μιγνυμένη, εἶπερ ἀπαντά τὰ ἀπλὰ μᾶλλον αἰσθητὰ ἑστίν. εάν ἀρα ἤσαι Ὀσιν ἔτεραι οὐσια, οὐδετέρας ἐσται αἰσθησις· ἀφανεὶ γὰρ ἡ ἔτερα ὀμοίως τῆν ἔτεραν. ἀπλῆς δ' οὐκ ἔστιν αἰσθάνεσθαι. ὡστε 30 ἡ οὐδεμία ἐσται αἰσθησις ἡ ἄλλη εξ ἀμφοῦν. ὅπερ καὶ γίγνεσθαι δοκεῖ· ἐκ τῶν κεραυνυμένων ἐν ὃ ἄν μιχθῶσιν. ἔπει οὖν ἐκ μὲν ἐνίων γίνεται τι, ἐκ δ' ἐνίων οὐ γίνεται, 2ο47 β τοιαῦτα δὲ τὰ ὑπ' ἔτεραν αἰσθησιν (μίγνυνται γὰρ ὃν τὰ ἐσχατα ἐναντία· οὐκ ἔστι δ' ἐκ λευκοῦ καὶ ὄξεος ὑ ἐν γενέσθαι ἀλλ' ἡ κατὰ συμβεβηκός, ἀλλ' οὐχ ὃς ἐξ ὀξεος καὶ βαρέος συμφωνία). οὐκ ἀρα οὐδ' αἰσθάνεσθαι 5 ἐνδεχεται αὐτῶν ἀμα. ἢσαι μὲν γὰρ οὐσι αἱ κινήσεις ἀφανίσθουσιν ἄλληλας, ἔπει μία οὐ γίνεται ἐξ αὐτῶν· ἄν δ' ἄνυσοι, ἡ κρειττων αἰσθησιν ποιεῖ, ἐπεὶ μᾶλλον ἄμα δυεῖν αἰσθοῦτ' ἄν ἡ ψυχὴ τῇ μιᾷ αἰσθῆσει ὃν μία αἰσθησις, οἴον ὄξεος καὶ βαρέος· μᾶλλον γὰρ ἄμα ἡ 10 κίνησις τῆς μιᾶς ταύτης ἡ τοῖν δυοῖν, οἴον ὄψεως καὶ ἀκοῆς. τῇ μιᾷ δὲ ἄμα δυοῖν οὐκ ἔστιν αἰσθάνεσθαι ἄν μη μιχθῆ· τὸ γὰρ μίγμα ἐν βούλεται εἶναι, τοῦ δ' ἐνὸς μίας αἰσθησις, ἡ δὲ μία ἄμα αὐτη. ὡστ' ἐξ ἀνάγκης τῶν μεμιγμένων ἄμα αἰσθάνεται, ὅτι μιᾷ αἰσθησει κατ' 15 ἐνέργειαν αἰσθάνεται· ἐνὸς μὲν γὰρ ἀριθμῷ ἡ κατ' ἐνέργειαν μία, εἴδει δὲ ἡ κατὰ δύναμιν μία. καὶ εἰ μία τοῖνυν ἡ αἰσθησις ἡ κατ' ἐνέργειαν, ἐν ἑκεῖνα ἐρεῖ. μεμιγθαί ἄρα ἀνάγκη αὐτά. ὡταν ἄρα μή ἡ μεμιγμένα,
single thing is more perceptible by itself than when in a compound. For example, a wine is more readily distinguished when pure than when mixed; so with honey and tint, and the tonic is more distinctly perceived when alone than when it is sounded along with the octave, as the two when together annul each other.

This result is produced by things out of which a unity is formed. If it is the case that the stronger stimulus displaces the weaker, it must, if they are simultaneous, itself be less distinct to sense than if it were alone, having suffered diminution to some extent by the admixture of the weaker, if the pure is always the more perceptible. So if two different stimuli are equal, neither will be perceived; either will annul the other to an equal extent. But they cannot be perceived as pure; hence either no sensation will result or another one derived from both, precisely as things when mingled yield something fresh so long as it is true mixture that takes place.

Thus in certain cases of the simultaneous presentation of sensation something derivative results, but in certain cases not, and such are instances of objects falling under diverse senses. (Mixture occurs with objects when their most extreme divergences of quality are related as contraries; white and shrill do not yield anything unitary except per accidens, but, quite otherwise, low and high yield a concord.) Since then this is so, neither will it be possible to perceive them together. If they are equal in intensity the stimuli will cancel each other, since no unitary sensation is derived from them, while if they are unequal the stronger will produce sensation, and both will not be perceptible, since consciousness would more readily distinguish two objects by a single sense and if they both belonged to a single sense, e.g. high and low, than it would these, for the stimuli are more closely located in the case of this selfsame sense than when we have two different senses, e.g. sight and hearing.

But by a single sense we cannot perceive two objects simultaneously unless they combine with each other. For the combination requires to be something unitary, and of a unitary object the perception is single and a single sensation is one possessing internal simultaneity. Consequently things in combination must be simultaneously perceived, because apprehended by a single act of perception. It is of what is numerically one that the explicit perception is single while it is of the specifically one that the implicit perception is unitary. Hence also, if the explicit perception is single it pronounces those objects to be numerically one. Hence they must have entered into combination, and so, when they are not combined,
δύο ἔσονται αἰσθήσεις αἱ κατ’ ἐνέργειαν. ἄλλα κατὰ
20 μίαν δύναμιν καὶ ἀτόμον χρόνον μίαν ἀνάγκην εἶναι τῇ
ἐνέργειαν· μιᾶς γὰρ εἰσάγαγε μία κύνησις καὶ χρήσις,
μία δὲ ἡ δύναμις. οὐκ ἄρα ἐνδέχεται δυνὴν ἅμα αἰσθά-
νεσθαι τῇ μιᾷ αἰσθήσει. ἄλλα μὴν εἰ τὰ ὑπὸ τὴν αὐτὴν
αἰσθήσιν ἅμα ἀδύνατον, εὰν ἥ δύνα, δὴλον ὅτι ἤττον ἐτὶ
25 τὰ κατὰ δύο αἰσθήσεις ἐνδέχεται ἅμα αἰσθάνεσθαι, οἷον
λευκὸν καὶ γλυκὺ. φαίνεται γὰρ τὸ μὲν τῷ ἁριθμῷ ἐν
ἡ ψυχῇ οὐδὲν ἐτέργο λέγειν ἄλλ’ ἥ τῷ ἅμα, τὸ δὲ τῷ
ἐδει ἐν τῇ κρινοῦσῃ αἰσθήσει καὶ τῷ τρόπῳ. λέγω
δὲ τούτῳ, ὅτι ἵσως τὸ λευκὸν καὶ τὸ μέλαν, ἐτερον τῷ
30 εἴδει ὅν, ἡ αὐτὴ κρίνει, καὶ τὸ γλυκὸ καὶ τὸ πικρόν, ἡ
αὐτὴ μὲν ἐαυτῇ, ἐκείνης δ’ ἄλλῃ, ἄλλ’ ἐτέρως ἐκάτερον
τῶν ἐναντίων, ὃς δ’ αὐτῶς ἐαυταῖς τὰ σύστοιχα, οἷον
448α ὡς ἡ γεύσις τὸ γλυκὺ, οὕτως ἡ ὄψις τὸ λευκὸν· ὡς δ’
αὐτὴ τὸ μέλαν, οὕτως ἐκείνη τὸ πικρόν. ἔτι εἰ αἱ τῶν
ἐναντίων κυνήσεις ἐναντία, ἅμα δὲ τὰ ἐναντία ἐν τῷ
αὐτῷ καὶ ἀτόμῳ οὐκ ἐνδέχεται ὑπάρχειν, ὑπὸ δὲ τὴν
5 αἰσθήσιν τὴν μίαν ἐναντία ἐστίν, οἷον γλυκὺ πικρᾷ,
οὐκ ἂν ἐνδέχομαι αἰσθάνεσθαι ἅμα. ὡμοίως δὲ δὴλον
ὅτι οὐδὲ τὰ μὴ ἐναντία· τὰ μὲν γὰρ τοῦ λευκοῦ τὰ δὲ
τοῦ μελανὸς ἐστίν, καὶ ἐν τοῖς ἄλλοις ὡμοίως, οἷον τῶν
χυμῶν οἱ μὲν τοῦ γλυκέος οἱ δὲ τοῦ πικροῦ. οὐδὲ τὰ
10 μεμιμημένα ἅμα· λόγοι γὰρ εἰσὶν ἀντικειμένων, οἷον τὸ
διὰ πασῶν καὶ τὸ διὰ πέντε, ἃν μὴ ὡς ἐν αἰσθάνηται.
οὕτως δ’ εἰς λόγος ὁ τῶν ἀκρων γίνεται, ἄλλος δ’ οὐ.
ἔσται γὰρ ἅμα ὁ μὲν πολλοῦ πρὸς ὀλίγου ἡ περίττο
πρὸς ἄρτιον, ὁ δ’ ὀλίγου πρὸς πολὺ ἡ ἄρτιον πρὸς
there will be two explicit sensations. But when the faculty is single and the time individual, the activity of sense must be numerically one; the stimulation and exercise of a single faculty at a unitary time must be single; and the faculty is single.

Thus it is impossible to perceive two things simultaneously by a single sense. But certainly, when objects of the same sense, if dual, cannot be simultaneously perceived, it is clear that still less will this be possible in the case of objects of two different senses, e.g. white and sweet.

Consciousness appears to recognize numerical identity not otherwise than by the simultaneity of the perception, while specific unity is given by the unity of the sense which discriminates it and the manner in which the perception occurs. By this I mean that, though supposing it be black and white, objects specifically distinct, which the same sense discriminates, and sweet and bitter, which a sense that is self-identical, though different from the former, distinguishes, yet there is a diverse manner in which it perceives either contrary, and it is in the same manner as each other that the senses apprehend corresponding members of different pairs of opposites; e.g. sight perceives white in the same manner as taste does sweetness, and the former perceives black as the latter does bitter.

Further, if contrary sensibles give contrary stimuli and contraries cannot coexist in anything identical and individual, but under a single sense we find things opposed to each other, as, for example, sweet is opposed to bitter, it is impossible to perceive them simultaneously. Similarly it is clear that neither will things that are not opposites be simultaneously intuitable. Some of them fall within the province of white and others of black, and in the same way in other cases, e.g. flavours, some are assignable to sweet, others to bitter. Neither can composites be simultaneously perceived unless as forming a unity, for they are proportionate combinations of opposites, e.g. chords of the octave and of the fifth. If they are apprehended as one, a single ratio prevails between the extremes, but otherwise not, for that would require the simultaneous apprehension of the ratio of greater to less or odd to even on the one hand, and on the other that of less to greater or even to odd.

The consequence of all this is that, if there is a still greater remoteness and diversity between qualities which, though occupying corresponding positions in their respective genera, yet are heterogeneous, than between those ascribed to the same genus, e.g. sweet and white, which, though corresponding to each other, nevertheless are heterogeneous, and if sweet differs still more from black than from white in kind, then they, sweet and black, are still less capable of being
20 ἀμα ἐνδέχοιτο αὐτὰ αἰσθάνεσθαι ἢ τὰ τῷ γένει ταῦτα.  
21 ὡστὲ εἰ μὴ ταῦτα, οὐδὲ ἐκεῖνα.  

21 ὡστὲ λέγουσι τυχε τῶν περὶ τὰς συμφωνίας, ὅτι οὐχ ἀμα μὲν ἀφικνοῦνται οἱ ψόφοι, φαίνονται δὲ, καὶ λανθάνει, ὅταν ὁ χρόνος ἢ ἀναίσθητος, πότερον ὅρθως λέγεται ἢ οὐ; τάχα γὰρ ἄν φαίη τίς καὶ 25 νῦν παρὰ τούτῳ δοκεῖν ἀμα ὅραν καὶ ἀκούειν, ὅτι οἱ μεταξὺ χρόνου λανθάνουσιν. ἢ τοῦτο οὐκ ἄλθεσις, οὐδὲ ἐνδέχεται χρόνον εἶναι ἀναίσθητον ἢ οὐδένα λανθάνειν, ἀλλὰ παντὸς ἐνδέχεται αἰσθάνεσθαι. εἰ γὰρ ὅτε αὐτὸς αὐτοῦ τις αἰσθάνεται ἢ ἄλλον ἐν συνεχεῖ χρόνῳ, μὴ 30 ἐνδέχεται τὸτε λανθάνειν ὅτι ἐστὶν, ἐστὶ δὲ τις ἐν τῷ συνεχεί καὶ τοσοῦτος ὅσος ὅλως ἀναίσθητος ἐστὶ, δὴλον ὅτι τὸτε λανθάνοι ἄν εἰ ἐστὶν αὐτὸς αὐτοῦ καὶ εἰ ὅρα 448 b καὶ αἰσθάνεται· καὶ εἰ αἰσθάνεται ἐτὶ, οὐκ ἂν εἰ δὲ χρόνος οὔτε πράγμα οὐδὲν ὁ αἰσθάνεται ἢ ἐν ὑ, εἰ μὴ οὔτως, ὅτι ἐν τούτῳ τινὶ ἢ ὅτι τούτῳ τι ὅρα, εἴπερ ἐστὶ τι μέγεθος καὶ χρόνου καὶ πράγματος ἀναίσθητον 5 ὅλως διὰ μικρότητα· εἰ γὰρ τὴν ὅλην ὅρα, καὶ αἰσθάνεται τὸν αὐτὸν συνεχῶς χρόνου, οὐ τῶν νῦν τούτων τινὶ. ἀφηρήσθω ἢ [τὸ] ἙΒ, ἐν ἢ οὐκ Ἑσθάνετο. οὐκοῦν ἐν ταύτῃ τινὶ ἢ ταύτῃ τι, ὥσπερ τὴν γῆν ὅρα ὅλην, ὅτι τοῦτο αὐτῆς, καὶ ἐν τῷ ἐναιατῷ βαδίζει, ὅτι ἐν τῷ 10 τῷ μέρει αὐτοῦ. ἀλλὰ μὴν ἐν τῷ ἙΒ οὐδὲν αἰσθάνεται. τῷ ἄρα ἐν τούτῳ τινὶ τοῦ ἈΒ αἰσθάνεσθαι λέγεται τοῦ ὅλου αἰσθάνεσθαι καὶ τὴν ὅλην. ὁ δὲ αὐτὸς λόγος καὶ ἐπὶ τῆς ΛΓ. ἢ ἔτι γὰρ ἐν τινὶ καὶ τινός, ὅλου δὲ οὐκ ἐστὶν αἰσθάνεσθαι. ἢπαντα μὲν οὖν αἰσθητά ἐστιν, 15 ἀλλ' οὐ φαίνεται ὅσα ἐστὶν· τοῦ γὰρ ἡλίου τὸ μέγεθος ὅρα καὶ τὸ τετράπηχυ πόρρωθεν, ἀλλ' οὐ φαίνεται ὅσον, ἀλλ' ἐνίοτε ἀδιαίρετον, ὅρα δ' οὖν ἀδιαίρετον. ἢ δ' αἰτία ἔρχεται ἐν τοῖς ἐμπροσθεν περὶ τούτου. ὅτι μὲν οὖν 19 οὐθεὶς ἐστὶ χρόνος ἀναίσθητος, ἐκ τούτων φανερόν·  

448 b 7 ἢ] τὸ ὀμισσὸν ἢ L S U Alex.
simultaneously perceived than members of the same genus; hence, if in the latter case this is impossible, neither can it occur with the former.

There is a theory mooted by certain people about concords, that the sounds, though not arriving simultaneously, yet appear to do so, their lack of simultaneity being undetected, when the time between them is imperceptible.

Is this correct, or is it not? If true, one might readily assert that we also apparently see and hear at the same time because the intervening moments are undetected.

We answer that it is not true, and there can be no imperceptible time, none that escapes us; every moment can be perceived. For if, when one has consciousness of one's self or of another person during a continuous period of time, one cannot at that time be unaware that one exists, but there is within the continuous time a section of such minute size as to be wholly imperceptible, clearly one would then be unaware whether one was one's self and whether one saw or perceived; if one still perceived, there would be neither time in which nor thing of which one could be conscious except thus—by being percipient during part of the time or perceiving part of the thing, if there are magnitudes both in time and in things which their minuteness makes imperceptible. But this is not so, for if one sees a whole line and perceives a time continuously identical, one does not do so by means of one of the particular "now's" contained in it. Subtract, from AB the whole line, a part CB in which there is no sensation; then perception in one part of this whole or of one part of it gives consciousness of the whole, which is like seeing the whole earth because one sees this particular part of it, or walking a whole year because one walks during this part of it. Remember, in BC there is no consciousness; hence, by being conscious in part of this whole, AB, one is said to be conscious of the whole time and see the whole extent.

The same reasoning will hold with the part AC, for perception is always in a part and of a part, and it is impossible to perceive anything in its entirety. Hence, the above conclusion being absurd, everything is perceptible though its size is not apparent; we see the extension of the sun or a four-cubit measure from afar, though the determinate size is not apparent, and sometimes things seem not to have size but to be indivisible.

We cannot, however, see the indivisible; the reason for this was stated before. Hence from these considerations it is clear that no part of time is imperceptible.

But we have to discuss the problem raised before—whether
20 τῆς πρότερον λεχθείσης ἀπορίας σκεπτέον, πότερον ἐνδέχεται ἀμα πλεούνων αἰσθάνεσθαι ἢ ὁυκ ἐνδέχεται. τὸ δ' ἀμα λέγω ἐν ἐνι καὶ ἀτόμῳ χρόνῳ πρὸς ἀλληλα. πρῶτων μὲν οὖν ἄρι ὡδ' ἐνδέχεται, ἀμα μὲν, ἐτέρῳ δὲ τῆς ψυχῆς αἰσθάνεσθαι, καὶ οὐ τῷ ἀτόμῳ, οὔτω
25 δ' ἀτόμῳ ὡς παντὶ ὄντι συνεχεῖ; ἢ ὅτι πρῶτον μὲν τὰ κατὰ τὴν μίαν αἰσθησιν, οἶδον λέγω ὅψιν, εἰ ἔσται ἄλλῳ αἰσθανόμενη ἄλλου καὶ ἄλλου χρῶματος, πλεῖο γε μέρη ἢ ἔστι ἄλλῳ ταῖτα; καὶ γὰρ ἀισθάνεται πάλιν τῷ αὐτῷ γένει. εἰ δὲ ὅτι ὡς δόου ὄμματα φαίῳ τις, οὐδὲν κωλύει,
30 οὔτω καὶ ἐν τῇ ψυχῇ, ὅτι ἱσως ἐκ μὲν τοῦτον ἐν τι γίνεται καὶ μία ἡ ἐνέργεια αὐτῶν· εἴδει δὲ ἢ μὲν ἐν τῷ ἤ ἀμφοῖν, ἐν καὶ τό αἰσθανόμενον ἔσται, εἰ δὲ χωρίς, οὐχ ὑμοίως ἢ ἔστι· ἢ τις ἀισθηθεῖν αἰ αὐτά πλεῖς ἢ
449 α ἐστονταί, ὡσπερ εἰ τις ἐπιστήμασις διαφόρους φαίῃ. οὔτε γὰρ ἡ ἐνέργεια ἀνευ τῆς καθ' αὐτῆν ἐσται δυνάμεως, οὔτ' ἀνευ ταύτης ἔσται αἰσθηθείς. εἰ δὲ τοῦτων ἐν ἐνι καὶ ἀτόμῳ <μὴ> αἰσθάνεται, δῆλον ὅτι καὶ τῶν ἄλλων
5 μᾶλλον γὰρ ἐνδέχετο τοῦτων ἀμα πλεούνων ἢ τῶν τῷ γένει ἐτέρων. εἰ δὲ ἢ ἄλλῳ μὲν γυλκέοις ἄλλῳ δὲ λευκοῦ αἰσθάνεται ἡ ψυχὴ μέρει, ἢτοι τό ἐκ τοῦτων ἐν τί ἐστιν ἢ οὐχ ἐν. ἀλλ' ἀνάγκη ἐν· ἐν γάρ τι τὸ αἰσθητικὸν ἐστι μέρος. τίνος οὖν ἐκεῖνο εὐός· οὐδὲν γὰρ ἐκ τοῦτων

it is possible or not to perceive several things simultaneously. By simultaneously I mean, in a time which, for the various things relatively to each other, is one and atomic.

Firstly, then, is the following solution possible—that they are indeed simultaneously perceived but by different psychical organs, not by an individual organ, though by one which is individual in the sense of forming a continuous whole? Or is it the case that if so, in a single sense, for instance sight, which will perceive different colours by something different in each case, these partitions will assuredly form a plurality specifically various? This is so, for it, again, perceives by means of generic identity.

If some one were to allege that there is no difficulty in the psychical faculties being like the two eyes, specifically alike, we may reply that perhaps in the case of the eyes there is a single product and the exercise of their function is unitary, and, so far as they yield a unitary result, specifically the sense-organs are also single, but when the sensations are diverse the case is different.

Further identical senses will be rendered multiple and distinct in the same sense as one talks of distinct sciences; for neither is there activity apart from its appropriate potentiality, nor without activity does sensation exist.

But if these contentions are correct and hence these qualities cannot be perceived in a single individual moment by means of a division in the organ of perception, it is clear that no other qualities can, for there was a better possibility of these in their severalness being simultaneously perceived than of qualities generically different. If it is really the case that the mind perceives sweet with one part, white with another, the product of these must be either one or not one. But it must be a unity because the sentient organ is a unity. What is the unity then which that perceives? There is no such unitary product.
10 ἐν. ἀνάγκη ἄρα ἐν τι εἶναι τῆς ψυχῆς, ὡς ἀπανταί οἰσθάνεται, καθάπερ εἰρηται πρότερον, ἄλλο δὲ γένος δὴ ἄλλου. ἄρ' οὖν ἢ μὲν ἀδιάιρετον ἐστὶ κατ' ἐνέργειαν, ἐν τι ἐστὶ τὸ οἰσθητικὸν γλυκέος καὶ λευκὸν, ὅταν δὲ διάιρετον γένηται κατ' ἐνέργειαν, ἔτερον; ἢ ὁσπερ ἐπὶ τῶν πραγ-15 μάτων αὐτῶν ἐνδέχεται, οὕτως καὶ ἐπὶ τῆς ψυχῆς: τὸ γὰρ αὐτὸ καὶ ἐν ἀριθμῷ λευκὸν καὶ γλυκὸν ἐστὶ, καὶ ἀλλὰ πολλά, εἰ μὴ χωριστὰ τὰ πάθη ἄλληλων, ἄλλα τὸ εἶναι ἔτερον ἐκάστῳ ὁμοίως τοῖνυν θετέον καὶ ἐπὶ τῆς ψυχῆς τὸ αὐτὸ καὶ ἐν εἶναι ἀριθμῷ τὸ οἰσθητικὸν πάντων, τῷ μέντοι εἶναι ἔτερον καὶ ἔτερον τῶν μὲν γένει τῶν δὲ εἰδεί. ὡστε καὶ οἰσθάνουσθ' ἃν ἀμα τῷ αὐτῷ καὶ 22 ἐνί, λόγῳ δ' οὐ τῷ αὐτῷ.

10 ὅτι δὲ τὸ οἰσθητὸν πᾶν ἐστὶ μέγεθος καὶ οὐκ ἔστιν ἀδιάιρετον οἰσθάνειςθαι, δὴ λοιπόν. ἔστι γὰρ οὕτως μὲν οὐκ ἄν ὁφθείη, ἀπειροῦ ἡ ἀπόστημα, 25 οἶδεν δὲ ὁρᾶται, πεπερασμένους ὁμοίως δὲ καὶ τὸ ὁσ-φραντὸν καὶ ἀκουστὸν καὶ ὀσῶν μὴ αὐτῶν ἀπτόμενοι οἰσθάνουσθαι. ἔστι δὲ τὶ ἐσχάτον τοῦ ἀποστήματος οἶδεν οὐχ ὁρᾶται, καὶ πρῶτον οἶδεν ὁρᾶται. τοῦτο δὴ ἀνάγκη ἀδιάιρετον εἶναι, οὐ ἐν μὲν τῷ ἐπέκεισα οὐκ ἐνδέχεται 30 οἰσθάνεσθαι οὕτως, ἐν δὲ τῷ ἐπὶ ταῦτα ἀνάγκη οἰσθάνεσθαι. εἰ δὴ τὶ ἔστω ἀδιάιρετον οἰσθητῶν, ὅταν τεθῇ ἐπὶ τῷ ἐσχάτῳ οἶδεν ἔστω υἱότατον μὲν οὐκ οἰσθητῶν πρῶτον δ' οἰσθητῶν, ἀμα συμβήσεται ὁρατῶν εἶναι καὶ ἀόρατον· τοῦτο δ' ἀδύνατον.

449 b περὶ μὲν οὖν τῶν οἰσθητηρίων καὶ τῶν οἰσθητῶν τίνα τρόπον ἔχει καὶ κοινῇ καὶ καθ' ἐκαστὸν οἰσθητήριον εἰρηται· τῶν δὲ λοιπῶν πρῶτον σκεπτέον περὶ μνήμης 4 καὶ τοῦ μνημονεύειν.
Hence there must be some unity in the soul by which we perceive all things, as before stated, though different genera are perceived by different organs. Is that, therefore, which apprehends sweet and white, a unit so far as it is actually indivisible, but diverse in so far as it is actually divisible? We answer that in the case of the soul it is the same as with things. An identical and numerically single thing can be sweet and white and have many other qualities, so long as its properties are not disunited from one another, though in aspect of existence each is diverse. Accordingly we must in the same way affirm that with the soul too, that, which is per-cipient of everything, is self-identical and numerically single, though, in apprehending objects now generically now in species different, it has a corresponding diversity in the aspect of its existence. Hence the mind may perceive things simultaneously by means of something selfsame and unitary though not notionally the same.

That every object is a magnitude and that the indivisible cannot be perceived, is clear. The distances from which an object cannot be seen are infinite in number, but the range from which it is visible is limited, and this holds true also for the objects of smell and hearing and all things perceived without actual contact. But there is a point which terminates the range from which vision is impossible and is the first from which the thing becomes visible. That indeed must be indivisible which, when at a distance beyond this point, cannot be seen, but must be seen when nearer. If, then, there is really anything indivisible which is an object of perception, when placed at the terminal point which, while the last at which it is not perceptible, is yet the first at which it is perceptible, it will turn out to be both visible and invisible at the same time, which is impossible.

This is our account of the sensoria and the objects of sense and the manner of their existence both generally and relatively to each sense-organ. Of the remaining subjects let us consider first memory and the act of remembering.
ΠΕΡΙ ΜΝΗΜΗΣ ΚΑΙ ΑΝΑΜΝΗΣΕΩΣ

I

4 Περὶ δὲ μνήμης καὶ τοῦ μνημονεύειν
5 λεκτέον τι ἐστὶ καὶ διὰ τιν’ αἰτίαν γίγνεται καὶ τίνι
6 τῶν τῆς ψυχῆς μορίων συμβαίνει τούτῳ τὸ πάθος καὶ
7 τὸ ἀναμμηνήσκεσθαι· οὐ γὰρ οἱ αὐτοὶ εἰσὶ μνημονικοὶ
8 καὶ ἀναμνηστικοὶ, ἀλλ’ ὡς ἐπὶ τὸ πολὺ μνημονικὸ μὲν
9 οἱ βραδεῖς, ἀναμνηστικάτεροι δὲ οἱ ταχεῖς καὶ εὐμαθεῖς.
10 πρῶτον μὲν οὖν ληπτέον ποιά ἐστι τὰ μνημονεύτα·
11 τολλάκις γὰρ ἔξαπατάται τούτῳ. οὔτε γὰρ τὸ μέλλον
12 ἐνδεχεται μνημονεύειν, ἀλλ’ ἐστὶ δοξαστὸν καὶ ἐλπιστὸν
13 (εἰ δ’ ἀν καὶ ἐπιστήμη τῆς ἐλπιστικῆς, καθάπερ τινές
14 φασὶ τὴν μαντικῆν), οὔτε τοῦ παρόντος, ἀλλ’ αἰσθησις·
15 ταῦτη γὰρ οὔτε τὸ μέλλον οὔτε τὸ γενόμενον γνωρίζομεν,
16 ἀλλὰ τὸ παρὸν μόνον. ἢ δὲ μνήμη τοῦ γενομένου· τὸ δὲ
17 παρὸν ὅτι πάρεστιν, οἷον τοῦτο τὸ λευκὸν ὅτε ὅρα, οὔδεις
18 αὐν φαίη μνημονεύειν, οὔδὲ τὸ θεωρούμενον, ὅτε θεωρῶν
19 τυγχάνει καὶ ἐννοῶν· ἀλλὰ τὸ μὲν αἰσθάνεσθαι φησι,
20 τὸ δ’ ἐπιστασθαι μόνον· ὅταν δ’ ἀνευ τῶν ἐνεργεῖων
21 ἔχῃ τὴν ἐπιστήμην καὶ τὴν αἰσθησιν, οὕτω μέμνηται
22 [τὰς τοῦ τριγώνου ὅτι δύο ὀρθαίς ἵσαι], τὸ μὲν ὅτι
23 ἐμαθεν ἢ ἐθεώρησεν, τὸ δὲ ὅτι ἥκουσεν ἡ ἐδειν ἢ ὁ τι
24 τοιοῦτον· δεῖ γὰρ ὅταν ἐνεργῇ κατὰ τὸ μνημονεύειν,
25 οὔτως ἐν τῇ ψυχῇ λέγειν, ὅτι πρότερον τούτῳ ἥκουσεν
26 ἡ ὕσθετο ἡ ἐνόησεν. ἐστὶ μὲν οὖν ἡ μνήμη οὔτε
27 αἰσθησις οὔτε ὑπόληψις, ἀλλὰ τούτων τινὸς ἐξει ἢ

449 b, 22 τὰς...ἴσαι recte volunt deleri Biehl et Freudenthal.
We must define and account for memory and the act of remembrance and assign the psychical faculty which provides for this phenomenon and for the act of recollection. The two phenomena are not identical, for it is not the same people who have good memories and who have good powers of recollection; as a rule those people remember well who are slow-witted, while on the other hand those excel in powers of recall who are clever and quick at learning.

Hence as a preliminary to our argument the question arises—how are the objects of memory characterised? Mistakes are often made about this. Now the future cannot be remembered; it is rather the object of opinion and hope. (There might be a science which belonged to the province of hope; some people say that prophecy is such a science.) Nor does memory regard the present; it is perception which is concerned with this, for by perception we apprehend neither the future nor the past but the present only. Memory concerns the past; no one would say that he remembers that the present is present, e.g. this particular white object, when he is looking at it. Nor would he say that he remembers that the object of thought is present whenever he chances to be engaged in thought or contemplation; in the one case he says he perceives, in the other merely that he knows. But when knowledge or perception is present without actual experience of the real objects, in those circumstances one remembers in the one case that he learned something or thought of something, in the other that he heard, or saw, or had some similar sense-experience. When one actually remembers, he must recognize in consciousness that previously he had heard or perceived or thought of the thing remembered.

Hence memory is neither perception nor conceptual
πάθος, ὅταν γένηται χρόνος. τοῦ δὲ νῦν ἐν τῷ νῦν οὐκ ἐστὶ μνήμη, καθάπερ εἰρηταὶ καὶ πρότερον, ἀλλὰ τοῦ 30 μὲν παρόντος αἰσθήσεις, τοῦ δὲ μέλλοντος ἐλπίς, τοῦ δὲ γενομένου μνήμης. διὸ μετὰ χρόνου πᾶσα μνήμη. ὡσθ' ὅσα χρόνου αἰσθάνεται, ταῦτα μόνα τῶν ζώων μνημονεύει, καὶ τούτω ὃ αἰσθάνεται. ἐπεὶ δὲ περὶ φαντασίας εἰρηταὶ πρότερον ἐν τοῖς περί ψυχῆς, καὶ νοεῖν οὐκ ἔστων ἄνευ 450 a φαντάσματος: συμβαίνει γὰρ τὸ αὐτὸ πάθος ἐν τῷ νοεῖν ὁπερ καὶ ἐν τῷ διαγράφειν. ἔκει τε γὰρ οὐθὲν προσχρώ- μενοι τῷ τὸ ποσόν ὁρισμένον εἶναι τοῦ τριγώνου, ὁμοιογράφου ὁρισμένου κατὰ τὸ ποσόν· καὶ ὁ νοῶν ὁσαύ- 5 τος, κἂν μὴ ποσόν νοῆσῃ, τίθεται πρὸ ὁμάτων ποσόν, νοεῖ δ' οὐκ ἢ ἃ ποσόν· ἄν δ' ἡ φύσις ἢ τῶν ποσῶν, ἀορίστων δὲ, τίθεται μὲν ποσόν ὁρισμένον, νοεῖ δ' ἢ ποσόν μόνον· τί δὲ τίνα μὲν οὖν αἰτίαν οὐκ ἐνδεχεται νοεῖν οὐδὲν ἄνευ τοῦ συνεχοῦς, οὐδ' ἄνευ χρόνου τὰ μὴ 10 ἐν χρόνῳ ὅντα, λόγος' ἄλλος· μέγεθος δ' ἀναγκαῖον γνωρίζειν καὶ κίνησιν γὰρ καὶ χρόνου· καὶ τὸ φάντασμα τῆς κοινῆς αἰσθήσεως πάθος ἐστίν· ὥστε τούτῳ φανερὸν ὅτι τῷ πρώτῳ αἰσθητικῷ τούτῳ ἡ γνώσις ἐστίν· ἡ δὲ μνήμη καὶ ἡ τῶν νοητῶν οὐκ ἄνευ φαντάσματος ἐστὶν· 15 ὥστε τοῦ νοητικοῦ κατὰ συμβεβηκός ἂν εἰη, καθ' αὐτὸ δὲ τοῦ πρώτου αἰσθητικοῦ. διὸ καὶ ἔτεροις τισὶν υπάρχει τῶν ζώων, καὶ οὐ μόνον ἀνθρώποις καὶ τοῖς ἔξοχοι δόξαι ἢ φρόνησιν. εἰ δὲ τῶν νοητικῶν τι μορίων ἦν, οὐκ ἄν ὑπήρχε πολλοὶ τῶν ἄλλων ζώων, ἵσως δ' οὐδεὶ τῶν 20 θητῶν, ἐπεὶ οὐδὲ νῦν πᾶσι διὰ τὸ μὴ πάντα χρόνου αἰσθήσεις ἔχειν· ἀεὶ γὰρ ὅταν ἐνεργῇ τῇ μνήμῃ, καθάπερ καὶ πρότερον εἴπομεν, ὅτι εἰδε τούτῳ ἡ ἡκουσεν ἡ ἐμαθε, προσαυτοπάθενται ὅτι πρότερον· τὸ δὲ πρότερον καὶ

449 b 29 καὶ πρότερον om. L S U M Them. vet. tr., deleri volunt Freudenthal et Biehl.

450 a, 20 θητῶν θηρίων Rassow et Biehl.
ight, but some permanent condition or modification it attaches to them dependent upon lapse of time. What is now present we do not now in present time remember, as has been said before; with the present perception is employed, with the future hope, with the past memory. Hence all remembering implies lapse of time; and so, those that have a sense of time are the only animals that remember, and the organ of memory is that which enables us to perceive time.

Imagination has been already discussed in the Psychology. We cannot think without imagery, for the same phenomenon occurs in thinking as is found in the construction of geometrical figures; there, though we do not employ as a supplementary requirement of our proof a determinateness in the size of the triangle, yet when we draw it we make it of a determinate size. Similarly in thinking also, though we do not think of the size, yet we present the object visually to ourselves as a quantum, though we do not think of it as a quantum. If the nature of the object be quantitative but indeterminate, our presentation is of a determinate quantity, though we think of as quantitative merely.

The reason why we can think of nothing apart from continuity and cannot think of objects not in time apart from time, belongs to a different inquiry from this, but we must apprehend magnitude and change by the same means as that by which we are conscious of time. Imagery is a phenomenon belonging to the common sense; so this is clear, that the apprehension of these determinations belongs to the primary organ of sensation: and memory, even the memory of concepts, cannot exist apart from imagery.

Hence since all this is so, indirectly it belongs to the noetic faculty, but in its essential nature to the primary principle of sensation. This is the reason why it is found in several of the other animals and not only in man or those possessing the power of entertaining opinions and endowed with intelligence. If it belonged to the conceptual faculties it would not be found in many of the other animals and perhaps in none that are mortal, since, as facts are, all living beings do not possess it, because not all have a sense of time. Always, when in the act of memory, as already said, we remember that we have heard or seen or learned this thing, we are conscious also that it was prior; now prior and posterior are distinctions in time.


104 ARISTOTLE

υστερον ἐν χρόνῳ ἑστίν. τίνος μὲν οὖν τῶν τῆς ψυχῆς ἑστίν ἡ μνήμη, φανερόν, ὅτι οὕτπερ καὶ ἡ φαντασία. ἦς ἐστὶ μνημονεύτα καθ' αὐτὰ μὲν ὅσα ἐστὶ φανταστά, κατὰ 27 συμβεβηκὸς δὲ ὅσα μὴ ἀνευ φαντασίας.

27 ἀπορήσειε δ' ἄν τις πώς ποτὲ τοῦ μὲν πάθους παρόντος τοῦ δὲ πράγματος ἀπόντος μνημονεύεται τὸ μὴ παρόν. δήλου γὰρ ὅτι δεὶ 30 νοῆσαι τοιοῦτον τὸ γιγνόμενον διὰ τῆς αἰσθήσεως ἐν τῇ ψυχῇ καὶ τῷ μορίῳ τοῦ σώματος ἐκ ἔχουτι αὐτὴν, οἶνον ζωγράφημα τι τὸ πάθος, οὐ φαμέν τῷ ἔξω μνήμην εἶναι· ἢ γὰρ γιγνομένῃ κίνησις ἐνσημαίνεται οἴον τῦτον τινὰ τοῦ αἰσθήματος, καθάπερ οἱ σφραγίζομενοι τοῖς δακτυλίοις. διὸ καὶ τοῖς μὲν ἐν κινήσει πολλῇ διὰ πάθος ἢ δι’ ἡλίκιαν οὖσιν οὐ γίγνεται μνήμη, καθάπερ ἄν εἰς ὕδωρ μείνῃ ἐμπιπτούσῃ τῆς κινήσεως καὶ τῆς σφραγίδος· τοῖς δὲ διὰ τὸ ψυχεῖσθαι, καθάπερ τὰ παλαιά τῶν οἰκο- 5 δομημάτων, καὶ διὰ σκληρότητα τοῦ δεχομένου τὸ πάθος οὐκ ἐγγίγνεται οὐ τύπος. διόπερ οἱ τε σφόδρα νέοι καὶ οἱ χέρουτες ἀμνήμονες εἰσίν· ρέουσι γὰρ οἱ μὲν διὰ τὴν αὐξησίν, οἱ δὲ διὰ τὴν φθίσιν. ὁμοίως δὲ καὶ οἱ λιανταχεῖς καὶ οἱ λιαν βραδεῖς οὐδέτεροι φαίνονται μνήμονες· 10 οἱ μὲν γὰρ εἰσὶν ὑγρότεροι τοῦ δέοντος, οἱ δὲ σκληρότεροι. τοὺς μὲν οὖν οὔ μὲν εἰς τὸ φάντασμα ἐν τῇ ψυχῇ τῶν δ' οὐχ ἀπτείαι. ἀλλ' εἰ δ' τοιοῦτον ἐστὶ τὸ συμβαίνον περὶ τὴν μνήμην, πότερον τοῦτο μνημονεύει τὸ πάθος, ἢ ἐκεῖνο ἀφ' οὗ ἐγένετο; εἰ μὲν γὰρ τοῦτο, τῶν 15 ἀπόντων οὐδέν οὖν μνημονεύομεν· εἰ δ' ἐκεῖνο, τῶν αἰσθανόμενοι τοῦτον μνημονεύομεν, οὐ μὴ αἰσθανόμεθα, τὸ ἀπόν; εἰ τ' ἑστιν ὁμοίως ὄσπερ τύπος ἡ γραφὴ ἐν ἤμι, τοῦτον αὐτὸν ἡ αἰσθησίς διὰ τὶ ἄν εἰς μνήμην ἐτέρου, ἀλλ' οὖν αὐτὸν τοῦτον; ὁ γὰρ ἐνεργῶν τῇ μνήμῃ 20 θεωρεῖ τὸ πάθος τούτῳ καὶ αἰσθάνεται τούτῳ. πῶς οὖν τὸ μὴ παρὸν μνημονεύει; εἰ δ' γὰρ ἄν καὶ ὅτι τὸ μὴ
Hence it is clear to what psychic faculty memory belongs; it belongs to that to which imagination must be assigned. To the class of objects of memory per se belong all things that can be imagined; to the indirect, all that cannot be divorced from imagination.

A difficulty might be raised as to how it can ever come about that, though contemporaneously with our present mental modification the real object is not present, yet it is the absent object which is remembered. But this is no impossibility, for it is clear that we must regard the modification arising from sensation in the soul and in that bodily part where sense resides, as if it were a picture of the real thing, and memory we call the permanent existence of this modification. When a stimulus occurs it imprints as it were a mould of the sense-affection exactly as a seal-ring acts in stamping.

This is the reason why memory does not occur in those who are in a rapid state of transition, whether owing to some perturbing experience or their period of life; it is as if this stimulus, like the seal, were stamped on running water. Again in others their worn-out condition—like that of old buildings—and the hardness of the receptive structure, prevent the sense-affection from leaving an impression. Hence we explain why the very young and the aged have no memory; in the former growth, in the latter decay, cause rapid transition. For like reasons, neither very quick-witted nor very slow people seem to have good memories; in the one class there is too much fluidity, in the other too much density, and hence the former do not retain the image in the mind, while in the latter it never gets fixed.

If these are indeed the facts with regard to memory, whether do we remember this resultant modification or that which caused it? If the former, there would be no such thing as memory of things absent. On the other hand, if it is the latter we remember, how, though perceiving the former, do we remember the absent object which we do not perceive? Once more, if what is retained is like the original in the fashion of an impression or copy, why is the perception of this very thing the memory of some other thing and not of it itself? It is this modification of consciousness which one engaged in remembering has present to his mind, and it is this that he perceives. How then can one remember what is
παρὸν καὶ ἀκούειν. ἦ ἐστὶν ὡς ἐνδέχεται καὶ σ' βάινει τοῦτο; οἷον γὰρ τὸ ἕν τῷ πινάκι γεγραμμένον ζω— καὶ ζῳὸν ἐστὶ καὶ εἰκών, καὶ τὸ αὐτὸ καὶ ἔν τούτῳ ἐστὶν ἄμφω, 25 τὸ μέντοι εἶναι ὑπαύτον ἐστὶν ἄμφοιν, καὶ ἐστὶ θεωρεῖν καὶ ὡς ζωὸν καὶ ὡς εἰκών, οὕτω καὶ τὸ ἔν ἡμῖν φάντασμα δεῖ ὑπολαβεῖν καὶ αὐτὸ καθ' ἐαυτὸ εἶναι θεωρῆμα καὶ ἅλλου φάντασμα. ἦ μὲν οὖν καθ' ἐαυτό, θεωρῆμα ἦ φάντασμα ἐστὶν, ἦ δ' ἅλλου, οἷον εἰκῶν καὶ μνημόνευμα.

30 ὥστε καὶ ὅταν ἐνεργῆ ἡ κίνησις αὐτοῦ, ἃν μὲν, ἦ καθ' αὐτὸ ἐστὶ, ταύτη ἀισθητὰς ἡ ψυχή αὐτοῦ, οἷον νόημα τι ἡ φάντασμα φαίνεται ἐπελθέιν· ἃν δ' ἦ ἅλλου, ὡσπερ ἐν τῇ γραφῇ ὡς εἰκόνα θεωρεῖ, καὶ μὴ ἐσωτερικῶς τὸν Κορίσκον ὡς Κορίσκον· ἐνταῦθα τε ἅλλο τὸ πάθος τῆς

451a θεωρίας ταύτης καὶ ὅταν ὡς ζωὸν γεγραμμένον θεωρῆ, ἐν τῇ ψυχῇ τὸ μὲν γίγνεται ὡσπερ νόημα μόνον, τὸ δ' ὡς ἐκεῖ ὅτι εἰκὼν, μνημόνευμα. καὶ διὰ τοῦτο ἐνίοτ' οὐκ ἴσμεν, ἐγγυνομένων ἡμῖν ἐν τῇ ψυχῇ τοιούτων κινήσεων ἀπὸ τοῦ αἰσθητῆς πρῶτον, εἰ κατὰ τὸ ἡσθησθαι συμβαίνει, καὶ εἰ ἐστὶ μνήμη ἢ οὖν δισταχομεν· ὅτε δὲ συμβαίνει ἐννοήσαι καὶ ἀναμνησθῆναι ὅτι ἠκουσμαεν τι πρῶτον ἡ εἰδομεν. τοῦτο δέ συμβαίνει, ὅταν θεωρῶν ὡς αὐτὸ μεταβάλλῃ καὶ θεωρη ὡς ἅλλον. γίγνεται δὲ 10 καὶ τοῦναντίον, οἷον συνεβή 'Ἀνιφέροντι τῷ ὘ρείτῃ καὶ ἅλλους ἐξιστιμένους· τὰ γὰρ φαντάσματα ἔλεγον ὡς γενόμενα καὶ ὡς μνημονεύοντες. τοῦτο δὲ γίγνεται, ὅταν τις τὴν μὴ εἰκόνα ὡς εἰκόνα θεωρη. αἱ δὲ μελέται τὴν μνήμην σώζουσι τῷ ἑπαναμνήσκειν· τοῦτο δ' ἐστὶν 15 οὐδέν ἔτερον ἢ τὸ θεωρεῖν πολλάκις ὡς εἰκόνα καὶ μὴ ὡς καθ' αὐτό. τὶ μὲν οὖν ἐστὶ μνήμη καὶ τὸ μνημονεύειν, εἰρθητι, ὅτι φαντάσματος, ὡς εἰκόνας οὐ φάντασμα, ἔξις, καὶ τίνος μορίου τῶν ἐν ἡμῖν, ὅτι τοῦ πρώτου αἰσθητικοῦ καὶ ὃ χρόνον αἰσθανόμεθα.
not present to one? One might as well see or hear what is not present.

But perhaps there is a way in which this can occur and it does really come about? That is so, for, as the animal depicted on the panel is both animal and representation, and, while remaining one self-identical thing, is yet both of these, though in aspect of existence the two are not the same, and we can regard it both as animal and as copy, so too the image in us must be considered as being both an object of direct consciousness in itself and relatively to something else an image; in its own nature it is an object of direct inspection or an image, so far as it represents something else it is a copy and a souvenir.

Hence when the change connected with it is actually experienced, if the mind perceives it in terms of its own proper nature, it appears to present itself to consciousness in the guise of an object of thought or an image; but when it is perceived as referring to something else, we regard it as the copy in the painting and as the picture of Coriscus although we have not then beheld him. Here this way of regarding the thing is an experience different from what occurs when we regard the object as an animal in chalk merely; in the latter case the psychical modification occurs merely as an object of thought, in the former as a memory, because there it is viewed as a representation.

Hence sometimes we do not know, when those psychical changes due to previous perception take place in us, if it is as connected with a previous perception that they occur, and we are in doubt whether it is a memory or not. Sometimes it chances that on reflection we recollect that we have heard or seen the thing previously; this takes place when, after regarding the object of consciousness in its own nature, we change and refer it to something else. The reverse of this also occurs, as befell in the case of Antipheron of Oreos and other estatics; they took their mental images to be objective and said they remembered the occurrences. This comes about when we take what is not a representation as though it were one. But exercise strengthens the memory through the repeated performance of the act of recollection, which is merely to view the image frequently as a copy and not in its own nature.

This is our account of memory and the act of remembering; it is the permanence of an image regarded as the copy of the thing it images, and the member in us to which it appertains is the primary seat of sensation and the organ employed in the perception of time.
Περὶ δὲ τοῦ ἀναμιμνήσκεσθαι λοιπὸν εἰπεῖν. πρῶτον μὲν οὖν οὐσὶ ἐν τοῖς ἐπιχειρηματικοῖς λόγοις ἐστὶν ἀληθῆ, δεὶ τίθεσθαι ὡς ὑπάρχοντα. οὐτε γὰρ μνήμης ἐστὶν ἀνάληψις ἢ ἀνάμνησις οὔτε λήψις· ὅταν γὰρ τὸ πρῶτον μάθη ἡ πάθη, οὔτ’ ἀναλαμβάνει μνήμην οὐδεμίαν (οὐ-
δεμία γὰρ προγέγονεν) οὔτ’ ἐξ ἀρχῆς λαμβανεί· ὅταν δὲ ἐγγένεται ἢ ἔξις καὶ τὸ πάθος, τότε ἡ μνήμη ἐστὶν. ὥστε μετὰ τοῦ πάθους ἔγγυμομένου οὐκ ἔγγυμεταί. ἐτὶ δ’ ὅτε τὸ πρῶτον ἐγγέγονε τῷ ἀτόμῳ καὶ ἐσχάτῳ, τὸ μὲν πάθος ἐνυπάρχει ἡδὸν τῷ παθόντι καὶ ἡ ἐπιστήμη, εἰ δεὶ καλεῖν ἐπιστήμην τὴν ἔξιν ἢ τὸ πάθος (οὐθὲν δὲ κωλύει κατὰ συμβεβηκὸς καὶ μνημονεύειν ἐνία οὖν ἐπιστάμεθα). τὸ δὲ μνημονεύειν καθ’ αὐτὸ οὐχ ὑπάρξει πρὶν χρονισθῇ-
ναι. μνημονεύει γὰρ νῦν ὃ εἶδεν ἢ ἐπάθε πρότερον, οὐχ ὅτι μνημονεύει. ἐτὶ δὲ φανερὸν ὅτι μνη-
μονεύειν ἔστι μὴ νῦν ἀναμνησθέντα, ἀλλ’ ἐξ ἀρχῆς αἰσθάμενον ἡ παθόντα. ἀλλ’ ὅταν ἀναλαμβάνῃ ἡν-
πρότερον ἐξεν ἐπιστήμην ἡ αἰσθήσιν ἦν οὖ ποτὲ τὴν 5 ἔξιν ἐλέγομεν μνήμην, τοῦτ’ ἐστὶ καὶ τότε τὸ ἀναμμη-
σκεσθαι τῶν εἰρημένων τι. τὸ δὲ μνημονεύειν συμβαίνει καὶ ἡ μνήμη ἁκολουθεῖ. οὐδὲ δὴ ταῦτα ἀπλῶς, εἰν ἐμπροσθεν ὑπάρξαντα πάλιν ἐγγένεται, ἀλλ’ ἐστιν ὡς, ἐστὶ δ’ ὃς οὐ. διὸ γὰρ μαθεῖν καὶ εὑρεῖν ἐνδέχεται τὸν 10 αὐτὸν τὸ αὐτὸ· δεὶ οὖν διαφέρειν τὸ ἀναμμηνήσκεσθαι τούτων, καὶ ἐνούσης πλείονος ἀρχῆς ἢ ἐξ ἡς μανθάνονσιν ἀναμμηνήσκεσθαι.

συμβαίνουσι δ’ αἱ ἀναμνήσεις, ἐπειδῆ πέφυκεν ἡ κίνησις ἢ δὲ γενέσθαι μετὰ τὴν ἐπιστήμην. εἰ μὲν ἐξ ἀνάγκης, δῆλον ὡς ὅταν ἐκεῖνη κινηθῆ, τὴν ἐπιστήμην.
Recollection remains to be dealt with. First of all we must posit as fact all the conclusions come to in our "Tentative Reasonings" which were correct. Recollection is neither the recovery nor the acquirement of memory.

When, on the first occasion, one learns or experiences something, he neither reacquires a memory, for none has previously existed, nor does he acquire it initially then. But when a disposition as well as the experience has once been produced then memory is found; hence it does not come into being in conjunction with the origination of the experience in us.

Further, when memory first has been produced in the individual and ultimate organ of sensation, the experience and the knowledge in question (if it is proper to call the disposition or experience knowledge; but there is nothing to prevent our having indirectly remembrance also of some of the objects of knowledge) have already existence in the experiencing subject. But memory in the proper sense will not exist till after the lapse of time. We remember in present time what we have previously seen or heard, we do not now remember what we have now experienced. But further, clearly, we may remember, not in virtue of a present act of recollection, but by being conscious or feeling the experience from the start. On the other hand, when we reacquire the knowledge or perception or whatever it was, the permanence of which we called memory, here and now we have recollection of any of these. As a result we remember them and memory ensues; not that that can be said without restriction in all cases when previous experiences are repeated in consciousness; in some cases it is so but in others not, for the same man may learn or discover the same thing twice. Recollection then must differ from the latter operations; it requires a more considerable basis to start from than in the case of learning.

The occurrence of an act of recollection is due to the natural tendency of one particular change to follow another. If the sequence is necessary, it is clear that, on the former
15 κίνησιν κινηθήσεται· εἰ δὲ μὴ ἡξ ἀνάγκης ἀλλ' ἔθει, ὡς ἐπὶ τὸ πολὺ κινηθήσεται. συμβαίνει δ' ἐνίοις ἀπαξ ἔθισθήναι μᾶλλον ἡ ἄλλους πολλάκις κινούμενοι· διὸ ἐνα ἀπαξ ἱδόντες μᾶλλον μνημονεύομεν ἢ ἐτεροὶ πολ- λάκις. ὅταν οὖν ἀναμμηνησκόμεθα, κινούμεθα τῶν ἔκειν ἐιωθεν. διὸ καὶ τὸ ἐφεξής θηρεύομεν νοήσαντες ἀπὸ τοῦ νῦν ἡ ἄλλου τυώς, καὶ ἀφ' ὀμοίῳ ἡ ἐναντίον ἡ τοῦ σύνεγγυς. διὰ τούτῳ γίνεται ἡ ἀνάμνησις: αἱ γὰρ κινήσεις τούτων τῶν μὲν αἱ αὐταὶ, τῶν δὲ ἁμα, τῶν ἐκείνη γένηται· ὧς δὲ τὰ πολλὰ ἐτέρων γενομένων κινήσεων οὐων ἐπομεν, ἐγένετο ἐκείνη. οὖδὲν δὲ δεῖ 20 σκοπεῖν τὰ πόρρω, πῶς μεμνήμεθα, ἀλλὰ τὰ σύνεγγυς· δήλου γὰρ ὅτι ὁ αὐτὸς ἐστὶ τρόπος. λέγω δὲ τὸ ἐφεξῆς οὐ προζητήσας οὐδ' ἀναμμηνησθεῖς. τῶ γὰρ ἔθει ἀκολου- θοῦσιν αἱ κινήσεις ἀλλήλαις, ὥς μετὰ τὴνδε. καὶ ὅταν τοίων ἀναμμηνήσκεται βούληται, τοῦτο ποιήσει· ζητή- 25 δὲ μέρος ἔχουσιν, ὥστε τὸ λοιπὸν μικρὸν ὑ ἐκινήθη μετ' ἐκείνο. ξητοῦσι μὲν οὖν οὕτω, καὶ μὴ ξητοῦντες δ' οὐτως ἀναμμηνήσκονται, ὅταν μεθ' ἐτέραν κίνησιν ἐκείνη γένηται· ὥς δὲ τὰ πολλὰ ἐτέρων γενομένων κινήσεων οὐων ἐπομεν, ἐγένετο ἐκείνη. οὐδὲν δὲ δεῖ 30 σκοπεῖν τὰ πόρρω, πῶς μεμνήμεθα, ἀλλὰ τὰ σύνεγγυς· δήλου γὰρ ὅτι ὁ αὐτὸς ἐστὶ τρόπος. λέγω δὲ τὸ ἐφεξῆς οὐ προζητήσας οὐδ' ἀναμμηνησθεῖς. τῶ γὰρ ἔθει ἀκολο- θοῦσιν αἱ κινήσεις ἀλλήλαις, ὥς μετὰ τὴνδε. καὶ ὅταν τοίων ἀναμμηνήσκεται βούληται, τοῦτο ποιήσει· ζητή- 35 σει λαβέιν ἀρχὴν κινήσεως, μεθ' ἡν ἐκείνη ἔσται. διὸ 40 αὔτος καὶ κἀλλιστα γίνονται αὖτ' ἀρχὴς αἱ ἀναμμηνήσεις· ὡς γὰρ ἔχουσι τὰ πράγματα πρὸς ἄλληλα τῷ ἐφεξῆς, οὕτω καὶ αἱ κινήσεις. καὶ ἐστὶν εὐμνημονεύσα τὸ ἐκείν ἐξει, ὡςπερ τὰ μαθήματα· τὰ δὲ φαύλα 452 σει λαβέιν ἀρχὴν κινήσεως, μεθ' ἡν ἐκείνη ἔσται. διὸ 45 καὶ κἀλλιστα γίνονται α профессиональн ἀρχης αἱ ἀναμμηνήσεις· ὡς γὰρ ἔχουσι τὰ πράγματα πρὸς ἄλληλα τῷ ἐφεξῆς, οὕτω καὶ αἱ κινήσεις. καὶ ἐστὶν εὐμνημονεύσα τὸ ἐκείν ἐξει, ὡςπερ τὰ μαθήματα· τὰ δὲ φαύλα 50 καὶ τούτω διαφέρει τὸ ἀναμμηνήσκεσθαι τοῦ πάλιν μαθάνειν, ὅτι δινήσεται πὼς δὲ αὐτοῦ κινηθήναι ἐπὶ τὸ μετὰ τὴν ἀρχὴν. ὅταν δὲ μὴ, ἀλλὰ δὲ ἀλλοὺ, οὐκέτι μέμνηται. πολλάκις δ' ἡν μὲν ἄδυνατε τἄνα-
MEMORY AND RECOLLECTION

change occurring, the second will be summoned into activity; when, however, the connection is not necessary but due to custom, the occurrence of the second process will take place only in most cases. It so happens that some people receive a greater bent from a single experience than others in whom the sequence has frequently taken place, and hence, in some instances, after seeing the things once, we remember them better than others who have seen them frequently. Thus, when we recollect, one of our previous psychic changes is stimulated which leads to the stimulation of that one, after which the experience to be recollected is wont to occur. Consequently we hunt for the next in the series, starting our train of thought from what is now present or from something else, and from something similar or contrary or contiguous to it. This is the means of effecting recollection; the change in those cases is now identical, now concomitant with, and now partially inclusive of the idea to be recalled, and hence the remainder formerly occurring subsequently to the rest is but small.

This is the way in which the search for the idea not present is carried out, and, even when there is no search, it is in this way that recollection occurs, when the one process occurs after the other; and in general it is after experience of other changes such as we have described that the process in question occurs. We must consider, not how we remember things remotely connected but those that are close to each other, for it is clear that the method is the same in both cases. I use the expression "next in order" without implying a prior search or act of recollection; for it is owing to the custom of their being experienced in sequence that one particular process follows another. Hence, when one wishes to recall something, this is what he does—he tries to find the starting point of a process after which the one in question will recur. This is why the swiftest and best way of recollecting is to start from the beginning; the subjective changes are related to each other in the same way as the facts remembered stand to each other in virtue of their place in the series. Those things are easily recalled which have an orderly arrangement such as we find in mathematics; but things wanting in exactitude are with difficulty remembered. To recollect and to learn a second time differ in this, that he who recalls a thing will be able by his own agency to pass to the process succeeding the starting point; when this is not so and the instrumentality of someone else is required, it is no longer a case of remembering.

Often when as yet unable to recollect, by searching one
ARISTOTLE

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μηθήναι, ζητοῦν δὲ δύναται καὶ εὑρίσκει. τούτο δὲ
10 γίνεται κωνόντες πολλά, ἐως ἂν τοιαύτην κινήσῃ κίνησιν
ἡ ἀκολουθήσει τὸ πράγμα. τὸ γὰρ μεμνησθαῖ ἐστὶ τὸ
ένειναι δυναμέν τὴν κινοῦσαν. τούτῳ δὲ, ὡστ' ἐξ αὐτοῦ
καὶ ὃν ἔχει κινήσεων κινηθήναι, ὦσπερ ἔφη. δει
δὲ λαβέσθαι ἀρχῆς. διὸ ἀπὸ τῶν δοκοῦντων ἀναμμηνή.
15 σκεσθαί ἐνίοτε. τὸ δ' αἰτιόν ὅτι ταχύ ἀπ' ἄλλου ἐπ'
ἀλλο ἔρχονται, οἷον ἀπὸ γάλακτος ἐπὶ λευκὸν, ἀπὸ λευκοῦ
δ' ἐπ' ἀερά, καὶ ἀπὸ τοῦτο ἐφ' υγρόν, ἀφ' οὗ ἐμνήσθη
μετοπῶρον, ταῦτην ἐπιζητῶν τὴν ὀραν. ἔοικε δὴ καθόλου
ἀρχῇ καὶ τὸ μέσον πάντων· εἰ γὰρ μὴ πρότερον, ὅταν
20 ἐπὶ τούτῳ ἔλθῃ, μηθήσθηται, ἢ οὐκέτ' οὐδὲ ἄλλοθεν,
οἷον εἰ τὰς νοῆσειν ἐφ' ὃν ΑΒΓΔΕΖΗΘ'. εἰ γὰρ μὴ
22 ἐπὶ τοῦ <Θ> ἐμνήσθη, ἐπὶ τοῦ Ε ἡμενηται, εἰ τὸ Η ἢ
22 τὸ Ζ ἐπιζητεῖ>· ἐντεῦθεν γὰρ ἐπὶ ἀμφοῖ κινηθῆναι ἐνδε-
χεται, καὶ ἐπὶ τὸ Δ καὶ ἐπὶ τὸ Ζ. εἰ δὲ μὴ τούτων τι
ἐξήτει, ἐπὶ τὸ Γ ἐλθὼν μηθήσθηται, [εἰ τὸ Η ἢ τὸ Ζ
25 ἐπιζητεῖ]>· εἰ δὲ μὴ, ἐπὶ τὸ Λ· καὶ οὕτως ἀεί. τοῦ δ'
ἀπὸ τοῦ αὐτοῦ ἐνίοτε μὲν μηθῆσθαι ἐνίοτε δὲ μὴ, αἰτιῶν
τὸ ἐπὶ πλειόν ἐνδεχεσθαί κινηθῆναι ἀπὸ τῆς αὐτῆς ἀρχῆς,
οἷον ἀπὸ τοῦ Γ ἐπὶ τὸ Ζ ἢ τὸ Δ. ἐὰν οὖν δι' α' πάλαι οὐ
κινηθῇ, ἐπὶ τὸ συνηθέστερον κινεῖται· ὦσπερ γὰρ φύσις
30 ἦδη τὸ ἔθος. διὸ πολλάκις ἄ ἐννοοῦμεν, ταχὺ ἀναμμη-
σκόμεθα· ὦσπερ γὰρ φύσει τὸδε μετὰ τὸδε ἐστίν, οὕτω
452 β καὶ ἐνεργεία· τὸ δὲ πολλάκις φύσις ποιεῖ. ἐπεὶ δ' ἐν
τοῖς φύσει γίγνεται καὶ παρὰ φύσιν καὶ ἀπὸ τύχης,
ἐπὶ μᾶλλον ἐν τοῖς δ' ἐθος, οἷς ἡ φύσις γε μὴ ὁμοίωσ

452 a, 21—25 text. recept. habet Biehl, primus scriptis Freudth., Rh. Mus.
xxiv. et Archiv für Gesch. d. Philos. ii. 1889. 21 vulgo legitur: εἰ γὰρ μὴ
ἐπὶ τοῦ Ε μέμνηται, ἐπὶ τοῦ Ε ἐμνήσθη, sed ἐπὶ τοῦ Ε μέμνηται om. E M Y, pro
Ε, Z etiam vet. tr. 24 ἐζητεί Biehl, ἐπιζητεῖ S et reliqui eedd., etiam Freudth.,
ἐπιζητεῖ L | Ζ] θ E Y. 25 ἐπιζητεῖ habet etiam E (Bus.) | A] δ Y. 28 Β
pro 1' legi vult Freudth. | εὰν οὖν δι' α' πάλαι οὐ Biehl, εὰν οὖν μὴ Λ S U Y et
omnes reliqui eedd. | διὰ παλαιοῦ Λ S U M Them. Mich. vet. tr. et omnes reliqui
edd., δι' α' πάλαι οὐ Y et E (Bus.).
manages to do so and finds what he was seeking. Here what happens is, that one initiates many processes before he arrives at the stimulation of that one on which the object sought will ensue. Remembering depends upon the potential presence in consciousness of the causal process, and upon this, on the condition that, as mentioned, the transition be effected by one's own agency and by means of processes that one already possesses.

A starting point from which to begin must always be found. Hence commonplaces seem to be often the initial point in the act of recollection. The reason why these are employed is that we pass quickly from one to another, *e.g.* from milk to white, from white to air, from this to wet, passing from which we call to mind the late autumn, which is the season we had in view.

It is true that in general the middle member also of a whole series of terms seems to be a starting point; if one does not recollect before, one will do so when he comes to it, or else there is no other point from which he can pass to the recollection of the thing in question. Suppose for instance one has a series of thoughts ABCDEFGH; if one has not remembered at H, one remembers at E, if he is seeking for G or F; for from that point we can go in either direction both towards D and towards F. But if we are not seeking for one of these members of the series, *i.e.* G or F, by going to C we shall effect recollection; if that is not so, by going to A we can. This is universally the process.

The reason why, though the same link is employed, recollection sometimes is and sometimes is not successful, is that we can pass to a further distance at one time than at another from the same starting point, *e.g.* from C to F or to D. Hence, if the transition is mediated by some connecting link which has not lately been employed, one passes to the more familiar consequent, for the newly acquired habit has become exactly like a natural disposition. It is thus that we explain why frequently we recollect quickly what we have been meditating upon. It is just in accordance with a natural tendency to follow one another in a particular order that things actually happen; and it is frequent repetition that produces a natural tendency. But since in the realm of Nature we meet with events contrary also to the order of Nature and due to chance, this is still more likely to occur in things due to custom, among which a natural order does
Aristotle

υπάρχειν· ὦστε κυνηγήναι ἐνίοτε κάκει καὶ ἄλλως, ἄλλως
5 τε καὶ ὃταν ἄφέλκη ἐκείθεν αὐτόσε πη. διὰ τὸῦτο καὶ
ὁταν δεὶ όνομα μνημονεύσαι, παρόμοιον μὲν, εἰς δ' ἐκεῖνον
σολοκιζομεν. τὸ μὲν οὖν ἀναμμηνήσκεσθαι τοῦτον συμ-
8 βαίνει τοῦ τρόπον.

τὸ δὲ μέγιστον, γνώριζεν δεὶ τὸν χρόνον,
ἡ μέτρῳ ἡ ἀορίστως. ἐστῶ δε τι ὅφι κρίνει τὸν πλεῖώ καὶ
10 ἐλάττω· εὐλογον δ' ὡσπερ τὰ μεγέθη· νοεὶ γὰρ τὰ
μεγάλα καὶ πόρρω οὐ τῷ ἀποτείνειν ἐκεῖ τὴν διάνοιαν,
ὡσπερ τὴν ὄψιν φασίν τινες (καὶ γὰρ μὴ ὄντων ὁμοίως
νοῆσει), ἀλλὰ τῇ ἀνάλογον κυνήσει. ἐστὶ γὰρ ἐν αὐτῇ
τὰ ὅμοια σχήματα καὶ κυνήσεις. τίνι οὖν διοίκει, ὅταν
15 τὰ μείζω νοῆ, ἡ ὃταν ἐκείνα νοῇ τὰ ἐλάττω; πάντα γὰρ
τὰ ἐντὸς ἐλάττω, καὶ ἀνάλογον καὶ τὰ ἐκτός. ἐστι δ' ὦ
ὡς ὡσπερ καὶ τοῖς εἰδέσιν ἀνάλογον λαβεῖν ἄλλο ἐν
αὐτῷ, οὔτως καὶ τοῖς ἀποστήμασιν. ὡσπερ οὖν οἱ τὴν
ΑΒ ΒΕ κινεῖται, ποιεῖ τὴν ΓΔ· ἀνάλογον γὰρ ἡ ΛΓ
20 καὶ ἡ ΓΔ. τι οὖν μᾶλλον τὴν ΓΔ ἡ τὴν ΖΗ ποιεῖ;
ἡ ὡς ἡ ΑΓ πρὸς τὴν ΛΒ ἔχει, οὔτως ἡ [τὸ] Θ πρὸς
tὴν ἑχει. ταῦτα οὖν ἡμι κινεῖται. ἀν δὲ τὴν ΖΗ
βούληται νοῆσαι, τὴν μὲν ΒΕ ὁμοίως νοεῖ, ἀντὶ δὲ
τῶν ΘΙ τὰς ΚΛ νοεῖ· αὐταί γὰρ ἐχουσιν ὡς ΖΛ
25 πρὸς ΒΑ.

ὅταν οὖν ἡμι τε τοῦ πράγματος γίνεται κύνησις
καὶ ἡ τοῦ χρόνου, τοτε τῇ μνήμῃ ἐνεργεῖ. ἀν δ' οὕται

not prevail to the same degree. Hence in some cases we are impelled to pass both to one point and to another, especially when something diverts us from the one to the other. Hence too, when we have to remember a name, we may recollect one like it and commit a verbal blunder as regards the proper one. This is the explanation of the way in which recollection occurs.

But there is a most important fact to be noticed—that we must have apprehension of time either determinate or indeterminate. Let us grant as real something by which we discriminate greater and less periods. It is reasonable that we should do so in the same way as we discriminate extended magnitudes; we know things that have great size and are at a distance, not by our thought reaching out to them there, as some say our sight does (for though they are non-existent they can equally be known), but by a psychic process analogous to them: there exist in the mind figures and changes similar to the external objects.

What then is the difference between knowing the objects of greater size (the objective) and knowing the other set (the subjective) which are smaller? All the inner are smaller and analogous to the outer, and probably, just as in the case of the knowable forms of things the subject has another corresponding one within him, so it is with distances. Thus, if AB, BE be the process, that produces AC, CD, for AC and CD are in the same ratio as AB and BE. Does not this then give AF, FG quite as much as AC, CD? No, for AC is to AB as H is to I. These processes, then, occur together, but, if one wants to think FG, while he equally at the same time thinks BE, instead of the ratio of H to I he thinks that of K to L, for the latter lines are in the same proportion as FA stands in to BA.

Hence when the process corresponding to the concrete object and that corresponding to the time are coincident we have an act of memory. If one thinks that they are coincident
μὴ ποιῶν, οἶται μνημονεύειν· οὐθὲν γὰρ κωλὺει δια-
ψευσθῆναι τινα καὶ δοκεῖν μνημονεύειν μὴ μνημονεύοντα.

30 ἐνεργοῦντα δὲ τῇ μνήμῃ μὴ οἴεσθαι ἄλλα λανθάνειν
μεμνημένον οὐκ ἔστω· τότῳ γὰρ ἢν αὐτὸ τὸ μεμνημένον.
ἂν ἦν τοῦ πράγματος γένηται χωρὶς τῆς τοῦ χρόνου
ἡ αὐτή ἐκείνης, οὐ μέμνηται. η ἢ τοῦ χρόνου διττή
453 α ἔστων· ὅτε μὲν γὰρ μέτρῳ οὐ μέμνηται αὐτῷ, οἶνον ὃτι
τρίτη ἡμέρα ὁδήποτε ἐποίησεν, ὅτε δὲ καὶ μέτρῳ· ἄλλα
μέμνηται καὶ ἐὰν μὴ καὶ μέτρῳ. εἰώθασί δὲ λέγειν
ὅτι μέμνηται μὲν, πῶτε μέντοι οὐκ ἔστωσιν, ὅταν μὴ
5 γνωρίζωσι τοῦ πότε τὸ ποσὸν μέτρῳ.

5 ὅτι μὲν οὖν οὐχ οἱ
ἀυτοὶ μνημονικοὶ καὶ ἀναμνηστικοί, ἐν τοῖς πρότερον
ἐξηρταί. διαφέρει δὲ τοῦ μνημονεύειν τὸ ἀναμνησκε-
σθαι οὐ μόνον κατὰ τὸν χρόνον, ἄλλα ὃτι τοῦ μὲν
μνημονεύειν καὶ τῶν ἄλλων ζῶων μετέχει πολλά, τοῦ
10 ὃ ἀναμμηνήσκεσθαι οὐδὲν ὡς εἰπέων τῶν γνωριζομένων
ζῶων, πλὴν ἀνθρωπος. αἰτιῶν δὲ ὃτι τὸ ἀναμμηνήσκεσθαι
ἔστων οἰον συλλογισμὸς τις· ὃτι γὰρ πρότερον εἴδει ἢ
ἡκουσεν ἢ τι τοιοῦτον ἐπαθε, συλλογίζεται ὁ ἀναμμη-
σκόμενος, καὶ ἔστων οἰον ζήτησις τις. τοῦτο δὲ οἰς καὶ
15 τὸ βουλευτικὸν ὑπάρχει, φύσει μόνοις συμβεβηκέν· καὶ
16 γὰρ τὸ βουλεύεσθαι συλλογισμός τις ἔστων.

16 ὅτι δὲ ἐστὶ σω-
ματικὸν τὸ πάθος καὶ ἡ ἀνάμνησις ζήτησις ἐν τοιούτῳ
φαντάσματος, σημεῖον τὸ παρευχλεῖν ἐνίοτος, ἔπειδὰν μὴ
δύνωνται ἀναμνησθῆναι καὶ πάνω ἐπέχοντες τὴν διάνοιαν,
20 καὶ οὐκέτ' ἐπιχειροῦντας ἀναμμηνήσκεσθαι οὐδὲν ἦττον,
καὶ μάλιστα τοὺς μελαγχολικοὺς· τούτους γὰρ φαντάσ-
ματα κινεῖ μάλιστα. αἰτιῶν δὲ τοῦ μη ἐπ' αὐτοῖς εἶναι
τὸ ἀναμμηνήσκεσθαι, ὅτι καθάπερ τοῖς βάλλουσιν οὐκέτι

453 α, 19 ἔπεχοντες Christ, Biehl, ἔπεχοντας Bek. codd.
without securing that they really are so one thinks one remembers, for there is nothing to prevent one's being deceived and thinking one remembers when one does not. When, however, one actually remembers, it is impossible not to know it or to be unaware that that is so, for it is just in being aware of this that memory consists. But if the object-processes occur independently of that corresponding to the time, or the latter take place without the former, there is no memory.

The time-apprehending process is twofold; sometimes one does not remember the interval with exact precision, as e.g. 453 that someone did something the day before yesterday, but sometimes our sense of time is accurate. All the same one remembers, though not aware of the exact interval; we are wont to say we do remember though we don't know when the thing happened, when we cannot tell what is the exact extent of the interval.

We have already asserted that it is not the same people who remember well and who recollect well. Recollection differs from remembering not merely in the superiority of the sense of time which it involves, but in the fact that, while many of the other animals possess memory, we may say that none of those now known, except man, share in recollection. The reason is that recollection is like a syllogism. One who recollects comes to the conclusion that he saw or heard or had some such experience previously and the process resembles a search and, owing to its nature, recollection accrues only to those that have the power of deliberation, for deliberation is a sort of syllogistic process.

Evidence that this experience is of a corporeal nature, and that in recollecting we search for an image in a corporeal organ, comes from the fact that it distresses some people when they cannot recall a thing though applying their mind hard in attempting to do so and, when they no longer try to recollect, none the less the disturbance goes on. This happens especially with liverish people, for they are the class most easily moved by images. The reason why recollection is not under their control is, that, just as when one has thrown a
ἐπ’ αὐτοῖς τὸ στήσαι, οὕτως καὶ ὁ ἀναμμηνησκόμενος καὶ 25 θηρεύων σωματικῶν τι κινεῖ, ἐν ὁ τὸ πάθος. μάλιστα δ’ ἐνοχλοῦνται οἷς ἀν ψυχότης τύχῃ ὑπάρχουσα περὶ . ὧν ἀισθητικὸν τόπον· οὐ γὰρ ῥαδίως παύεται κινηθείσα, ἐκεῖ ἀν ἐπανέλθῃ τὸ ξητούμενον καὶ εὑρθυπορήσῃ ἡ κίνησις. διὸ καὶ ὅργαι καὶ φόβοι, ὅταν τὴ κινήσωσιν, ἀντικινοῦν·

τῶν πάλιν τούτων οὐ καθίστανται, ἀλλ’ ἐπὶ τὸ αὐτὸ ἀντικινοῦσιν. καὶ έσκει τὸ πάθος τοῖς ὁνόμασι καὶ μέλεσι καὶ λόγοις, ὅταν διὰ στόματος γένηται τι αὐτῶν σφόδρα· πανσαμένους γὰρ καὶ οὐ βουλομένους ἐπέρχεται πάλιν ἄδειν ἡ λέγειν. εἰςὶ δὲ καὶ οἱ τὰ ἄνω μεῖζον

453 b ἔχουτε καὶ οἱ νανώδεις ἀμυνημονέστεροι τῶν ἐναντίων διὰ τὸ πολὺ βάρος ἔχειν ἐπὶ τῷ αἰσθητικῷ, καὶ μητ’ ἔξ ἀρχῆς τὰς κινήσεις δύνασθαι ἐμμένειν ἀλλὰ διαλύεσθαι μητ’ ἐν τῷ ἀναμμηνήσκεσθαι ῥαδίως εὑρθυπορεῖν.

οἱ δὲ πάμπαν νέοι καὶ λίαν γέροντες ἀμυνήμονες διὰ τὴν κίνησιν· οἱ μὲν γὰρ ἐν φθίσει, οἱ δ’ ἐν αὐξήσει πολλῇ εἰσὶν· ἐτὶ δὲ τὰ γε παιδία καὶ νανώδη ἐστὶ μέχρι πόρρω τῆς ήλικίας. περὶ μὲν οὖν μνήμης καὶ τοῦ μνημονεύειν, τίς ἡ φύσις αὐτῶν καὶ τίνι τῶν τῆς ψυχῆς μνημονεύει τὰ

10 ζώα, καὶ περὶ τοῦ ἀναμμηνήσκεσθαι, τί ἐστὶ καὶ πῶς γίνεται καὶ διὰ τίνας αἰτίας, εἰρηται.
thing one can no longer check its course, so a man engaged in recollection and on the hunt for an idea stimulates into activity a bodily organ in which the experience is localised. Those feel the vexation most who happen to have fluid in the region of the sensory organ, for once the fluid substance is set in motion it is not easily brought to rest until the object sought for returns to mind and the process resumes its direct course. Hence, when they have set something in agitation, emotions of anger and fear, owing to the reaction of these organs, do not come to rest; on the contrary they react once more on them. The phenomenon resembles that which occurs when a name or a tune or a sentence has come to be much on one's lips; after one has stopped, and without one intending it, one is prompted again to sing or to speak.

Dwarfs and those who have a greater development in the upper parts of the body have poorer memories than those of the opposite type, because they have too great a weight pressing upon the organ of consciousness; the processes can neither persist in it from the time of the initial experience (on the contrary they are effaced), nor in the act of recollection can they easily take a direct course. The very young and the exceedingly aged remember badly because of their transitional state: the former are growing, the latter decaying rapidly; and besides, children are dwarf-like in type up to a considerably advanced time in their life.

This is our account of memory and remembering, the nature thereof and the psychical organ employed by animals in remembering; likewise of recollection, its nature, mode of occurrence, and causes.
COMMENTARY

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CHAPTER I.

436 a 1. ἐπὶ αἰσθήσεως καὶ αἰσθητῶν. This is the common title of the treatise and that known to Alexander of Aphrodisias. As, however, the discussion is to be not about the soul per se, but in particular about its connection with the body, i.e. not merely psychological but especially physiological, Alexander suggests that ἐπὶ αἰσθητηρίων τε καὶ αἰσθητῶν would be a more legitimate title. Sometimes αἴσθησις is used loosely instead of αἰσθητήριον, even by Aristotle himself. Simon Simonius adopts this amended title, translating it ‘De Organis Sensuum et Sensilibus.’

This is evidently the investigation promised in De An. i. ch. 1, 402 b 15, where Aristotle asks if the objects of sensation may not be more profitably treated of before the function of sensation itself. In the whole passage 402 b 5 sqq. he points out that a definition of soul in the abstract is not sufficient for a comprehension of what soul is, ἀλλὰ καὶ ἀνάπαλιν τὰ συμβεβηκότα συμβάλλει τά μέγα μέρος πρὸς τὸ εἰδέναι το τί ἐστιν. Thus we must proceed beyond our abstract definition and give an account of the various μόρια—faculties of soul, but these again cannot be understood apart from their ἔργα—functions, and, once more, point to an account of their ἀντικείμενα—objects. Aristotle doubts if these subjects should not be treated in the reverse order; to do so would be to begin with things ‘notiora nobis’; for, as later psychology also has pointed out, it is the things presented to our senses and not the psychical functions through which they are apprehended, which are in the order of time the primary objects of consciousness.

As a matter of fact, Aristotle does not adopt this reverse order in his exposition, thinking it sufficient to have pointed out the danger of resting content with a merely abstract treatment.
Thus we come finally to a discussion of αἴσθητα, the objects of sense and the bodily organs through which they are apprehended. It is not to be thought, however, that the separation of topics in Aristotle's psychological writings is observed with perfect logical rigidity. The general outlines of what is here laid down have already been anticipated in De An. ii. chs. 7–11, and the detailed treatment of sound which is omitted from this treatise is to be found there in ch. 8.

What in particular distinguishes this treatise from the De Anima is the greater detail with which αἴσθητα are treated and the attention devoted to the bodily organ of each sense.

dιώρισται, διοριζεῖν is a technical term with Aristotle, almost equivalent to 'to define' (ὁρός, ὁρισμός = definition).

καθ' αἰτίην, another technical term; it is defined in Anal. Post. i. ch. 4, 73 a 34 sqq. Those characteristics of a thing without which it would be impossible for it to be that thing, belong to it καθ' αἰτία. They are stated in the definition. Cf. also Metaph. vii. ch. 5, 1030 b 23 sqq. It is assumed that a thing can preserve its individuality though stripped of certain qualities. These latter are συμβεβηκότα. When Aristotle says he has given a definition of the soul per se, he means that he has stated the ultimate attributes that everything psychical (or rather everything living, for plants have ψυχή) must have. This definition appears in De An. ii. ch. 1, 412 b 5: ἐτή δὲν ἐντελέχεια ἡ πρώτη σώματος φυσικὸν ὀργανικὸν.

The question is, whether the soul per se is here contrasted with its faculties, or whether—as Alexander suggests is also possible—he is opposing soul considered alone to soul considered in its relation to the body. To this it may be objected that Aristotle never does consider soul apart from body. It is clear that Aristotle here means just what he says, after a discussion of soul in general and its faculties he is to go on to investigate their ἐργα or, as he here calls them, the πράξεως of the living creatures. This is a progress in the direction of greater detail, for one and the same δύναμις is capable of being determined in various ways when it passes into activity or ἐνεργεία. This will involve the more detailed treatment of the bodily organ of each ἐνεργεία also. Hence the predominantly physiological character of this treatise.

For the reason why a definition of soul in general is not sufficient, see De An. ii. ch. 3, 414 b 20 sqq. Things ἐν τῷ ἐφεξῆς, like souls and figures, have no common nature which can exist apart from the
particular type, e.g. triangle, quadrilateral, etc. Such things have a nature, 'media inter univocorum et equivocorum naturam.'

436 a 2. δύναμεων, δύναμις is the regular word for potentiality translatable by 'faculty,' by which term we also render μόριον. This latter term Aristotle inherited from the Platonic psychology. The word itself and the way in which Plato employs it suggest rather a theory of the separable and independent nature of the various faculties, the point of view, in fact, of 'faculty psychology.' Aristotle's is, however, far removed from any such theory.

436 a 3. ἐπίσκεψιν ποιεῖσθαι is an equivalent for θεωρίαν ποιεῖσθαι: cf. Metaph. 1. ch. 8, 989 b 24–27.

τῶν ζώων ἐξόντων. This brings in plants, which also have ψυχή, and to which some of the phenomena proposed for discussion belong (e.g. νεότης καὶ γηρας, ζώη καὶ θάνατος).

436 a 4. ἴδια, ἴδιος is that which is the peculiar possession of any one species.

κοιναί, κοινός is the reverse of ἴδιος. Alexander points out that Aristotle desires not merely to classify the psychical functions of animals but to discuss the things classified.

Simon would make out that the distinction falls wholly within the functions of animals and that here ἴδια and κοιναί mean respectively 'belonging to them quâ animal and quâ living' because there is no discussion of the functions of plants in the Parva Naturalia. However, the missing treatise De Plantis (cf. De Long. et Brev. Vit. 467 b 4) seems to have been intended to carry on the discussion of the most universal of all the conditions of life. Simon seems to be right in denying that by κοιναί Aristotle is referring merely to the functions which plants share with animals. But neither is it evident that the distinction falls wholly within the functions of animals as he asserts. As a matter of fact the Parva Naturalia though dealing chiefly with the functions of animals contain reference too to the phenomena of plant life. Possibly, however, Aristotle had no strict and complete classification in his mind, but merely wished to suggest that some functions might be the peculiar attributes of a certain species and of certain wider groups, as ἄνάμνησις of man and ἄναπνοη and ἔκπνοη of animals with lungs. Simon's view, however, derives confirmation from a passage further on (cf. note to 436 a 7).

436 a 5. πράξεις, πράξις is here employed in an unusual sense, as though it were a general term—action—used instead of the specific,
ἐνέργεια, which is par excellence the name for the function or activity of anything possessing mind (κυρίως γὰρ πρᾶξις λογικὴ ἡ ἐνέργεια ἡ ἐστιν. Alex. p. 4, l. 5 [W.]). But πρᾶξις has generally a very restricted application, meaning as a rule distinctively human actions into which deliberation and thought enter. Cp. passim in the Ethics, especially 1. ch. 1, 1094 a 1; vi. ch. 2, 1139 a 31 etc.

υποκινθω. υποτίθεσθαι is to state as a υπόθεσις. This word has both a technical and a general meaning. It is used to refer (1) to certain of the undemonstrable but indubitable principles which lie at the basis of the several sciences; this is its most common technical meaning.

Again it may be used (2) to indicate a statement which is assumed as an ultimate principle without proof for the purposes of a particular discussion, but which is demonstrable and will be proved when it is convenient to do so (cf. Alex. 4, l. 23 [W.]).

Alexander is wrong in saying that the υπόθεσις which is an indemonstrable principle of science is an ἀξίωμα. Aristotle (Anal. Post. 1. ch. 10) distinguishes three classes of first principles, (1) the κοινὰ ἀξίωματα of all science, e.g. the Law of non-contradiction, (2) definitions of the subject of demonstration (τὰ πρῶτα 76 a 32) and their properties (πάθη), (3) υποθέσεις, which affirm the existence of the subject to which the science is to attach predicates, e.g. lines and figures in geometry (76 b 5). These two latter classes of ἀναπόδεικτα are ἰδία—appropriate to the science in question; they are both species of θέσις (Anal. Post. 1. ch. 2, 72 a 15 sqq.). It is thus evident that, according to this technical use, a υπόθεσις is that which 'renders conclusions unconditional and categorical' (Poste, Posterior Analytics, Appendix B, p. 140). It corresponds to what Mill (Logic, Bk 1. ch. 8, §§ 6 and 7) calls a 'postulate'—the assertion that, e.g. the figure in geometry, the triangle, exists, which renders our conclusions unhypothetical. Without this postulate which asserts the existence of the things defined there is no way of distinguishing a science from any self-consistent system of mythology. Upon definitions alone a science cannot be built.

There appears, however, to be another technical use of υπόθεσις which was common in Greek geometry. The υπόθεσις is the Q.E.F. of a problem or Q.E.D. of a theorem, the proposition set up for proof. This seems to be the sense in which it is employed in Eth. Nic. vii. ch. 9, 1151 a 17 (cf. Mr Burnet's note on the passage), though Poste (op. cit. p. 105 note) cites it as an instance of the former usage.
It is quite clear that here Aristotle uses ὑποθεσις in the wider sense of ὑπόθεσις. The conclusions of the De Anima which can be proved are to be used as ἀρχαὶ in this treatise. These, therefore, though not indubitable first principles, are still certain; they are not 'hypotheses' in the modern sense, which are statements the certainty of which is still in doubt and which are assumed in a merely provisional way.

436 a 7. πρῶτων. In Posterior Analytics i. ch. 4, 73 b 33 sqq. it is shown that what is a universal and peculiar attribute of a species belongs to it primarily, e.g. the equality of its angles to two right angles belongs to the species triangle primarily and not to figure, the genus (τὸ καθόλου δὲ ὑπάρχει τότε, ὅταν ἐπὶ τὸν τυχόντος καὶ πρῶτον δεικνύηται).

To be πρῶτος then is to be ἴδιος, and πρῶτων will refer to the ἴδια mentioned above, i. 4. To proceed from ἴδια to κοινά is to follow the 'ordo doctrinae,' while from κοινά to ἴδια is the 'ordo naturae,' and this latter is the method which on the whole Aristotle follows in the De Anima in spite of his statement in De An. ii. ch. 2, 413 a 11 sqq.

Here, however, he is to begin with the ἴδια which belong to animal quā animal (if we interpret ἴδια as Simon will have it, cf. note to 436 a 4), e.g. Sense and Memory, and later he will go on to those functions which animals share with other living things.

The 'ordo doctrinae' is also employed by him when he treats of sight before touch in the De Anima, and in treating of animals before plants; it often proceeds from the γνωριμότερα ἡμῖν to the γνωριμότερα φύσει, cf. Physics i. ch. 1. Perhaps, however, πρῶτων refers to ζωὴν as opposed to τῶν ζωῶν έχόντων merely. This, which is Ziaja's interpretation, makes the upshot of the whole matter that he is going to treat of animals and their functions first, as in fact he does. This interpretation relieves us from the necessity of limiting ἴδια definitely to one or other of the two alternatives—peculiar to animal quā animal, and—peculiar to individual species.

436 a 8. κοινά τῆς ψυχῆς δόντα. The most important both of the generic and specific functions of animals are functions both of the soul and the body, and hence (as Thomas says) the necessity of a separate treatise.

436 a 9. μνήμη. Memory does not belong to all animals, cf. De Mem. 450 a 16 and 453 a 9, also Metaph. i. ch. 1, 980 a 29 sqq.; hence he says only that these functions belong to almost all animals (σχέδων, i. 11).
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436 a 10. ὁρεῖς or τὸ ὀρεκτικὸν (cf. Eth. i. ch. 13, 1102 b 30) is the general name for the appetitive or conative element in the soul. It appears in three specific forms, ἐπιθυμία, θυμός, and βουλήσις; the latter is a function of the rational soul. Cf. De An. iii. ch. 9, 432 b 5: ἐν τῷ λογιστικῷ ἡ βουλήσις γίνεται καί ἐν τῷ ἀλόγῳ ἡ ἐπιθυμία καί ὁ θυμός.

The Aristotelian distinction between θυμός and ἐπιθυμία is not the same as the Platonic (cf. Repub. iii. and iv., especially 439 e sqq.), for Aristotle in Ethics i. ch. 13, 1102 b 13 sqq. assigns both θυμός and ἐπιθυμία to that irrational part of the soul which truly is not absolutely irrational (κυρίως ἄλογον) in so far as it partakes in a way (μετέχει ποὺς) in reason, but yet is irrational in so far as it opposes reason (ἄντιστείνει τῷ ἀλόγῳ). According to Plato ἐπιθυμία belongs to the wholly irrational part of the soul. Nevertheless though, according to Aristotle, ἐπιθυμία and θυμός belong to the same φύσει τῆς ψυχῆς, yet they are distinguished in a way analogous to the Platonic; cf. Eth. vii. ch. 7, 1149 a 25 sqq. Ἐπιθυμία is a mere desire for what is pleasant as such, θυμός is passion acting without reflection, but not mere craving for pleasure, cf. Zeller, Arist. and Earlier Peripatetics ii. pp. 112–13. Anger is an inadequate rendering of θυμός, as the tenderer emotions are also ascribed to it by Aristotle, cf. Polit. vii. ch. 7, 1327 b 40. τὸ ὀρεκτικὸν has been already treated in the De Anima. The accurate distinction of θυμός and ἐπιθυμία really falls into the background in Aristotle, since their demarcation was not of importance for his psychology.

436 a 12. τῶν μετεχόντων ζωῆς, i.e. plants as well as animals. In addition to the above class there is second a class of 'communissima' such as νέωτης καὶ γήρας, ζωὴ καὶ θάνατος, and a third class which are κοινὰ ζωῶν ἐνίοις, e.g. ἀνάπνοι καὶ ἐκπνοί. If by ἰδιαὶ in l. 4 Aristotle means, as Simon maintains, peculiar to animal quid animal, then the first list—ἀἰσθησις etc.—is the tale of the ἰδιαῦ, and the four συνυγίαι form the constituents of the two latter classes.

436 a 14. συνυγίαι. Simon says, 'Est enim horum quasi privatio alterius.' They are related as a positive quality, and its στέρρας, i.e. the contradictory, within the same genus.

436 a 16. τί τε ἐκαστὸν αὐτῶν. The τί ἐστιν of anything consists of the characteristics revealed in its definition—the scientific 'connotation' of the name, cf. Anal. Post. ii. ch. 3.

436 a 17. αἰτίας. ἡ αἰτία or τὸ αἴτιον is cause,—that, the existence of which entails the existence of the thing of which it is said to be
the cause. According to Aristotle’s logical theories it is impossible to prove the τι ἐστιν of anything; only its existence, i.e. that it occurs (συμβαίνει), can be demonstrated; and this is done by giving its αἴτιον.

436 a 18. φυσικός. In De An. i. ch. 1, 403 a 29 sqq. there is a discussion of the spheres of the φυσικός and the διαλεκτικός, and it is first suggested that the physicist pays attention to the matter, the other to the λόγος or εἴδος (in his illustration the final cause) in natural phenomena. But the conclusion is come to, that the real φυσικός pays attention to both. Cf. also Metaph. vii. ch. 11, 1037 a 16 sqq.

περὶ ύγιείας καὶ νόσου. This tractate, which should have followed the περὶ ἀναπνοῆς (cf. 480 b 22), is not extant.

436 a 19. ἀρχάς, the premisses from which deduction is made.

436 a 20. ἐστερημένως. This word is applied both to those that lack and those that have been deprived of a quality. Cf. Metaph. v. ch. 22, 1022 b 22 sqq.

436 a 22. ιατρικῆς. Aristotle cites a case in which we can explain a phenomenon in medicine by geometrical principles,—that circular wounds are slowest to heal (cf. Anal. Post. i. ch. 13, 79 a 15).

436 b 2. ἀρχονταί, a reference to ἀρχαί (cf. l. 19 above).

436 b 4. μετ’ αἰσθήσεως. That sensation cannot exist apart from the bodily life is affirmed in De An. ii. ch. 2, 413 b 27. Ἡδονή, λύπη, θυμός, ἐπιθυμία, and ὀρέξεις generally, occur along with sensation; it enters into their being: cf. loc. cit. 413 b 22–24.

436 b 5. δὲ αἰσθήσεως. μύημα is due to αἰσθήσεις: it is a ἐξις φαντάσματος (cf. de Mem. 451 a 17) and a φάντασμα is a κίνησις ὑπὸ τοῦ αἰσθήσεως, i.e. a psychical affection originating with, and being a persistence of, a sense stimulation; it is the μονὴ τοῦ αἰσθήματος talked of in Anal. Post. ii. ch. 19, 99 b 36 and De An. i. ch. 4, 408 b 18. Again the φάντασμα is called a ὑπόλειμμα τοῦ αἰσθήματος. Cf. De Mem. ch. 1, 451 a 4 and De Insom. 461 b 21, and also An. Post. ii. ch. 19, 100 a 3, ἐκ μὲν οὖν αἰσθήσεως γίνεται μύημα.

πάθη. A πάθος is (1) in its most general signification, any attribute of a thing whatsoever as opposed to the concrete reality itself (cf. De Gen. et Corr. i. ch. 4, 319 b 8 etc.). In accordance with the etymology of the word there is, however, generally the side implication of the πάθος, being a determination produced in a thing which is passive and suffers modification (πάσχει) by something else. Hence (2) πάθος, though often used indiscriminately, tends to be demarcated from a permanent quality and to refer to a more
temporary attribute: cf. Categ. ch. 8, 9 b 28. It is often indistinguishable from συνμπεβηκός.

If the subject—the thing which has the πάθος—is mind or one of its faculties, then the πάθος is some modification of consciousness. We must, however, distinguish as a special meaning that sense of πάθος (found in De Mem. ch. 1, 450 b 1), where it means mental perturbation.

For the use of πάθος cf. Burnet, Eth. Nic. p. 88. Here, according to Alexander, ὑπνος καὶ ἐγρήγορεῖς come under the designation of πάθη τῆς αἰσθήσεως: cf. Comment. in De Sensu, p. 7 (Wendland), l. 25: ταῦτα γὰρ τι πασχούσης ὁ ὑπνος. The explanation is that exhalations from food proceed upwards to the brain, condense and, descending once more, press upon the seat of consciousness (the heart), and so produce sleep. Cf. also De Somn. 454 a 22: ἀμφο γάρ ἐστι τὰ πάθη ταῦτα περὶ αἴσθησιν τοῦ πρώτου αἰσθητικοῦ.

436 b 6. ἡς. A ἡς is a fixed and determinate disposition (mere temporary disposition is διάθεσις). Cf. Categ. ch. 8, 8 b 27. Aristotle seems here to be describing the character of the four συγγίαω mentioned above in 436 a 14 sq. Hence by ἡς he can hardly be referring to memory, which indeed is a ἡς of the image left by sensation, not directly of sensation itself. Alexander thinks that by ἡς sensation itself is referred to. But, if we hold that one of the pairs of correlatives is indicated, perhaps νεῦτης καὶ γῆρας may be intended, though in what sense these are ἡς of αἰσθητικός is not clear; they belong rather to τὸ θρεπτικόν—the ‘nutritive soul.’

436 b 7. σωτηρία. ἀναπνοὴ preserves the life because it cools the heart—the ultimate organ of sensation, and prevents it from destroying itself by means of its own heat. Cf. De Juvent. ch. 3, 469 a 5 sqq. and De Resp. chapters 1, 8 and 16.

στέρησεις. νόσος and θάνατος are φθοραὶ and στέρησεις of life. στέρησεις is used here in the sense of deprivation (cf. note to 436 a 20).

436 b 8. διὰ τοῦ λόγου here is equivalent to ‘deductively’ as opposed to ‘inductively’—δὲ ἐπαγωγής (cf. Phys. iii. ch. 3, 210 b 8 sqq.). No reference to a priori in the Kantian sense is intended.

436 b 9. αἴσθησεως. The distinction between noun and verb seems here to correspond to that between faculty and function. Cf. μνήμη and μνημονεύων De Mem. passim. In the famous passage in Anal. Post. ii. ch. 19, 100 a 17 it is generally understood to be that
between content and function—καὶ αἰσθάνεται μὲν τὸ καθ’ ἐκαστὸν, ἢ δὲ αἰσθήσις τοῦ καθόλου ἑστεν.

436 b 11–12. ηερὶ ψυχῆς. The reference is to De An. ii. chapters 2, 3, 5 etc. Cf. 413 b 1 sqq.

436 b 14. ἱδια. This supports Simon’s interpretation of ἵδιον in 436 a 4 above. If touch belongs peculiarly to each and every species, that must mean that it is a peculiar property of that nature which they all have in common. It is something which they have quâ animal. The usual meaning of ἵδιος is ‘belonging to a species exclusively,’ but as each species is here said to have the properties in question, the usual sense is out of the question.

436 b 15. Cf. De An. ii. ch. 3, 414 b 2 sqq. By touch we discriminate dry and moist, hot and cold—the ultimate properties of things material and also important characteristics of τροφὴ (ἡ γὰρ ἀφή τῆς τροφῆς αἰσθήσις). Compare also iii. ch. 12, 434 b 9 sqq. Touch is necessary for the animal’s preservation.

In the former passage (ii. ch. 3) we find that γεώτης also discriminates characteristics of τροφὴ and cf. below ch. 4. Taste discriminates flavour, but χυμός is simply a ὑδώσμα of the fundamental characteristics of τροφὴ—the tangible ones, and hence γεώτης is a species of touch (441 a 3 below).

436 b 19. τοῦ θερετικοῦ. The omission of μορίου (which is read by L S U P and Bek.) after θερετικοῦ makes this passage intelligible. Aristotle here refers to that which nourishes, not to the ‘nutritive faculty’ of the soul. (1) In the first place, it is not χυμός but γεώτης which should be a πάθος of any of the faculties of the soul, and (2) that would be a πάθος, not τῆς θερετικῆς δυνάμεως, but τοῦ αἰσθητικοῦ.

The first of the above reasons makes us reject Alexander’s interpretation of τοῦ θερετικοῦ μορίου as τοῦ γεωστικοῦ, which wants explanation and besides makes this statement a tautology.

Alexander himself suggests that the meaning is τὸ μόριον τρέφειν δυνάμενον, i.e. the nutritive object. But μόριον is strange and is better omitted as in E M Y.

Hammond does not notice the importance of the alteration in Biehl’s text, and translates: ‘flavour is an affection of the nutritive soul,’ and explains that ‘flavour as a property of food affects the processes of growth or the nutritive soul.’

But τὸ θερετικὸν here = τροφὴ.

436 b 20. Aristotle is clearly demarcating animals in general
from the smaller number that possess local movement, by a distinction in their sensational consciousness also. In all animals we have touch and taste, but in those that have κίνησις κατὰ τόπον we have also the senses which are stimulated by a medium external to the body (διὰ τῶν ἐξωθέν). The objects of touch and taste are external as well as those of the other senses, and hence it is no differentia of the senses of sight, hearing, and smell to be 'excited by external objects' as Hammond translates: cf. De An. iii. 12, 434 b 14: αἱ γὰρ ἄλλαι αἰσθήσεις δὲ ἑτέρων αἰσθάνονται, οἷον ὀσφυῖς ὤψις ἄκον.

For a discussion of the media (air, water and τὸ διάφανες) cf. ch. 3-5, the discussion of the special senses, and Bäumker, Des Aristoteles Lehre von den Äussern und Innern Sinnesvermögen, pp. 38 sqq.


προαιρετικάμενα, ἢκεν. perceiving their food before they are in actual contact with it.

437 a 1. φρονήσεως. φρόνησις is here used in a wide and general sense as equivalent to διάνοια— the faculty which gives us universals; but used more accurately, as in Eth. Nic. vi., it is περὶ ὀν ἐστὶ βουλευσασθαι (114 b 9), i.e. knowledge of τὰ πρακτά. Cf. 114 b 4: λείπεται ἡρὰ αὐτῆς (sc. φρόνησιν) εἶναι ἔξω ἀληθῆ μετὰ λόγου πρακτικῆν περὶ τὰ ἀνθρώπω ἀγαθὰ καὶ κακὰ.

The φρόνημος is able to determine what is good and profitable πρὸς τὸ εἶ ἔξω ὀλοκ, i.e. for his general welfare. φρόνησις is one of the ‘intellectual virtues.’ Some of the animals seem to have φρόνησις: cf. Metaph. i. ch. 1, 980 b 22, where some are said to be φρονιμώτερα than others.

437 a 3. νοητῶν. νοητὰ are the objective counterpart of νοῆμα, which are concepts generally, the contents of νοῆσις or νοῆς, i.e. intellect. Cf. De An. i. ch. 3, 407 a 7: ἡ νοῆσις τὰ νοῆμα, and Metaph. xii. ch. 7, 1072 b 22: τὸ γὰρ δεκτικὸν τοῦ νοητοῦ...νοῆς. φρόνησις τῶν νοητῶν is equivalent to θεωρία or ἐπιστήμη, which are regularly opposed to πράξεις as well as to a knowledge of τὰ πρακτά. Cf. Eth. vi. ch. 5, 1140 b 1: οὐκ ἂν εἶ ἡ φρόνησις ἐπιστήμη, and cf. ch. 3, 1139 b 17 sqq. ἐπιστήμη concerns τὰ ἐξ ἀνάγκης, φρόνησις those things which ἑνδέχεται ἄλλως ἔχειν. Hence, in the strict sense of the terms, the expression φρόνησις τῶν νοητῶν contains a contradiction.

437 a 5. καθ’ αὐτῆς, i.e. sight in its own sphere, in the objects directly presented to it. To the sphere of sight belong colour and
the mathematical qualities of objects perceived by sight—τὰ κοινὰ αἰσθητά (cf. ll. 9–10 below). Compare De An. ii. ch. 6, 418 a 9, where the κοινὰ αἰσθητά are said to be perceived καθ’ αὐτά. Besides those things which are thus perceived there are others that are perceived κατὰ συμβεβηκός, e.g. we perceive by sight qualities referring to another sense, which are ‘complicated’ with the visual one in the same object, and again we can perceive all sorts of other determinations of the visible object, e.g. that such and such a white object is ‘the son of Diares’ (418 a 21). Here some modification of the visual quality must pass as a symbol for or mean the other characteristics which we infer from it. But it is in the perception of these associated elements that hearing contributes more to intellectual life, for to the audible sounds we have by convention (κατὰ συνθῆκην) attached the concepts by which we think the whole of reality so far as it is known to us.

πρὸς δὲ νοῦν. νοῦς seems to be best described as the faculty of conceptual thought. Though sometimes defined so widely as to take in all mental activities superior to αἰσθησις (cf. De An. iii. ch. 4, 429 a 23: λέγον δὲ νοῦν ὃ διανοεῖται καὶ ἐπολαμβάνει ἡ ψυχή: cf. also De An. iii. ch. 3, 427 b 27–29), in its most characteristic application it refers to the highest faculty of all. That seems to be the apprehension of concepts in abstraction from the imagery, the sensuous setting or ἀλη by which they seem generally to be attended. Cf. De An. iii. ch. 4, 429 b 21 and Rodier’s notes to the preceding passage, also ch. 6, 430 b 30. Such simple concepts seem to form the starting point of all scientific knowledge, and in Eth. vi. ch. 6, 1114 a 7 νοῦς is said to be the faculty for apprehending them, not a faculty of discursive thought. Cf. also Anal. Post. ii. ch. 19, 100 b 12.

κατὰ συμβεβηκός. Cf. above, note to καθ’ αὐτήν. Aristotle does not mean to equate κατὰ συμβεβηκός and πρὸς νοῦν; as we saw, by sight we may perceive objects κατὰ συμβεβηκός. But it is audible sound alone which is elaborated into a system corresponding to the scheme of ideas and in each item suggestive of them.

437 a 8. τὰ κοινὰ. Cf. De An. ii. ch. 6, 418 a 17, iii. ch. 1, 425 a 14, iii. ch. 3, 428 b 22, and also below ch. 4, 442 b 2 sqq. ἱρέμια is here omitted from the list, though codex I. reads στάσις.

437 a 11. φωνής. Cf. De An. ii. ch. 8, 420 b 5 sqq. The general description of φωνή is ψόφος τίς ἐστιν ἐρμήκου. The narrower usage appears in 420 b 32: σημαντικός γὰρ ὁ ἔτι ψόφος

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It is sound which conveys a meaning. In 420 b 22 we find that it is φωνή which permits of the realisation of τὸ εὖ; cf. above 437 a 1. The ἀναγκαῖα (cf. 420 b 19, where γεῦσις is said to be ἀναγκαῖον) are the things chosen σωτηρίας ἐνεκεν. Aristotle means quite clearly that intelligence and the higher life generally depend upon ἀκοή and its special object φωνή. For the special reasons why sounds are best fitted to represent concepts, cf. Stout, *Manual of Psychology*, pp. 464 sqq.

437 a 15. σύμβολον. A σύμβολον is the token given by any of the parties to a compact (συνθήκη). Hence the apprehension of the meaning of a word is conventional and κατὰ συμβεβηκός, for φύσει τῶν ὄνομάτων οἷδεν ἐστιν (de Interp. 16 a 27). The opposite doctrine had been maintained in the *Cratylus* (ch. ix. sqq.). Cf. also 16 a 19. No sound is a word unless it become a conventional sign.
CHAPTER II.

437 a 19. δυνάμεως. δύναμις is the characteristic word for faculty or potentiality, not function (as Hammond has it), the appropriate word for which is ἔργον.

437 a 20. πρότερον. In De An. II. loc. cit.

437 a 22. στοιχεῖα. The four physical elements—the primary differentiations of πρῶτη ὄλη—are fire (πῦρ), water (ὕδωρ), earth (γῆ), and air (ἄηρ). Each has a pair of ultimate qualities one of which it shares with another of the elements and the other with another. Thus there are four ultimate qualities and those elements are most opposed to each other which have no qualities in common. Thus fire is hot and dry (θερμὸν καὶ ἐγρόν); water is cold and moist (ψυχρὸν καὶ ἐγρόν). These are contraries of each other. But fire and water share their heat and moisture respectively with air, their dryness and coldness with earth. Thus these latter two elements are relatively to each other contrarily opposed. Thus


437 a 23. τέταρτα. The traditional four elements were first distinguished by Empedocles. Cf. Burnet, Early Greek Phil. p. 59, also pp. 240 sqq. Empedocles referred smell to air also. Theophrastus, De Sensu, 7 (R. P. 177 b, 8th ed.), says he did not assign any particular element as connected with touch and taste. Aristotle's statement here need not mean more than that there was a general
tendency to correlate each sense with a particular element, and that
the disparity of the number of the senses and the elements respec-
tively caused a difficulty when it was attempted to carry out the
correlation completely.

437 a 24. \( \text{πέμπτης} \). Hearing and smell on the Empedoclean
theory, touch and taste on the Aristotelian are grouped together.

437 a 25. \( \text{θλιβομένου} \). Apparently the sensation caused by con-
cussion of the optic nerve owing to a blow in the region of the eye.
The words used however do not convey a very graphic description
of this experience. Perhaps Aristotle is here generalising so as to
include such light sensations as are caused by chemical changes in
the eye itself. The theory is to be referred to Alcmaeon of Kroton.
Cf. Theophrastus, *De Sensu*, 26: ὃτι δὲ ἔχει πῦρ (ὁ ὀφθαλμὸς)...δῆλον
ἐναλ' πληγέντος γὰρ ἐκλάμπειν.

437 a 31. ἐαυτόν. Because in the dark no other object is
visible, the eye, being of the nature of fire, will be visible. It should
thus be visible at any time in the dark. As this is not the case, the
theory is rejected.

Aristotle next goes on to give his own account of the phenomenon,
which professes to explain why this sensation of light experienced in
the dark occurs only when the eye moves rapidly.

437 a 34. λεία. Cf. 437 b 7, where he adds confirmatory in-
stances. From *Meteor*. iii. ch. 4, 373 a 35: ἀνακλωμένη μὲν οὖν ἡ
ὀψις ἀπὸ πάντων φαίνεται τῶν λείων, and 372 a 31 we should infer that
this was really a case of reflection. Though, however, smoothness
is assigned as the source both of luminousness in the dark and of
reflection generally, the two phenomena are never identified. Cf. *De
An.* ii. ch. 7, 419 a 2 sqq., where fungi, horn and scales are enumerated
along with the eye and the heads of fishes, as a class of ἀνώνυμα
which are πυρώδη φαινόμενα καὶ λάμποντα. Note πυρώδη φαινόμενα is
all he says. He would not allow that they were really πυρώδη, for in
that case they would really produce light. Thus according to Ari-
sotle these substances were not in the strict sense phosphorescent
(Bäumker, p. 26).

φῶς is the ἐνέργεια or ἐντελέχεια τοῦ διαφανοῦς (cf. *De An.* ii.
ch. 7, 418 b 9, 419 a 11)—the proper function of the transparent
medium.

Again, in ch. 3, 439 a 21 below, it is said to be the presence of
something of the nature of fire in the transparent medium. Since,
then, it requires something of the nature of fire to produce light and
the eye does not consist of fire, it cannot be said to produce light. Hence it would be suggested that the phenomenon is one of reflection, though where the light is to come from when the eyes are closed is not apparent.

437 b 2. φαίνεται (2). There are many instances of φαίνεται taking this sense (cf. 3, 440 a 8 etc.). But most interpreters take φαίνεται δε τοντο to mean 'This is evident,' i.e. what was said before about the eye not producing light is evident because of what follows. But that is not the sense required. The 'one becoming two' is not the reason why the eye does not emit light. But the eye is seen because, though really one, it appears when quickly moved to be two.

437 b 3. δυο γίγνεται το ἐν. This is very difficult to understand. Simon prefers to take Alexander's second interpretation, that one part of the eye sees the other—that which is 'in loco naturali' sees that which is not. But the interpretation does not explain why swiftness of motion is essential to the phenomenon. Probably Aristotle was thinking of common instances of a single object appearing to be made double by rapid motion (as e.g. a vibrating string) and applied this in a confused way to the present case. He apparently thought that the eye, when at the one position, could see itself at the other if the oscillation between the two was so rapid that it appeared to be at both points at the same time. It will not do to say, as Ziaja does, that the eye regains its former position before the light from it, when at the place from which it has moved, arrives. According to Aristotle the propagation of light is instantaneous and one must not read into his words a theory of light vibrations.

437 b 5. το ὄραμενον. The eye at the position to which it moves.

437 b 7. Cf. 437 a 34 above.

437 b 12. ἀνακλάσει. Aristotle does not mean to identify the present phenomenon with reflection but merely to adduce another instance illustrating the apparent duality of the eye by the apparent duality of seer and seen caused by reflection in a mirror.


437 b 13. Τιμάω. For the Platonic theory of sight-perception compare Timaeus ch. vii. 31 b and ch. xxx. 67 c sqq., and especially ch. xvi. 45 b sqq.

437 b 16. ὁ Τιμάος. Cf. Timaeus, 45 D.
437 b 17. **kevón.** kevós and its adverb kevōs are constantly used in the sense of 'irrelevant': cf. De An. i. ch. 1, 403 a 2 of definitions that are mere vague generalities.

Cf. also Eth. Nic. ii. ch. 7, 1107 a 30 etc.: but it may mean as well 'unfounded,' as in An. Post. i. ch. 3, 73 a 18. Here probably both implications are to be assigned to the word. The thought is, that it is absurd to talk of the ἀπὸσβεσις of sight, because the notion of 'quenching' has nothing to do with the nature of light. Hence the theory is groundless because of the irrelevancy of the ideas to the phenomena in question. In addition, even if they were relevant, the theory would conflict with facts. The argument of the whole passage is that ἀπὸσβεσις can be predicated only of τὸ πῦρ and ᾗ φλῶξ, not of light, for, as we saw before (cf. note to 437 a 34), light is not fire though it requires the presence of πυρῶδές τι. Plato and Empedocles, however, when alleging that the light which issues from the eye is quenched in darkness, imply that it is of the nature of fire which is θερμὸν καὶ ἐγρόν and is quenched by either moisture or cold, the contrary qualities. (The Aristotelian theory is that things are neutralised by and pass into their opposites.) Now φῶς is not of the nature of πῦρ and hence to talk of its ἀπὸσβεσις is absurd.

Secondly, even if there were something of the nature of fire in light though imperceptible, it would be extinguished by wet and cold weather; which is not true.

For the distinction of πῦρ and φῶς cf. also Top. v. ch. 5, 134 b 28.

437 b 20. τὸ φωτί. The mere bringing forward of the fact that light is not quenched by wet shows that Aristotle really means to deny that it is of the nature of fire.

Alexander, however, evidently troubled by the fact that light is warm and hence perhaps should be identified with fire, suggests an emendation or rather a reconstruction of the passage which would make out that Aristotle, while conceding that fire is 'dry' and 'warm,' points out that darkness which is supposed to extinguish it has neither of the opposed qualities and hence cannot do so. On this interpretation the rest of the passage would run—'but if darkness is really, though imperceptibly, cold and wet, we should expect the marked presence of those characteristics to make a difference to sight by daylight. But this is not found to hold good.'

437 b 22. ἰδατί. It would not be correct to say that light is not diminished when it penetrates water; ἰδατόρι frequently signifies rain or rainy weather.
Similarly πάγος must be here frosty weather, not ice.

437 b 25. τοιοούτον, i.e. the behaviour of light in cold or damp weather.

437 b 27. οὕτως. Cf. R. P. 177 b. Burnet, Early Greek Philosophy, pp. 231-2. They are vv. (Stein) 316-23, Fr. 84 (Diels, Die Fragmente der Vorsokratiker).

438 a 1. λοχάζετο. ἐξεύατο—suffused, is another reading which would make the construction easier.

438 a 3. διαθρῶσκον. διέσκον, suggested by Blass, N. Jahrb. f. Phil. u. Päd. 1883, p. 19, would improve the grammar of the passage. Translate 'but they (at δ') let the fire through.'

438 a 4. ἀπορροάως. Cf. Empedocles and Plato loc. cit. in note to 437 b 13. Aristotle’s words imply that Empedocles had no consistent theory but had recourse alternately to the doctrine that fire issued from the eyes and illuminated objects, and to that according to which effluences from bodies entered into the pores of the eye and so created perception.

The fact seems to be that Empedocles intended to account for vision by postulating that both those operations took place, but had great difficulty in reconciling them, and that thus at one time we hear more about the one than about the other.

The difficulties attending the acceptance of either one or both theories are pointed out below by Aristotle in 438 a 26 sqq.

We may conjecture as Hammond does, Aristotle’s Psychology, p. 152 note, that he imagined that the images of things entering by means of the pores through the outer covering of the eye are illuminated by the fire issuing from the pupil. But it is not clear that he said anything so definite unless Aristotle means (in ll. 29-30 below) that τὸ ἐν ἀρχή συμφύεσθαι τοῦ ὄμματος was one of the positions held by Empedocles. It is manifest from what Theophrastus says (R. P. 177 b) that, according to the Empedoclean theory, fire existed both in the external world and in the eye, and that the effluences from things which produced the perception of visible objects consisted of fire. Fire was the finest of all substances and could thus penetrate the finest of the pores. Through the passages of the water we perceived dark objects.

This must surely mean that objects throw off effluences composed both of fire and water and that the fire penetrating through the fine pores is perceived by its ‘like’ fire, and the water, a crasser substance, can enter only by the wider pores and is recognised by its ‘like’ the
water in the eye; cf. R. P. 177 b. Of course it is quâ light that objects are visible (dark being but a privation of light), and hence the really important part in vision is that played by the fire. Thus Aristotle is justified in regarding the Empedoclean theory as one which referred vision to fire.

438 a 5. Δημόκριτος. Cf. Zeller, Presocratic Philosophy, ii. pp. 266 sqq., cf. p. 268. This doctrine was also shared by Leucippus and Epicurus.

The theory of Democritus was also one of ἀπόρρουαν. Things threw off εἴδωλα which affected the sense organs. But in the case of sight it seems to have been not actually the εἴδωλον thrown off from the object but the impression caused by this in the air which was reflected in the eye. (Cf. Theophrastus, de Sensu, 50, Zeller, op. cit. ii. p. 219.) This was connected with his doctrine that we did not perceive things as they were in themselves but only as they affected the senses. Nevertheless he seems to hold that the medium is at the same time affected by an effluence from the seeing eye, but how it is possible to reconcile this with any intelligible theory of reflection it is difficult to see.

It is noteworthy that Plato too had some such theory of interaction between the effluence from the eye and from the external object; cf. Timaeus, 45 c.

The effluences are, however, according to him, fire (cf. the comparison of the eye to the sun in Rep. vi. 508). But he also agrees with Democritus in holding that by like we perceive like and that perception takes place with the whole soul.

438 a 6. ἐμφασις. Cf. notes to 437 a 34 sqq. ἐμφασις means the appearing or being visible of one body in another: cf. Meteor. iii. ch. 4.

438 a 8. ἐκείνω. The visibility or being seen of the reflected object exists not in the eye in which the reflection takes place but in the eye of the spectator who sees the reflection.

I have here followed Ziaja and Bender in opposition to Alexander, Simon, Thomas, St Hilaire and Hammond. Hammond appears to make τοῦτο refer to τὴν ἐμφασις and then to supply a new subject—τὸ ὄραν—as the subject of ἦστιν. This is surely in defiance of grammar.

If one took τοῦτο to mean τὸ τὴν ἐμφασις ὄραν the sense would be plain enough and would be exactly what we require. This is however to give a very liberal interpretation to τοῦτο which should mean
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... which is the appearance of an eidolon in a smooth surface. Now, though Aristotle could not say that the eidolon (a special term used by Democritus) was not ev ekei̇o (the reflecting eye), he can quite well maintain that the appearing of the eidolon in the reflecting surface is not itself in the surface. Alexander also takes to órăν as the subject of ésv of and interprets ev ekei̇o as ev tῆ ἐμφάσει. Simon and St Hilaire differ from him only in taking ev ekei̇o to mean ōtī to óμμα λείον.

If, therefore, we were to follow Alexander we should render—

For reflection occurs because the eye is smooth; but vision does not lie in the reflection or take place by means of it, but occurs in the see, i.e. is an affection of one who has the power of sight.' According to Simon and St Hilaire we should turn the latter part of the sentence thus 'but vision does not lie in this property of the eye, etc.'

In addition to the syntactical objections to these interpretations, they have the demerit of making Aristotle reason in a circle. In arguing against the theory that vision is reflection, to state as one's reason that vision does not lie in the reflection of things in the eye and in its property as a reflecting structure, is merely to reiterate one's objection without proving it. ekei̇o must refer to to óm̃ma and the argument is to the effect that reflection must presuppose vision, because the mirroring of anything is a fact not for the subject in whose eye it takes place but for a second person who sees it.

438 a 13. óφιν. Note that óφιν, the word for the sense-faculty, is used as though it referred to the sensorium. Cf. Neuhäuser, Aristotle's Lehre von den sinnlichen Erkenntnissvermögen und seinen Organen, p. 79, and cf. note to 438 b 22 below.

438 a 14. diafanês. The whole nature of to diafanês will be treated below in ch. 3.

438 a 16. εὐπιλητότερον. euvpolȳptoteron is the variant reading (LSU Alex.) which, if possible, only repeats the idea of euvφυλακτότερον. With euvpolȳptoteron the kai becomes epexegetic.

Aristotle is here referring to what are now called the aqueous and vitreous humours.

438 a 21. tois ēkoūsiv ai̇ma. The sanguineous and non-sanguineous animals were two main divisions in Aristotle's Zoology. Cf. De Part. Anim. iv. ch. 5, 678 a 33. Insects and Crustaceans were placed in the latter class as the fluids in their bodies, not being red, were not thought to be blood.

The transition to this topic once more is probably to be explained by the fact that Democritus, too, held a theory according to which something emanates from the eye. Hence Aristotle first mentions the doctrine in its most general form (ἀλος τὸ ἐξίοντι τῳ...ὀράν) and then glides on to discuss the specially Empedoclean and Platonic theories.

438 a 28. συμφωνεσθαι. The fire from the eye unites with that which is the effluence from external bodies.

438 a 29. τινες. Probably the more scientific Platonists or interpreters of Empedocles.

ἐν ἀρχῇ. Alexander and Simon interpret as I have translated. Aristotle proposes to simplify the phenomenon by supposing that the union of fire with fire takes place in the eye itself before the internal fire issues out, i.e. in the starting place of the internal fire according to the more complex theory. It will be easier, he thinks, to support the theory if one omits that part which makes the union of fire with fire take place outside the eye.

One must not translate with Hammond 'It would be better to assume that the combination of the eye with its object were in the eye's original nature.'

In the first place, this makes Aristotle propose to supersede the older theory by an explanation which merely shelves the difficulty and refers it to a 'faculty.' Secondly, Aristotle is talking not of a combination of eye with object but of fire with fire; as is apparent from the next sentence, apart from which this one cannot be understood.


438 a 31. φωτι πρὸς φῶς. Alexander affiliates this and the following statement—οὐ γὰρ τῷ τυχόντι κ.τ.λ.—to the doctrine expounded in De Gen. et Corr. i. ch. 10, where we find, 327 b 20: οὐ γὰρ ἀπαν ἀπαντή μικτόν ἀλλ' ἵπταμεν δεὶ χωριστὸν ἐκάτερον τῶν μικτήνων, i.e. only concrete objects (χωριστά), i.e. σώματα, can be mixed; now light is a πάθος of the definite type ἔκει (cf. De An. iii. ch. 5, 430 a 15) and hence cannot experience μὲις. This explanation assumes that the σύμφωνις here talked about is a case of μὲις, which is not quite evident. Neither is it evident that the union of light
with light (συμπαγές γενόμενον) mentioned in Plato, *Tim.* 45 c, against which this argument is directed, is properly a case of μίξις. Plato uses the term συμφυές below in 45 d probably hardly in the exact sense in which συμφυεσθαί is here employed. It need mean no more than 'kindred.'

συμφυεσθαί means no more than to grow together or unite, and not the union of two different substances which results in the production of a third distinct one, which is the sense in which Aristotle employs μίξις. Hence Alexander's discussion of the blending of lights (he denies that they can be united) seems to be irrelevant, and whether συμφυεσίς can be brought under the category of μίξις is not clear.

Besides, if Alexander's were the correct interpretation, a Platonist might still reply that according to his theory light is nothing ἄσωματον, and hence (according to Aristotelian principles) could combine with other light. Cf. *Timaeus,* 45 c: ἐν σῶμα οἰκεωθέν συνέστη by the union of the internal and the external light.

Perhaps Aristotle need mean no more than that the union of light with light is on the Platonic theory quite unexplained. Compare next note.

438 b 1. τὸ τυχόν. The commonest interpretation and that in consonance with Alexander's explanation (cf. above) is 'Not everything will unite with anything else' and that is referred to the doctrine οὐ γὰρ ἀπαν ἀπαντί μικτόν in *De Gen. et Corr.* 1. ch. 10.

According to the translation I suggest the argument would run, 'How will this unexplained "union" of the Platonists produce sight? When we see, we see something definite, i.e. it is not with τὸ τυχόν that the union is effected. The theory is not capable of explaining in detail how we see.'

438 b 3. ἐν ἄλλοις. *De An.* 11. ch. 7, 418 b 1, 419 a 9, iii. ch. 5, 430 a 16.

438 b 5. This seems to contradict what is said below in ch. 6, 446 b 31: ἄλλ' οὐ κίνησις (τὸ φῶς). It is true that κίνησις is frequently used for all the four varieties of change and as equivalent to μεταβολή—change in general, not merely to φορά—local motion, which is its most characteristic sense. The four species of change are 1. (κατ' οὐσίαν) γένεσις καὶ φθόρα: 2. (κατὰ τὸ ποσόν) αὔξησις καὶ φθίνεις: 3. (κατὰ τὸ πόσον) φορά: 4. (κατὰ τὸ ποσόν) ἄλλοιωσις. Hence, if light is an ἄλλοιωσις (qualitative change) and κίνησις is here used vaguely as including it, there is no contradiction between the two
statements. We shall, however, maintain when we come to chapter 6, that in the Aristotelian theory the propagation of light is not even to be described as ἀλλοιωσις.

438 b 10. ἡ ψυχή is wider than consciousness, but Aristotle, though of course meaning merely consciousness here, is forced to use the wider term for want of a special word to designate conscious life in general without suggesting any one special faculty. We shall be forced to translate ψυχή thus more than once.

438 b 11. εντός. This surely must mean εἰστὸς τοῦ ὄμματος. The faculty or δίναμις of the special sense of sight resides within the eye. If this statement is capable of being generalised at all, it can be extended only so far as to include the organs of the other two mediated senses (hearing and smell). This cannot be taken as a reference, as Alexander (p. 36) and Neuhäuser (pp. 65 and 127) seem to think, to the central sense, which resides further within the body (in the heart). It is not the function of this central faculty to discriminate the objects of the special senses. It is the seat rather of that self-consciousness which also discriminates the various special senses (cf. De An. iii. ch. 2), and is generally the organ of κοινὴ αἴσθησις and φαντασία.

If the faculty of vision resided in the central organ then surely according to Aristotle’s argument there would need to be a transparent medium extending through the body right up to it, and it itself would need to have the same property. Neuhäuser indeed maintains that something like this is, according to the Aristotelian theory, the case. But a much simpler explanation is possible.

Something internal is the organ, Aristotle says, and hence it must be transparent. The interior of the eye is that which fulfils the conditions. Why the organ should be transparent is due to his general theory that it should be capable of receiving the same determinations as those existing in the world outside, i.e. should be δεκτικόν τοῦ εἴδους of the external bodies (De An. ii. ch. 12, 424 a 18). Cf. Introduction, sec. iv. pp. 7 sqq.

The statement that the sense faculty resides within is not a deduction from what is said in the De Anima about the internal or central sense; it is a truth said to be given by observation (δηλον) and Aristotle at once proceeds to adduce a confirmatory instance.

If we hold with Neuhäuser that the seat of perception is really always a central organ—even in the case of the special senses—and that Aristotle held a theory according to which substance of the same
COMMENTARY

kind as that composing the peripheral organ extended along the πόρος up to the central chamber of the heart, then perhaps ἐντός might mean 'in the central region.' Perhaps Alexander, when he says πόρους ἐν οἷς τὸ διαφανές, may also be referring to a similar theory. It seems an extraordinary hypothesis (cf. Introduction, sec. vi.) and it is not at all clear whether Neuhäuser has succeeded in substantiating it or merely in disproving the rival theory, viz. that the blood is, in Aristotle's eyes, the medium of communication between the end organ and the central one. Cf. note to 439 a 2: Neuhäuser, Aristoteles Lehre von den sinnlichen Erkenntnissvermögen und seinen Organen, pp. 111-129.

438 b 14. τοὺς πόρους. Those who (e.g. Thomas, etc.) think that the reference is here to the central sense must hold that the πόροι are the optic nerves, which Aristotle imagined to be ducts leading to the brain and ultimately to the heart. Cf. Hist. Animal. iv. ch. 8, 533 a 13, De Part. Animal. ii. ch. 10, 656 b 17. Alexander, however, seems to understand them to be the πόροι of the older philosophers—the passages through which (according to their view) the eye's internal fire issued. Cf. Theoph. De Sensu, 7 (R. P. 176 b) and Arist. De Gen. et Corr. i. ch. 8, 324 b 26.

Alexander says τοὺς πόρους ἐν οἷς τὸ διαφανές ἐστὶ and since the nerves are not (except on Neuhäuser's theory) transparent we can assume only that he means the passages supposed to exist in the eye itself. Blindness ensuing on the cutting of the optic nerve would show rather that the sense was not localised in the eye, but we have seen reason (see previous note) for maintaining that this is not the Aristotelian view. Hence Aristotle is not here referring to such a serious wound as one which would sever the optic nerve but to a more superficial injury to the eye. This is also borne out by the simile which follows. You cut the wick and the flame goes out; and so you destroy the channel communicating the external light to the pupil and sight is destroyed. This interpretation also gives παρὰ its characteristic sense. On the other hand we must remember that παρὰ need mean no more than 'on.' To read ὀστε τιμηθήναι in this line along with Mr Bywater (Journal of Philol. xxviii. p. 243) would probably be better.


438 b 22. ψόφων. Cf. De An. iii. ch. i, 425 a 4: ᾗ δ' ἀκοὴ ἀέρος. πυρὸς δὲ τὴν δισφρησίν. This statement seems to contradict what is
said in *De An. iii. ch. 1*, 425 a 5: ἦ δ' ἀσφρησις θατέρων τούτων (sc. ὕδατος καὶ ἄερος)…τὸ δὲ πῦρ ἦ οἰδενὸς ἦ κοινὸν πάντων. If then we take ἀσφρησις to be the sense organ here (a very common use; cf. above 438 a 13, Bonitz, *Ind. p. 538 a 30*), the two passages are in disagreement. Again the statement in ll. 25–26 beneath ἦ δ' ὀσμὴ καταπώδης ἀναβυμίασις ἐστιν is in contradiction with ch. 4, 443 a 23 sqq., where it is denied that ὀσμὴ is of the nature of ἀναβυμίασις.

These considerations have led Alexander and most interpreters to maintain that here Aristotle is not putting forward his own theory (ὅ νὲρ ὃρ ἀρέσκοιτα αὐτῷ λέγει, Alex. 38, l. 14 [W.]), but merely discussing the consequences and the detailed working out of the doctrine suggested by the earlier philosophers—namely the ascription of each sense organ to a separate element.

On this interpretation the reading of the majority of the codices ὡς εἰ δεῖ in ll. 18–19 above, which Biehl adopts and Bäumker, p. 48, prefers, is particularly welcome. E M and Y read merely φανερῶν ὡς δεῖ and Bekker follows.

Thus it is contended that Aristotle's adoption of the correspondence of each sense organ to a separate element is merely hypothetical. Nevertheless it is strange that if this is so, Aristotle should go on to work out the connection between smell and fire by the aid of his own technical terms and connect it with his own theory of the excessive coldness of the brain. It almost looks as though the doctrine were one which had attractions for Aristotle and which was left as an unexpunged suggestion even after the possibility of reconciling it with the rest of his philosophy had been removed.

But, as it is stated, there are great difficulties to be overcome. The proof in ll. 22–25, as Alexander recognises, merely shows that the organ of smell is potentially (ἀνυάμει) of the nature of fire and is actually cold. It is not on all fours with the former two sense organs which are actually (ἐνεργείᾳ) water and air respectively.

Hence Hayduck (*Prog. Kön. Gym. zu Meldorf, 1876–7*) proposes not to take those lines (ὅ νὲρ ἐνεργείᾳ κ.τ.λ.) as a proof of the previous statement and to read ὡ δὲ ἐνεργείᾳ κ.τ.λ. He also proposes to omit l. 25 ἦ δ' ὀσμὴ…l. 27 πῦρος as being in hopeless disagreement with the other passage at 443 a 23 sqq. His explanation is that Aristotle, beginning with a discussion of the organs corresponding to each sensuous function, naturally mentions the act of smelling and so proceeds to discuss its peculiar organ, which, though not parallel to the organs of sight and hearing in that it does not
consist of any single element, he yet takes the opportunity of discuss-
ing. It seems however that Aristotle is really attempting to make the sense of smell in some way parallel to the other two and that ll. 22 sqq. are intended to prove this. Hence the elaborate doctrine about the coldness of the region in which the sense organ is situated and which is potentially warm; and we hear elsewhere that ἡ τῆς ὀσμῆς δύναμις θερμῆ τὴν φύσιν ἔστιν (444 a 27). So that, in spite of the fact that he has not proved the sense organ to consist of actual fire, Aristotle evidently wishes to establish some connection between fire and odour. Hence Ziaja (De Sensu, p. 11) maintains that he does not intend here to discuss the nature of the sense organ of smell and that there is no conflict between this passage and any other. He points out how, when the brain is said to be ὑγρότατος καὶ ψυχρότατος τῶν ἐν τῷ σώματι μαρίων, that agrees with the passage in De An. 425 a 3 sqq. where it is held that the sense organs are composed only of air and water. This latter statement however, it must be observed, is not perfectly unqualified, for Aristotle goes on to say that fire, though not a special ingredient of any one, may be said to exist in all (οἶδεν γὰρ ἂνευ θερμότητος αἰσθητικῶν) and that earth is either in none or is specially incorporated in the organ of touch (cf. below ll. 32 sqq.: τὸ δὲ ἀπτικὸν γῆς). This passage (q.v.) shows the difficulty which there is in extracting a consistent statement from Aristotle as to the nature of the sense organs, and the fact that his theories on this subject seem to fluctuate makes it difficult to avoid thinking that here he at least starts with an attempt to work a parallel between the organs of sight and hearing on the one hand and that of smell on the other. It is quite evident, as Rodier, De An. ii. p. 349, points out, that τὴν ὀσφυρῷσαι must here mean τὸ τῆς ὀσφυροσεως αἰσθητήριων, otherwise it could not support the statement φανερὸν ὃς εἰ δεῖ κ.τ.λ.; besides Aristotle plainly means the sense organs in the other cases—τὸ δρατικὸν, τὸ τῶν ψάφων αἰσθητικὸν, τὸ ἀπτικὸν.

Hence, unless we adopt Hayduck's bold emendations, we must conclude (1) that the doctrine here is a tentative construction of a parallel between the organs of smell, touch and taste and those of sight and hearing; (2) that the parallel consists in assigning each to a special element (touch and taste, being generically the same, share one between them); (3) that though Aristotle cannot work out the parallel in the case of smell and the attempt to do so endangers conflict with the rest of his teaching, the theory has attractions for him owing to its symmetry and the fact that in so far as it can be
worked out it connects with his account of the nature of the brain; and hence it was not deleted, but became incorporated with the remainder of his preserved writings.

γάρ. On Hayduck’s suggestion this is changed to δὲ, and the following statement is not a reason for the preceding one but a new premise from which, in combination with the preceding one, διὸ καὶ κ.τ.λ., ll. 27 sqq., is deduced.


The theory is, that the sense organ is potentially capable of receiving the ‘form’ i.e. the perceptible properties of the object of sense. In the act of perception object and sense are one, but, when the sense organ is not stimulated, it is only potentially percipient, the object only potentially perceived. Cf. 425 b 26: ἦ τοῦ αἰσθητοῦ ἐνέργεια καὶ τῆς αἰσθήσεως ἡ αὐτή ἐστι καὶ μία. In the act of perception the organ becomes like its object: previously to perception it is unlike; cf. 418 a 5, 6: τῶσχει μὲν οἷα ὁμοιον ὄν, πεπονθὸς δ’ ὁμοίωσι καὶ ἐστὶν οἷον ἐκεῖνο.

Note that Aristotle has no need to assume that the sense organs consist of the elements because like is perceived by like. The organ was not like its object in consisting of the same material but in receiving its εἶδος or λόγος—the pattern according to which it was constructed. Cf. Introduction, sec. iv.

438 b 24. τοιεῖ. The external object is the agent in perception; the sense organ is passive. Cf. De An. ii. ch. 5, 417 b 20: τὰ ποιητικὰ τῆς ἐνέργειας ἐξωθεῖν, τὸ ὄρατον καὶ τὸ ἀκουστὸν, ὁμοίως δὲ καὶ τὰ λοιπὰ τῶν αἰσθητῶν.

If we read δ in l. 25 below we cannot translate ‘the latter (sc. the sensation) must have an antecedent potential existence,’ as Hammond does, but ‘the sensation is what it previously had the potentiality of becoming.’

438 b 27. τῶν ἐγκέφαλον. The brain was not the organ of sensation according to Aristotle but played a subsidiary part in the bodily economy as neutralising the heat of the heart. On the other hand excessive cold in the brain was tempered (at least in man) by the dry warmth of odours which were healthful and hence delightful. Cf. below ch. 5, 444 a 9 sqq.
438 b 29. This is an application of the general Aristotelian doctrine that opposites pass into each other. Things are only opposite in so far as they have the same  ἀλη and it is through having the same  ἀλη that they can pass into each other. Hence the  ἀλη is potentially capable of being either. Cf. Phys. i. ch. 9, 192 a 21: φθαρτικὰ γὰρ ἄλλῳν τὰ ἐναντία, and iv. ch. 9, 217 a 22: ἐστὶν  ἀλη μία τῶν ἐναντίων, θερμοῦ καὶ ψυχροῦ καὶ τῶν ἄλλων τῶν φυσικῶν ἐναντιωσεων, etc.


438 b 33. γῆς. Cf. De An. iii. ch. i, 425 a 7: cf. above note to 438 b 22.

tὸ δὲ γευστικὸν κ.τ.λ. Cf. 441 a 3 sq.: ἡ γεῦσις ᾿αφή τις ἐστὶν and De An. iii. ch. 12, 434 b 18. Comment on this doctrine will be postponed until we come to chapter 4, where taste is discussed at length.

439 a 2. πρὸς τῇ καρδίᾳ. It is true that the organs of taste and touch transmit κινήσεις—sense affections—to the heart, but we cannot translate πρὸς τῇ καρδίᾳ by ‘conduct to the heart,’ as Hammond does, because, according to Aristotle’s general theory, all sense organs should do so, and besides Aristotle is here not discussing the question of the communication of the exterior sense organs with the inner πρῶτον αἰσθητήριον, but the nature of the composition of those sensoria. It is true that Aristotle does not make clear how the κινήσεις from the special senses are conveyed to the heart (cf. Zeller, Aristotle ii. pp. 67–70, English Trans.). Alexander says that there are three πόροι extending from the heart to the brain and then to the three sense organs of sight, hearing and smell respectively, but in the case of taste and touch the πόροι communicate directly with the end organs; by these the κινήσεις are transmitted. For confirmation of this cf. De Juvent. ch. 3, 469 a 12 sqq.; De Insom. ch. 3, 461 a 1 sqq. The blood seems to some to be the medium of transmission but we cannot certainly say so. According to Neuhäuser it certainly is not. The medium is a substance of the same nature as the end organ extending (in the case of the three senses of which the organs are localised in the head) along πόροι first to the brain and ultimately to the heart. Cf. Introduction, sec. vi. and Neuhäuser, pp. 110 sqq. It is true also that the heart, which is the organ of the common sense (cf. De Juvent., De Insom. loc. cit. above and De Somno ch. 2, 455 a 21: τὸ κύριον αἰσθητήριον), seems to be also the special organ of touch (cf. 455 a 23: τοῦτο (τὸ κύριον αἰσθητήριον) τῷ
between which and its object the flesh seems to be the medium (cf. De An. ii. ch. 11, 423 b 26: τὸ μεταξὺ τοῦ ἀπτικοῦ ὑπάρχει, and iii. ch. 2, 426 b 15: ἡ σάρξ οὐκ ἔστι τὸ ἐσχατὸν αἰσθητήριον). But however that may be—and if the latter point is to be insisted upon we had better translate 'their organ is situated in the region of the heart'—the question is here not one of communication, but of the origin of the organs in question. If the organ of smell is actually cold and potentially warm and apprehends what is in actuality warm (δοσιμῇ), so conversely the organ of taste and touch should be actually warm but potentially cold if it apprehends what is actually cold, viz. γῆ.

Alexander, however, will not allow that γῆ is the proper object of touch. Certainly it is the Aristotelian theory that touch perceives not merely the qualities of γῆ, i.e. τὸ ψυχρόν and τὸ ἔρημον, but all the four ultimate (and primary in that sense) qualities of objects (cf. above note to 437 a 22) and others as well (cf. De Gen. et Corr. ii. ch. 2, 329 b 17 sqq.). Hence once more we have evidence that the above argument is at best only tentative.

If we take it that the organ of touch is actually of the nature of earth and has the characteristic qualities of earth, then it is impossible to see how it is connected with the heart, which is the seat of warmth. If it is potentially of the nature of γῆ then it will, like the heart, have actually the opposite qualities. But in that case we shall have failed to account for the perception of τὸ θερμὸν, as well as other qualities, by it, in the sense of reconciling that to the general Aristotelian doctrine that the organ is unlike the object before sensation but in the act of perception becomes qualitatively identical with it, as is stated in De An. ii. ch. 5, 417 a 20.

Cf. also De Part. Animal. ii. ch. 10, 656 a 29: καὶ διότι αἳ μὲν δύο φανερῶς ἡρτημέναι πρὸς τὴν καρδίαν εἰσίν, ἡ τε τῶν ἀπτῶν καὶ ἡ τῶν χυμῶν.

αἰσθητήριον. One more proof that the whole passage is a discussion of sensoria.
CHAPTER III.

(This chapter begins the treatment of the objects of the special senses. It treats of colour.)


439 a 10. *ἐργον.* In *De An.* i. ch. 1, 402 b 12 Aristotle talks about the function (*ἐργον*) of the sense. The function of the sense is to perceive, that of the object to cause perception; but as we shall see (cf. note to 439 a 17–18), when functioning, sense and its object are qualitatively identical.

*ἐνέργεια.* This practically repeats the sense of *ἐργον.* *ἐνέργεια* contains more explicitly the notion of the realisation of an end than *ἐργον,* but the two are often almost identical and tend to replace each other in our texts, e.g. in *De Mem.* ch. i, 449 b 20.

439 a 11. *τὸ τί ἐστιν* is the essential nature of a thing as revealed in its definition (without going on to state its additional properties). Aristotle is now to discuss what each object of sense is in its own objective nature apart from its action on the sense organs.


Similarly in *De An.* ii. ch. 5, 417 a 20, we learn that, in the act of sensation, object and sensorium are alike. Whatever is said in this connection of the sensorium holds of the sense faculty and, as we have seen, Aristotle often uses the name of the faculty interchangeably for that belonging to the organ. His theory shows in this respect what we might call a thorough-going psycho-physical parallelism.

It is by his distinction between the actual and the potential object of sense that Aristotle attempts to explain the problem about the independent existence of external objects of sense. Considered *κατὰ δύναμιν* or as *ὑποκείμενα* (cf. *Metaph.* iv. ch. 5, 1010 b 30 sqq.) they have an independent existence, *κατ᾽ ἐνέργειαν* not. Apart from
actual perception the sense also is a δύναμις merely and, as potentialities, sense and its object are different and have different names—χώμα and γεώνυς, ψόφος and ἄκον, χρώμα and ὄψις etc. But the ἐνέργεια of each is one and the same, e.g. ψόφησις and ἀκουσίς are one and the same.

It is, however, impossible for Aristotle to maintain this attitude towards external reality consistently. If the sense is that which is receptive of the εἴδος of things, how can it be said to receive that which prior to this reception had no existence? It is not sufficient to say that its ὑποκέιμενον existed; if we strip the external world of all εἴδος, nothing is left but the πρῶτη ὦλη, and this, being perfectly undifferentiated, cannot account for the difference of the εἴδος which we apprehend at different times. Aristotle is forced to think of the εἴδος as existing antecedently to the perception of it, and consequently we find in De An. ii. ch. 5, 418 a 3: τὸ δὲ αἰσθητικὸν δυνάμει ἐστὶν ὁδὸν τὸ αἰσθητὸν ὑδη ἐντελεχεῖα. Thus the object apart from perception, which is said (in Metaph., loc. cit.) to cause the perception and is yet called a ὑποκέιμενον, cannot be regarded as a mere ὑποκέιμενον, for to exist ἐντελεχεία is to have εἴδος (cf. Metaph. ix. ch. 8, 1050 b 2 and Bonitz ad 1043 a 18, cf. also Ind. p. 219 a 25). According both to ancient and modern physical atomism this ὑποκέιμενον, which is yet something actual and not mere ὦλη, would be described in terms of spatial configuration, mass and motion—the primary qualities from the atomistic point of view. This solution however could not be entertained by Aristotle, for whom the qualities relative to the special senses were as primary determinations of physical reality as motion, figure and mass (cf. notes to ch. 6, 445 b 6 sqq.). The atomistic solution is only a makeshift; but we are left with a bad contradiction in the Aristotelian theory.

439 a 20. περὶ φωτός. Cf. De An. ii. ch. 7, 418 b 11: τὸ δὲ φῶς ὁδὸν χρώμα ἐστὶ τοῦ διαφανοῦς, ὅταν ἡ ἐντελεχεία διαφανεῖ ὑπὸ πυρὸς ὑ τοιοῦτον ὁδὸν τὸ ἀνω σῶμα (τὸ ἀνω σῶμα is the upper fire, the celestial ether).

tοῦ διαφανοῦς. For Aristotle's theory of τὸ διαφανεῖς cf. Introduction pp. 20 sqq. At first sight it seems strange to define light as the colour of the transparent medium, especially as he goes on (in 439 b 11 below) to define colour as the limit of the transparent element in bodies. But that which renders bodies visible is colour and, though an object must have a definite boundary or surface for this colour to
be detected, still we are bound to assume that throughout, so far as it is a coloured thing, its nature is the same (439 a 35 below). This quality on which its colour depends and which transpires through and through is light (φῶς), which is, however, but the activity or the proper function of that property—τὸ διαφανὲς—which permeates all bodies to a greater or less degree. Cf. De An. ii. ch. 7, 418 b 9: φῶς δὲ ἔστιν ἡ τούτου ἐνέργεια, τὸ διαφανοῦς ἡ διαφανὲς, and 419 a 11: ἡ δὲ ἐντελέχεια τοῦ διαφανοῦς φῶς ἔστιν.

Thus though φῶς is not χρώμα in the sense in which that is the πέρας of the transparent element in bodies, still it is the colour principle which transfuses all substances.

439 a 21. By κατὰ συμβεβηκός Aristotle means, not 'casually,' but 'indirectly' i.e. subject to some condition being fulfilled, not in its own nature without further determination. Relatively to the thing which has a certain attribute only upon the supervision of some condition, that attribute is contingent, and it seems to be with this in mind that Kant identifies the contingent and the conditioned in the proof of the antithesis in the fourth antinomy. But, from another point of view, when we take into account the dependence of this attribute upon its conditions it is seen to be necessary. κατὰ συμβεβηκός in Aristotle is by no means equivalent merely to 'due to chance' but in its general sense is used simply as opposed to καθ’ αὐτό, due not to the essence of the thing to which it belongs but to some external condition.

πυρόδες. Cf. De An. ii. ch. 7, 418 b 12 quoted above in note to 439 a 20 and again 419 a 24: τὸ γὰρ διαφανὲς ὑπὸ τούτου (sc. πυρὸς) γίνεται διαφανὲς. It is fire, then, or anything of the nature of fire, the sun or the celestial ether (τὸ ἀνω σῶμα), which raises the transparent medium from a state of mere potentiality in which it is ἄχρωμα—colourless and invisible (418 b 28)—to a state in which colour is actually visible. The fire evidently makes it actually transparent, and this state of actual transparency, this ἐνέργεια, is light. We cannot say with Hammond that 'light is that which converts the potentially diaphanous into the actually diaphanous.' It is fire which performs this function.

439 a 22. παρονσία (cf. De An. 418 b 16 and 20) seems here to be reminiscent of its technical Platonic signification—immanence, and thus we could define light as 'the immanence of fire in the transparent medium.'

But there are two points of view from which light can be
regarded, (1) as a state of illumination, cf. De An. iii. ch. 5, 439 a 15, and (2) as though it were the stimulation proceeding from the coloured object to the eye (cf. De An. ii. ch. 7, 418 a 31: τὸν δὲ χρῶμα κανητικὸν ἐστιν τοῦ κατ’ ἐνεργειαν διαφανοῦς).

Yet according to this passage in the De An. it is implied that the state of illumination must be already realised for the stimulation which causes vision to take effect. Aristotle, though frequently asserting that there is a stimulation proceeding from object to eye and talking as though this were light, yet in chapter 6 below turns round and says that light is not a stimulation at all. According to the interpretation of that chapter which I adopt, it is not a stimulation of the type ἀλλοώσις even (i.e. qualitative change). Yet light is still said to cause us to see (447 a 12), and if it is not the stimulus through the medium, what is that stimulus? It appears as though Aristotle, influenced by the apparent instantaneousness of light transference, were trying to combine into one the notion of it (1) as a ἕσις, the state of illumination, and (2) as an action passing from the object to the eye, two notions which will not unite.

Compare chapter 6, 446 a 22—447 a 12, and Introduction, sec. vii.

439 a 23. τὸ διαφανὲς is no proprium of air or any one transparent substance.


χωριστῇ. Light is not a substance. χωριστά is a common designation for substances. Cf. De Gen. et Corr. i. ch. 10, 327 b 21.

439 a 26. Cf. below 439 b 10. τὸ διαφανὲς is found in all, not merely in certain bodies.

439 a 29. ἄφριστῳ. φῶς as the general colour principle permeates bodies through and through in so far as they share in the material condition of colour phenomena.


439 a 34-35. The point is that colour is not the boundary or surface of the body but, as appears in 439 b 12 below, of the transparent element in the body.

439 b 2. We may supply εἶναι after ἐντός, not necessarily χρωμα-
Aristotle does not actually say that colour, in the sense of definite tint, pervades the body through and through. That resides in the surfaces. But the colour principle, which is made definite only when the body has a definite surface, must pervade the body in every part in so far as it is διάφανές. This colour principle can be nothing else than φῶς, and its opposite is σκότος.

Most of the commentators, however, will have it that here Aristotle is distinguishing bodies which are coloured ‘externally’ e.g. air and water, which have no proper colour of their own, and those coloured ‘internally’ i.e. with a proper colour of their own, opaque bodies, and that he here declares that it is an identical principle in each class that makes them receptive of colour. The difference between the two classes of objects is that the former set, having no definite surface, have no definite limit of the διάφανες in them and it is a definite boundary that gives definite colour. But it is solely the want of definiteness in their limits which causes the indefiniteness of the colour. Since they show colour of some kind, they must have the constitution which renders colour possible. This is their transparency, which we must hence ascribe to opaque bodies also.

If we accept this theory the translation will run as follows: ‘We must, however, believe that the type of construction which internally and of its own nature takes on colour is the same as that which receives its colour from without. Now air and water show colour, for the gleam they have betrays tint.’

The advantage of this interpretation is that it does not make Aristotle say that the colour pervades the whole of an opaque object. for this, unless we explain the distinction between definite and indefinite colour as above, seems to conflict with his statement that colour resides on the surface. Cf. also Top. v. ch. 8, 138a 15.

φαίνεται. Simon would translate ‘appear to be coloured,’ as though they really were not. But, though colour were held to pervade pellucid substances which have no definite surface, that would not entail as a consequence that it permeated opaque bodies as well—which is the conclusion against which Simon wishes to argue.

439 b 3. ἀνύη. Thomas and Simon translate this by ‘aurora,’ on what grounds it is difficult to discover. Perhaps it means the ray e.g. of the sun falling upon these bodies.

439 b 6. σώματιν. Alexander says that Aristotle here means to indicate στέρεα—solids, as though they were more properly σώματα.
than air and water. But the distinction should properly be between pellucid and opaque bodies as in ll. 13–15 below. Aristotle had already, in *De An. II.* ch. 7, 418 b 7, noticed that many *στερεά* were transparent. Probably here he leaves this latter class out of account. (Cf. ch. 5, 445 a 17 sqq. and notes on *σώμα* and *σωματοϊσθαί*; cf. beneath 439 b 18.) The argument certainly requires *σώμαστι* here to mean definitely bounded or solid bodies. The omission of the class of transparent solids from consideration is simply a sign of the inadequacy of the theory.

439 b 10. *ποιي.* τὸ διαφανὲς is the ‘material’ cause of colour, i.e. it accounts for its possibility.

439 b 12. *χρώμα κ.τ.λ.* This is the definition, the τί ἐστιν of *χρώμα* per se, and, in stating this, the *De Sensu* makes an advance on the *De Anima* which defined it merely in reference to the organ of sight as κυνητικὸν τὸν κατ’ ἐνέργειαν διαφανοῦς.

439 b 14. *ὄσοις κ.τ.λ.* These are the ‘corpora terminata’ or *στερεά* of the commentators, which have a colour of their own and ἐντὸς χρωματίζεται. Many interpreters, however, disjoining κατὰ τὸ ἔσχατον from ὑπάρχειν and uniting it with ὄροιος, find themselves in a difficulty and *identify* those referred to by καὶ ὄσοις with αὐτῶν τῶν διαφανῶν!

439 b 20. *διελομένους.* διαρεῖσθαι constantly means to break up a genus into species or to discriminate species from each other. But, as Aristotle has not yet given any classification of the ‘intermediate’ colours, i.e. those over and above black and white, we must interpret ἡδ οι *διελομένους* (the reading of all MSS. and edd.) as meaning merely ‘after recognising the distinction’ between the other colours and black and white. This is to take *διελομένους* in its vaguest sense. It is thus much better to read *εἶδη* instead of ἡδ. The phrase then becomes a common one and gives *διελομένους* its wonted sense. Cf. *Politics IV.* ch. 10, 1295 a 8: τυραννίδος ὁ εἶδη δῦο μὲν διελομένει etc. It is true that, owing to the aorist *διελομένους*, we seem still to be committed to the promise of a preliminary classification of the species of colour which is not fulfilled. The full list of the colours appears only in ch. 4, 442 a 22 sqq. Thus a minor inaccuracy is left in any case, and it may be argued that ἡδ *διελομένους* need give no more than this sense. But *εἶδη* is a rather tempting emendation.

Aristotle’s theory is that the chromatic tones are obtained by a mixture of substances which already have the basal tones of white and black. The chromatic tones are intermediate between black
and white, which appear to be regarded as lying at the two extremities of a continuum in the centre of which the other tints are found. Aristotle does not however attempt to assign its exact place in the scale to any one colour or state its affinity to either of the extremes. Each distinct colour depends upon the proportion in which the black and white, out of which it is formed, are mingled. But he does not venture to state the proportion which obtains in any one case. Cf. also Metaph. x. ch. 2, 1053 b 30.

439 b 26. μικτόν. The doctrine of composition or mixture is referred to again directly: cf. especially 440 b 14 sqq.

439 b 29. A λόγος appears to be the relation which prevails between two numbers when a division of the greater by the less yields a rational quotient. Numbers that are not so related are said to be ὀνκ ἐν λόγῳ (cf. 440 a 16). λόγος then is not ratio in general but commensurate ratio. The incommensurate is the irrational —ἀλογος. Thus we cannot translate ὀνκ ἐν λόγῳ, μὴ ἐν ἀριθμοῖς etc. by 'disproportionate,' for that applies to a ratio when one of the terms is excessive, not to one where the quantities are incommensurate.

439 b 34. εὐλογίστως—easily reckoned, from λογίζεσθαι to reckon. Cf. Metaph. xiv. ch. 6, 1092 b 27.

440 a 2. The reason is that the εὐλογίστων ἀριθμοῖ, i.e. proportions where the division of one term by the other takes very little trouble, are few in number. The author of the Problems in 920 a 27 avers that the most agreeable harmony is that of the octave, and the reason for this is that the terms are whole numbers 2 and 1, or 4 and 2, and the division yields no remainder. The next harmony in order of pleasantness is that of the fifth, where the two notes are related as 1 to 1\(\frac{1}{3}\), and so on.

440 a 5. τεταγμένας. The proportion of elements may be uniform in every part, i.e. the combination is according to a regularly recurring pattern, e.g. 3:1, 3:1, 3:1 etc., not 2:1, 4:1, 3:1 etc.

440 a 6. μὴ καθαραί. Some commentators (e.g. Simon, Hammond) identify the ἄτακτον χρώμα with the μὴ καθαραί, but, unless we read τοῖς αὐτοῖς before ἀριθμοῖς in 1. 6 as Biehl suggests, this is impossible, for Aristotle has immediately before said that both the τεταγμέναι and the ἄτακτον are ἐν ἀριθμοῖς.

The impurity referred to must be want of saturation, i.e. want of colour, if it is caused by absence of proportion between the elements,
and all chromatic colour involves a proportion between its components. But one may ask, why does impurity seem to occur only in the second class of colours—those due to an irregular structure? The reason I would suggest is this—Aristotle identifies the most pleasing colours with those which depend upon a regularly recurring structure in the combination of their elements. Relatively to these, other colours are not so pleasing and hence not regarded as so pure, καθαραί, if purity is a mark of excellence (as frequently in Plato, cf. *Philebus* 57a et passim); but the colours of this second class contain in themselves differences in purity. Their impurity we may assign to a total want of commensurate proportion in their composition. Unless some such explanation as this is adopted we shall have to make αὐτῶς ταῦτα refer to both classes of colours; but this is to strain the Greek.

440 a 8. τὸ φαίνεσθαι κ.τ.λ. Literally 'the shining of one colour through another.'

This second theory is, like the first, also rejected by Aristotle.

440 a 12. διὰ δ' ἀχλύος. The reason for this is discussed in *Meteorology* iii.

440 a 16–21. It is difficult to see what connection this paragraph has either with what precedes or what follows. Thurot and Susemihl (*Philol.* 1885) think that it is misplaced in the text. It refers back to the theories of Empedocles and Democritus mentioned in chapter 2.


440 a 19. εὐθὺς—directly, without the intervention of any intermediate steps in the argument.

440 a 21. ἀφὴ. Why was it necessary for the atomists to identify all sensation with touch? Surely because differences in sensation corresponded to differences in the tangible properties of things. Cf. chapter 4, 442 b 1 and 11: οἶ δὲ τὰ ἱδα εἰς ταῦτα ἀνάγωσιν κ.τ.λ. The argument runs—if sensation is to be effected by contact, contact with a medium which is sensitive to stimulation will explain perception better than a theory according to which the actual particles of the distant objects impinge upon the sense organs. On the other reading (LSU Alex. vet. tr.) ἥ ἀφὴ καὶ ταῖς ἀπορροίαις there is no argument.

Thomas and Alexander try to connect this with what follows; but Aristotle goes on to talk of κατηχεῖσι impinging on the sense organ, not effluxes.
440 a 23. _μέγεθος_ is almost always a spatial quantum, but cf. _μέγεθος_ _χρόνον_ ch. 7, 448 b 4.

The discussion on the possibility of the existence of imperceptible quanta is contained in chapter 6, 445 b 3 sqq.

_χρόνον_ _άναλοσθητον_. Aristotle argues at length against there being any such thing as an imperceptible time in ch. 7 below 448 a 21 sqq. The two moments of time in which the two sensations arrive would, on this hypothesis, be indistinguishable as two distinct moments, but would appear as one single moment which had no parts. Now, as time is a _continuum_, each part of it must be capable of resolution into other parts. Hence the supposition of an atomic time is absurd, no part is imperceptible. Cf. notes to chapter 7, and Introduction, sec. viii.

440 a 26. _άκινητον_—when not set in motion. The surface colour sets in motion the medium and so affects the sense (cf. _De An._ ii. ch. 7, 418 a 31: _πάν ἐν ἀγωμά_ _κινητικόν_ _ἐστι_ _τοῦ_ _κατ’_ _ἐνέργειαν_ _διαφάνοις_). But Aristotle thinks that the action of the surface colour would be different if it itself were acted on by an underlying tint.

Ε Μ Υ read _κινητών_, which would imply that the surface colour was independently itself in motion; but this is not an Aristotelian doctrine.

440 a 30–31. The common reading is _καὶ_ _ἀυτὴ_ _τὶς_ _ἄν_ _ἐἰθ_ _χρωμάτων_ _μίξις_. Alexander interprets this to mean that Aristotle admits that the superposition theory is one which accounts for one way of mingling colours. But it is strange that, after rejecting the juxtaposition theory of mixture, Aristotle should say _καὶ_ _ἀυτὴ_—‘this too is a theory which accounts for the mixture of colours.’ Simon, thinking that the difficulty about _μεγέθη_ _αὔρατα_ still applies to the superposition theory, suggests the punctuation and accentuation I have adopted and contends that here Aristotle is calling in question this second theory as well. If this is not so, he says, Aristotle must be convicted of carelessness, for he nowhere else points out the defect in the theory.

Without accepting his argument (which seems to be unfounded) I think we can still accept his interpretation of the intention of the clause. Aristotle calls the _ἐπιτολασίς_ theory in question because it really is not an account of the _μίξις_ of the colours. The two colours are simply juxtaposed, in this case one on the top of the other instead of in minute parts side by side. This is merely a case of the _σύνθεσις_ of the colours, not of their true mixture. We may
anticipate the doctrine which Aristotle refers to further down and which is expounded in De Gen. et Corr. i. ch. 10, 327 b 32 sqq.

There are two spurious kinds of mixture, μίεις merely πρὸς αἰσθήσειν, i.e. the substances appear to sense to be mixed but are really not so. (1) First there is the juxtaposition of things that can be resolved into ultimate individual parts, e.g. grains of corn, men, etc. (eis τὰ ἑλάχιστα 440 b 5 sq. below); ἄταν...οὕτως εἰς μικρὰ διαφέρῃ τὰ μηγνίμενα, καὶ τεθῇ παρ’ ἄλληλα τούτων τὸν πρῶτον ὄστε μὴ δῆλον ἐκαστὸν εἶναι τῇ αἰσθήσει. This is the kind of μίεις referred to in 440 b 4 below, which explains the χρόαν κοινήν (440 a 32) of distant objects, which vanishes when we approach them. This is a case in which σύνθεσις and μίεις are identical in the sense that σύνθεσις is the only μίεις of which the objects are capable. (2) Secondly, when there is no limit to the minuteness of the parts (e.g. in liquids), the mere juxtaposition of minute parts is merely apparent mixture (πρὸς αἰσθήσειν). To more accurate vision the appearance of mixture ceases to exist. In true mixture (which seems to be analogous to what we should call chemical combination; cf. Mr Joachim in Journal of Philol. xxix.) every part of the compound produced by the union of two substances must be homogeneous with the whole: cf. 328 a 10: τὸ μιχθὲν ὄμοιομερὲς εἶναι and below 440 b 3: πάντη πάντως. Each part of the one must completely interpenetrate the other, or rather, in union the two substances must completely change their nature so as to be incapable of being found in actuality in any part however minute. (This implies a still closer union than that of chemical combination, according to which the atoms are juxtaposed in the molecule, which is not homogeneous in every part.)

Now superposition of colours one over the other does not imply their mixture in the true sense.

440 a 31. κάκεινος must mean ‘on the former,’ i.e. the juxtaposition, theory, not ‘in this way’ (referring to the ἐπιπόλασις account) as Hammond has it.

The argument is, that the one colour shines through the other and that at close quarters the duality of the tint can possibly be detected, though at a distance the two produce a certain ‘common’ (κοινὴν) tint. But, says Aristotle, this general indeterminate tint can equally well be produced by the juxtaposition of parts of different colour provided they are minute enough or we are far enough away. But it is not this neutral tint, which varies with the accuracy of the
vision, that has to be accounted for. Composite colours are on a different footing, and neither of the two theories has succeeded in accounting for them, cf. 440 b 16-19 beneath.

440 a 33. There is no need for substituting δ for γάρ with Susemihl (Philol. 1885).

The fact that no magnitude is invisible is the reason why we can account for the juxtaposition of minute parts differently coloured producing a common tint. If the parts were really invisible they would not produce any colour sensation either alone or together.

Compare chapter 6 below and notes.

The theory of juxtaposition is then rejected in so far as it implies the existence of invisible magnitudes, and retained to explain the production of neutral tints relative to the keenness of our vision, in so far as it is conceded that the parts do produce an effect upon our sight. The parts, as we shall see, are perceived ἐνεργεία only in the whole (ἐν τῷ δόλῳ); individually taken they are only διύναμει perceptible.

440 a 34. From εἶ δ᾽ 440 a 34 to b 14 is one long protasis.

440 b 2. τῶν ἐλαχίστων. Cf. De Gen. et Corr., loc. cit. and note to 440 a 30-31. τὰ ἐλαχίστα are not infinitely minute parts, but the smallest parts that can be treated as individuals. Many things on division do not present such parts, e.g. water and other continuous substances are specially ἐδιαιρέτα and prone to mix. Cf. beneath II. 10 sqq., De Gen. et Corr. 328 b 3: τὰ ὑγρὰ μικτὰ μάλιστα τῶν σωμάτων. ἐκόριστον γὰρ μάλιστα τὸ ὑγρὸν τῶν διαιρετῶν, since μικρὰ... μικρὸι παρατίθεμεν μέγνυσι μᾶλλον, 328 a 33.


ἐν τοῖς περὶ μέξως. Probably only the passages referred to above.

440 b 10. ὅσα δὲ μὴ κ.τ.λ. e.g. water. Cf. above.

The modern atomic theory holds that there is a limit to the process of resolution and that that is found when the atom is reached. But there is a difficulty here, for the atom, if anything occupying space, must be divisible into smaller components.

440 b 16. κυρίαν. This is the reason of the real constant colour of objects.

440 b 22-23. τὸν αὐτὸν τρόπον κ.τ.λ. i.e. the mathematical development of all three is alike.

440 b 25. ἀριστεύει. How Aristotle reconciles this with the undoubted continuous graduation between colour and colour will be discussed when we come to chapter 6.

CHAPTER IV.

440 b 28. This is the only place where Aristotle mentions the omissions in the De Sensu. Hence Biehl conjectures ἀφής instead of φωνής (as otherwise the absence of any other treatment of touch will be unnoticed). φωνή is defined in De An. II. ch. 8, 420 b 32 as σημαντικὸς τις ψόφος and again in 420 b 5 as ψόφος τις ἐμψυχου. It is significant sound uttered by a living creature (cf. above chapter 1, 437 a 11 and note).

ψόφος, of which φωνή is thus a species, is defined in De An. 420 b 11 as ἄφρος κίνησις τις: cf. below ch. 6, 446 b 34: δοκεῖ δὲ δ' ψόφος εἶναι φερομένου τινος κίνησις. This movement of the air is of the nature of a rebound. The air rebounds when struck in the same way as smooth bodies rebound from a smooth surface (cf. De An. 420 a 21 sqq.).

440 b 29. ἐν τοῖς περὶ ψυχῆς. De An. II. ch. 8.

440 b 30. πάθος (cf. note to chapter 1, 436 b 5 above) may mean phenomenon or affection generally, though it is not phenomenon in the widest sense in which that term is employed by modern thought, viz. as including concrete substances. πάθος is phenomenon in the sense in which that means an affection, event or attribute ascribed to any concrete subject. Now πάθος is often used for a peculiarly psychical affection and so perhaps the subject to which, as πάθη, smell and taste are relative, is the perceiving soul. Hence it will be as subjective phenomena that they are almost identical. This seems to be borne out by a passage in the De An. II. ch. 9, 421 a 31 sqq.: διὰ τὸ μὴ σφόδρα διαδήλους εἶναι ταῖς ὀσμαῖς ὀφθαλμοῖς, ἀπὸ τούτων εἶληφε τὰ ἀνώματα καθ' ὁμοιότητα τῶν πραγμάτων: odours not being distinctly presented like flavours have borrowed their names from the latter owing to the resemblance of the actual experience in the two cases. This is to follow Alexander and render τῶν πραγμάτων by 'the sensation.' Cf. Rodier, Traité de l'Âme, Vol. II. pp. 309-311.
COMMENTARY

For the connection between taste and smell cf. also De An. ii. ch. 9, 421 a 16: έυκε μεν γάρ ἀνάλογον έχειν πρόσ τήν γεύσιν καὶ ὁμοίως τὰ εἴδη τῶν χυμῶν τοῖς τῆς ὁσμῆς and 421 a 26 ὀσπέρ χυμῶς ὁ μεν γλυκίς ὁ δὲ πικρός, οὔτω καὶ ὁσμαί.

Alexander, Thomas and Simon, however, seem to interpret πάθος here not as subjective affection but as objective quality. It is true that this subjective similarity rests upon an objective foundation. Alexander explains the identity by means of the passage in ch. 5 beneath, 442 b 29 sqq. Odour is produced by the further modification of a substance in which flavour has been already developed; τὸ ἐγρόν is needed as a basis for both and the effect produced in the first case by τὸ ἐγρόν is obtained by dissolution (ἐναποπλώειν), the same process as that by which τὸ ἐγχυμόν ἐγρόν produces odour both in air and water: cf. Rodier, op. cit. Vol. ii. pp. 309–316, Alex. De Sens. pp. 66, 67, 88–91 (W.). But though the similarity has an objective foundation it does not cease to be a subjective phenomenon, and it is as such that we should infer τὸ αὐτὸ πάθος to be understood in antithesis to οὐκ ἐν τοῖς αὐτοῖς, which must be interpreted as ‘non in eisdem subjectis,’ as Simon renders it, following Thomas and Alexander. The vehicle of taste is water, that of smell is air and water alike, or rather that common nature which both have, named by Theophrastus τὸ δι- ὁσμον (cf. chapter 5 beneath). St Hilaire and Hammond think that οὐκ ἐν τοῖς αὐτοῖς refers to the diversity of the organs of the two senses. But χυμός and ὁσμή could hardly be said to exist εἰ τοῖς αἰσθητήριοις, and if Aristotle meant here to refer to the organs his statement is singularly obscure.

441 a 1. αὐτῶν κ.τ.λ. This is the explanation of a difference in function by a difference in faculty, a method much derided in modern psychology. But when one remembers that the ‘faculty’ is a determinate structure or disposition of the sense organ, and was so to Aristotle, the explanation, though not a genetic one, is seen to be adequate to the purpose in hand.

441 a 3. ἀκριβεστάτην. ἀκρίβεια contains at once the notions of complexity and delicacy, or precision. The emphasis is probably on the former in the famous passage in De An. i. ch. 1, 402 a 2, where Psychology is said to rank among the first of the sciences in point of ἀκρίβεια. For the want of definiteness in our sense of smell cf. De An. ii. ch. 9, 421 a 9 sqq.: τὴν αἰσθήσιν ταύτην οὐκ ἔχομεν ἀκριβῆν, ἀλλὰ χείρω πολλῶν ξύων. The reason is—φαίλως ἀνθρωπος R.
όσμάται, καὶ οἴθειος ἀσφραίνεται τῶν ἀσφραίτων ἀνευ τοῦ λυπηροῦ ἡ τοῦ ᾑδέους. That is to say, where feeling-tone enters largely into the sensation there can be no exactitude in our perception, as modern Psychology teaches is in most cases true. But the final reason for both phenomena is the indefiniteness of the structure of the sense organ (οἷς οὐκ ὤντος ἀκριβοῦς τοῦ αἰσθητηρίου). Compare De An. ii. ch. 9, 421 a 21: κατὰ δὲ τὴν ἄφην πολλῷ τῶν ἄλλων διαφεροῦτος ἀκριβοῦ.

The reason for the superiority of touch in man is the greater softness of his flesh. Softness of flesh is an index not only of tactual discriminativeness but of intellectual endowment. Cf. De An., loc. cit. 421 a 26 and De Part. An. ii. ch. 16, 660 a 11: μαλακωτάτη δὲ ἡ σάρξ ἢ τῶν ἀνθρώπων ὑπήρξεν. τούτο δὲ διὰ τὸ αἰσθητικώτατον εἶναι τῶν ζωῶν τὴν διὰ τῆς ἄφης αἰσθησιν.

Aristotle's ideal of a ἔφυνής would, on this showing, be the skilful surgeon or mechanician. But we must remember that τὸ θερμὸν καὶ τὸ ψυχρόν were among τὰ ἀπτὰ, and probably by softness of flesh he means sensitiveness to these influences as much as anything else and hence merely delicacy of constitution in general. At least so Alexander understands him. Would this be an argument for the mental superiority of the female sex? If so, Aristotle is forgetting himself.

441 a 3-4. ἡ δὲ γεύσις ἄφη τις ἐστίν, and hence is more ἀκριβης than smell. Cf. De An. ii. ch. 9, 421 a 18-20, also ch. 10, 422 a 8: τὸ δὲ γευστὸν ἐστὶν ἄπτον τι and De Sens. ch. 2, 439 a 1: τὸ δὲ γευστικὸν εἶδος τι ἄφης ἐστὶν. Compare also De An. ii. ch. 3, 414 b 11 and iii. ch. 12, 434 b 18, likewise De Part. An. ii. ch. 10, 656 b 37 and ch. 17, 660 a 21.

The chief arguments to prove the identity of taste and touch are (1) that by taste we are sensible of the presence of food which is an object of tactual sensation (414 b 7 sqq., 434 b 18-19), (2) that τὸ ψυχρὸν is the ῥῆν, the vehicle of taste, and it is ἄπτον τι (422 a 11). But (3) Aristotle finds strong confirmation for his theory in the fact that neither requires an external medium for its operation as the others do (422 a 8 sqq.). The flavoured substance impinges directly upon the sense organ—the tongue. Again (4) the division into right and left parts, which is not to be detected in the case of the organ of touch, is almost unnoticeable in the tongue (656 b 33 sqq.) and (5) the softness of the human tongue causes its greater sensitiveness, just as softness of the flesh generally causes delicacy of touch (660 a, 17-21, cf. De An. ii. ch. 9, 421 a 20 sqq. and
last note). For this doctrine compare also the passage beneath, 441 b 26 sqq.

441 a 6–7. Cf. Zeller, Presocratic Phil. (Eng. Trans.), II. p. 166, Burnet, Early Greek Phil. p. 231, Empedocles v. 312 (Stein). But cf. Theophrastus De Sens. 7 (Dox. 500, R.P. 177 b), who says that Empedocles did not push his investigation of taste or touch further than to say that in them too sensation was caused by particles fitting into the pores of the sense organ.

441 a 7–8. The meaning of πανσερμία is best illustrated by a passage in the De Gen. Animal. iv. ch. 3, 769 a 26 sqq., where he explains a theory that the various qualities of animals all lie commingled in the semen which forms as it were a πανσερμία of all characteristics, by comparing the γονή to a liquid in which many different flavours are dissolved. πανσερμία then evidently means a substance in which the germs of all things lie.

Trendelenburg (De An. p. 214) thinks that the word is a Democritean term. It certainly is employed by Aristotle three times (Physics, III. ch. 4, 203 a 21, De Coelo, III. ch. 4, 303 a 16 and De An. i. ch. 2, 404 a 4) to describe the mixture of atoms out of which, Democritus asserted, the world was fashioned. It is however once employed with reference to the theory of Anaxagoras (cf. De Gen. et Corr. i. ch. 1, 314 a 18 sqq.), according to which bone and flesh were the simple elements out of which air, fire, earth and water were constructed: οἱ δὲ (sc. οἱ περὶ Αιναξαγόραν) ταῦτα μὲν ἄπλα καὶ στοιχεῖα (λέγουσιν), γῆν δὲ καὶ πῦρ καὶ ὕδωρ καὶ αέρα σύνθετα πανσερμίαν γὰρ εἶναι τούτων: i.e. 'for they—flesh and bone—constitute that in which the latter all lie in germ.' Cf. Zeller, Presocratic Phil. II. p. 332, Burnet, Early Greek Phil. p. 290 and note. It is quite likely that the term originated with Anaxagoras, whose interests lay more in biological phenomena than those of his predecessors, but there seems to be no doubt that Democritus, however inconsistent it may have been with the general drift of his mechanical philosophy, also employed it.

This special theory—that water is οἶνον πανσερμία χυμὸν—must be assigned to Democritus, at least in the first form in which it is stated (see next note). As Alexander (p. 68) points out, we must assume a spatial difference to be responsible for the difference of flavour in different parts, and this, says Alexander, stamps the theory as Democritean.

The first theory differs from the second in that it supposes that
flavours exist in water ἐνεργεία— in actual fact though imperceptible to sense, while the second gives them only potential existence; according to it they exist in water only in germ. This second theory is then contrasted with a third, according to which water is qualitatively identical in every part, and any flavour can be derived from any portion of it, the differences which we actually find being caused τῷ μάλλον ἡ ἐπίτον θερμαίνειν— by the different amounts of heat to which different portions of water are exposed. Simon acutely conjectures that this third theory must be assigned to Anaxagoras owing to its compliance with his doctrine of πάντα ἐν πᾶσιν. It still comprises the doctrine that water is ὁ θερμαίνεια in which tastes lie in germ, but assigns their actual differentiation out to an active external cause. (Note that Aristotle says τῷ ποιοῦν not ποιοῦν τι. All theories may have recognised the agency of heat in producing taste but not in producing differences in flavour.)

441 a 14. This passage causes difficulty, for at first sight it seems strange that, if Aristotle meant that the fruits were plucked, he should not have said καρπῶν instead of περικαρπίων. Hence Thurot and Susemihl (Philol. 1885) propose to read καρπῶν. But though the word properly means σκέπασμα καρποῦ, yet there are passages in which it can only mean the fruit as a whole, e.g. Meteor. iv. ch. 3, 380 a 11 and Problems, 25, 925 b 30, and cf. below 441 b 1. Alexander suggests that it is possible to use περικάρπιον in its literal sense and, in that case, the point will be that fruits change in taste independently of the removal or permanence of the husk or peel.

But this is hardly the meaning required. The other interpretation is possible, and the point is that, as the connection with the root has been severed, the water drawn up by the plant through its roots (τὸ ἐκτὸς ὕδωρ) does not give the change in taste.

πυρομείων is the ms. reading, but it should mean, on the whole, ‘ignited’: cf. De Part. Animal. ii. ch. 2, 649 b 5, where πυροῦν is distinguished from θερμαίνειν and identified with φλόγα ποιεῖν. Where it does not mean actually to ignite, it at least denotes such intense heating as occurs in roasting or baking (cf. De Gen. Animal. iii. ch. 2, 753 b 4, and Problems, 927 b 39 sqq.). Now, here, in the case of the sun’s action, no such intense degree of heating is involved. Hence I propose to read πυρομείων which means ‘reddened,’ and suggest that Aristotle is thinking of the reddening effect the sun produces on many fruits as it ripens them. He is here then referring to the ripening effect of the sun which actually makes fruits
become sweet. (Mere cooking without adding a sweetening in-
gredient does not.) In the next clause he contrasts it with the
effect produced by drying and withering which makes them bitter
(cf. Problems 925 b 36: ἐλαῖα καὶ βάλανοι παλαιούμεναι πικρὰ γίνονται).
It is in the final clause—l. 18, καὶ ἑφομένονς κ.τ.λ.—that he talks of
the effect of cooking.

441 a 20. The sense is the same whether we read παναπερμίας
(which is grammatically preferable) or παναπερμίαν. The water is a
material in which the germs of the flavours lie commingled.

441 a 21-22. ὡς τροφῆς. Alexander, who reads ὡς ἐκ τῆς
αὐτῆς τροφῆς, explains that many tastes arise out of the same water,
as many different parts of the body—bones, flesh etc., are formed
out of the same nourishment, and again different trees are nourished
by the same water; and thus similarly each part of the same tree,
root, bark and fruit, has a characteristic flavour though feeding on
the same moisture. He is followed by Thomas who nevertheless
used the early Latin translation which gives the equivalent of our
reading. Both readings no doubt render such an interpretation
possible, but ours rather suggests the translation I have given. In
that case the sense is simpler. There is no parallel between water
and food in general. Aristotle simply says that different tastes are
developed by plants that live upon the same water; he may mean
either the different tastes found in bark and fruit or the different
flavours of different fruits. The latter is more probable since he has
just been talking of fruits. He means that the same water can
be supplied to different trees, yet you get different flavours, which
ought not to be the case if one definite flavour resides in one
definite portion of water as the second—the Democritean—theory
would make out. The παναπερμία theory in its first form is thus
refuted and Aristotle passes on to the opinion of Anaxagoras.

441 a 24. δύναμις, in this line and again in the next, is practi-
cally equivalent to φύσις; cf. above ch. 3, 439 a 25: κοινὴ φύσις
καὶ δύναμις. Cf. also De Mem. ch. 2, 452 a 31 and note.

441 a 25. λεπτότατον. The argument is directed merely against
the proposition that water acted on by heat, without any other
determinant, will develop flavour. Water alone when heated does
not thicken, but all flavours reside in substances that show traces of
thickening to a greater or less degree. Hence water plus heat is not
alone the cause of flavours. That which causes the thickening in
fluids must be the cause. This is earth (γῆ) or rather one of the

The whole of the above discussion is a good example of the 'dialectical' development of an Aristotelian argument. Previous theories are dealt with in an order relative to the amount they contribute to the final solution of the problem. Though each is in turn set aside, some part of it remains unabrogated in the next, and the last to be discussed is that which approaches most nearly to the true account of the matter.

441 a 32. πᾶχος ἔξουσι. It is not sufficient for the argument to say that flavours thicken when heated, but that at all times they show traces of density.

441 a 33. συναιτιόν. Cf. De An. 11. ch. 4, 416 a 14 where πῦρ is likewise said to be the συναιτιόν of the growth of bodies. The αἰτιόν is φυχή. (συναιτιόν μὲν πῶς ἔστιν, οὐ μὴν ἄπλως γε αἰτιόν.)

Some translators render φαίνονται 'apparently,' but with the participle it should mean 'evidently.' The sense also requires it, for this to Aristotle's mind is not merely an apparent fact, but a real fact which furnishes the proof positive that χυμός is dependent on τὸ ἔλογος. The previous proofs have been merely negative and directed against the claims of other circumstances to fill the position of cause.

This reasoning will support the reading διὸ ἐνθέλογος in 441 b 8 below.

441 b 5. γῆς τῷ εἴδος. Cf. Meteor. iv. ch. 7, 383 b 20 sqq. The πολλοῖ in 441 b 2 above are Metrodorus and Anaxagoras, according to Alexander.

441 b 8. διὸ ἐνθέλογος is the reading of MSS. L S U and evidently of the ancient Latin translation. Alexander also interprets as though this were the reading: διὰ τοῦτο οὐν φησίν εὐλόγως καὶ τοὺς χυμοὺς ἐν τοῖς ἐκ τῆς γῆς φυομένοις, τοιτέστιν ἐν τοῖς φυτοῖς, καὶ ταύτῃ τρεφομένοις μετὰ υψώτητος ἐγγίνεσθαι μάλιστα: the vet. tr. renders 'terra nascentibus' as though it actually read ἐκ τῆς γῆς. Whatever the reading, Alexander's must be the correct interpretation (cf. note to 441 a 33). It is on account of the savours being primarily in earth that they can enter into plants. Aristotle does not say ἐνθέλογος without being able to produce reasons.

441 b 10. ὥσπερ καὶ τάλλα. Aristotle is no doubt thinking in particular of the other elementary qualities—τὸ ἔλογον etc., but this statement is with him a universal principle.
COMMENTARY

441 b 14. ἐν τοῖς περὶ στοιχείων. Cf. De Gen. et Corr. II. ch. 1 sqq. The fuller discussion (ἐν ἔτεροις ἀκριβεστέροις, 329 a 27) referred to there seems to be lost, as all other references to the subject are more brief.

Up to this point the argument is clear. Aristotle is explaining what he has already proved as a fact. Earth in possessing the quality of dryness can act on τὸ ύγρὸν, since opposites modify each other. It is a case of explaining the qualities presented to the other senses by the interaction of the tactual properties of things. Cf. De An. II. ch. 5, 417 a 6, where he talks of the other αἰσθήσεις as the συμβεβηκότα of fire, earth, air and water. (Though he insists that in one way the former are prior to the latter, cf. De Gen. et Corr. II. ch. 2, 329 b 14: καίτοι πρότερον ὀψις ἄφης.)

The difficulty which now ensues is in connection with the function of τὸ θερμὸν in helping to produce flavour.

441 b 15. οὐδὲν πέφυκε κ.τ.λ. This statement seems to conflict with that in De Gen. et Corr. II. ch. 2, 329 b 22: δὲ δὲ ποιητικά ἀλλήλων καὶ παθητικὰ τὰ στοιχεῖα, μήγεναι γὰρ καὶ μεταβάλλει εἰς ἄλληλα. But probably there Aristotle is simply stating his doctrine in a rough provisional way. Really as σώματα and hence οὐσίαι the elements cannot be opposed to each other and act on each other. (So Alexander explains.) Cf. Categ. 3 b 24: υπάρχει δὲ ταῖς οὐσίαις καὶ τὸ μὴ ἔχει αὕτας ἐναντίον ἐστι, and it is ἐναντία that act on each other; οὐσία is merely δεκτικὴ τῶν ἐναντίων. The upshot of the matter is, that it is not as substances, but as possessed of opposite qualities, that the elements act on each other. This sentence is then inserted as a caution, but how it furthers the main argument here is not apparent, unless indeed we connect it with that preceding clause in which we find it stated that heat is the peculiar property of fire, dryness of earth. Liquidity (τὸ ύγρὸν) will thus be the special characteristic of water, and the implication will be that the latter element will be acted on in a more pronounced way by earth, the element which has in an especial degree the attribute most opposed to its most characteristic quality. Fire possessing τὸ ξηρὸν in a less marked degree will act upon it also, but not in the pre-eminent way in which γῆ does.

When Aristotle says that τὸ θερμὸν is the ἐδών of πῦρ, this cannot be in the full sense of ἐδών consistent with the rest of his doctrine, for τὸ θερμὸν is also shared by ἁέρ and, as we have seen, πῦρ is also ἔρην. He must mean, as Alexander explains in conformity with De Gen. et Corr. IV. ch. 4, 382 a 3: τῶν στοιχείων ἰδιαίτερα ξηρὸν μὲν
γῆ, ψυρὸν δὲ ὠδωρ, that earth is the principal illustration of dryness or possesses dryness in a special degree, as fire does heat, and so on. Cf. Alex. De Sens. pp. 72–73 (W.). Cf. also De Gen. et Corr. iv. ch. 5, 382 b 3: ψυρὸν σῶμα ὠδωρ.

441 b 17–18. ἐναποπλῶνοντες. A cognate word πλῦσις is used in 445 a 16 for the corresponding process which produces odour. Susemihl (Philol. 1885 and Burs. Jahrestb. 17) wishes to delete τοὺς χυμοῖς, but in mentioning flavours here Aristotle is not illustrating a thing by itself. He compares the solution of the primitive ἔξηρόν which produces flavours to the solution of flavours actually produced.

441 b 19. η φύσις. No personification of Nature is implied here. Aristotle merely means that this is a natural process. The function of πῦρ in the process is obscure. Alexander makes it the cause of the percolation as well as of the κίνησις which renders τὸ ψυρὸν determinate in quality; κυνώδα he renders by ἀλλοωόνδα, i.e. changing qualitatively. But it is possible to understand it literally—of the motion involved in the percolation. Some, e.g. Hammond and St Hilaire, translating κυνώδα in different ways, will have it to be concerned only with the former process. But, unless we adopt the conjecture that the function of τὸ θερμόν is to act on τὸ γεώδες, we may as well understand it to bring about local motion in this case as beneath in 442 a 6, where it is said to cause the light particles in food to rise upwards.

441 b 23. Here πάθος is used in a wide sense, but still with the signification of being the attribute of a subject that is passively affected when it (the attribute) comes into being.

441 b 24. ἀλλοωτικόν. Cf. De An. ii. ch. 5, 416 b 34: δοκεῖ γὰρ (ἡ αἰσθήσις) ἀλλοωτικός τις εἶναι: ἀλλοωτικός is that kind of κίνησις denoting qualitative change. ἀλλοωτικὰ is practically identical with πᾶσχειν (cf. Phys. vii. ch. 3, 245 b 13: τὸ πεποιθὸς καὶ ηλλοω-μένον προσαγορεύομεν: cf. Alex. De An. 84, 12), and both words are employed indifferently in the De Anima for psychical modifications (cf. ii. ch. 5, 418 a 2 and 417 b 14). But Aristotle points out that, though they both are used as though they were the proper terms (ὡς κυρίοις) for all psychical changes, there are some operations to which they are really not applicable.

1. In the first place, the transition from the state in which man possesses knowledge to the exercise of that knowledge is hardly a case of πᾶσχειν or ἀλλοωτικός in the usual sense. The change is not
produced by anything external. To exercise his intelligence is in a man's own power—ἐπὶ αὐτῷ—for the universals which are the objects of knowledge are in a way in the soul. Again it is a case not of φθορά ὑπὸ τοῦ ἐναντίον but of σωτηρία, i.e. the realisation of a predetermined end.

2. Secondly, change such even as that from a state of ignorance to a state of knowledge, where the alteration is in a definite direction and towards the establishment of a definite higher development, towards the realisation of the potentialities of the individual in question (ἐπὶ τὰς ἑξεις καὶ τὴν φύσιν 417 b 16), is hardly ἀλλοίωσις proper, even though in the acquisition of knowledge one requires an external agent—the teacher.

With these reservations Aristotle proposes still to use the terms ἀλλοίωσις and πᾶσχεν. They are no doubt, in one way, specially applicable to sensuous processes, because there must be an external agent—the individual object (cf. 417 b 25: ἀναγκαῖον γὰρ ὑπάρχειν τὸ αἰσθητόν, and cf. 417 a 6 sqq.). But Simon points out that even sense perception cannot be properly a case of πᾶσχεν, for agent and patient must be in the same genus (De Gen. et Corr. i. ch. 7, 323 b 32 sqq.), which the sense faculty and its object are not. Cf. Introduction, sec. iv.

441 b 25. It would be possible to make προῦπάρχειν agree with the subject of ᾧ, namely τὸ...πάθος, and this interpretation would give a meaning consistent with Aristotle's general doctrine, for previous to the act of perception the object is only δυνάμει αἰσθητόν. The next clause, however, requires us to construe it with τὸ αἰσθητικόν (as Hammond, Bender, St Hilaire do), or still better with τοῦτο (Simon), for it is not the sense faculty which existed δυνάμει before the act of sensation, but its operation. The δύναμις, the faculty, actually exists before the sensational experience.

For the doctrine of this passage see De An. ii. ch. 5, 417 b 19: καὶ τὸ κατ' ἐνέργειαν (αἰσθάνεσθαι) δὲ ὁμοίως λέγεται τῷ θεωρεῖν. In knowledge (cf. last note) there is a two-fold transition, (1) from a state of ignorance to the acquisition of a definite body of knowledge, i.e. from mere indeterminate δύναμις to a determinate one or ἑξεις; (2) there is also the change from the possession to the exercise of this ἑξεις (eis ἐντελέχειαν, b 7). There is a corresponding double transition in sensuous process. The first is effected by the parent (ὑπὸ τοῦ γεννῶντος, b 17) of the sensitive individual and is the creation of a being with fully developed sense faculties. The second, corresponding to the exercise of knowledge, is the actual exercise of the
sense faculty and is produced by the object of sense. In sense, then, the formation of a permanent psychical disposition is due to natural agency, in knowledge to instruction; actual exercise of a faculty is in both a higher process, originated in the first case externally, in the second internally.

441 b 26–27. οὐ παντός ἔηροῦ. Alexander thinks that this statement is made in order to rule out odour, which also owes its existence to τὸ ἔηρον. But, as ὅσμη is produced by τὸ ἐγχυμὸν ἔηρον, it is clear that those words are not used for the purpose of excluding it. By τὸ ἔηρον Aristotle surely means dry substance, and it is the same substance as has flavour that is odorous. The intention is obviously to rule out all ἔηρον that is not μεμηγμένον, i.e. does not enter into a compound.

441 b 27–28. η θάδος...στέρησις. The positive modification is τὸ γλυκόν, the negative τὸ πικρῶν: cf. 442 a 7 sqq.

441 b 30. I read οὐχ ἐν μῶνον instead of οὐδὲν αὐτῶν with Bekker and Biehl. Wendland restores οὐχ ἐν μῶνον to the text of Alexander, p. 77; and the vet. tr. renders ‘non est unum solum,’ which, in spite of what Biehl says, can be a translation only of οὐχ ἐν μῶνον. This version apparently read also οὐδὲ αὐτοῦς τοῖς φυτοῖς after ἔζως for it inserts ‘neque ipsis plantis.’ οὐχ ἐν μῶνον gives the best sense, but μῶνον might be dispensed with.

441 b 31. τὰ μὲν ἀπτὰ κ.τ.λ. Alexander points out that αὐξάνει and τρέφειν are not identical. Things so far as quantitative cause increase; only in so far as potentially capable of forming the substance of the body which they nourish are they said to be nutritive. Cf. De Gen. et Corr. i. ch. 5, 322 a 20 sqq. and also De An. ii. ch. 4, 416 b 12 sqq.: ἐστι δ' ἐπερ ροφή καὶ αὐξητικῷ ἐλνατ. ἦ μὲν γὰρ τοιόυτον τί τὸ ἔμυστρον αὐξητικῶν (sc. τὸ προσίδον ἢ τὸ προσφερόμενον: cf. Rodier, op. cit. ii. p. 242), ἦ δὲ τόδε τί καὶ ὀνόμα τροφή. That is to say, τροφή (the abstract term) or τρέφειν is the continuous renewal of the individual which preserves its identity as an individual of definite type, i.e. as an ὀνόμα; αὐξησις is that renewal in its quantitative aspect.

The point here, however, seems to be not to hold αὐξησις and τροφή apart, but to show that that which has the function of causing growth must also have the properties of nutritive food, and reciprocally τὸ τρόφιμον is known to sense as τὸ γευστῶν (442 a 2) and the fundamental positive characteristic of things that have flavour is sweetness.
But food, as that which causes growth, is that which can rise up (owing to the agency of heat—for fire is the lightest element) and so become incorporated in the body. Hence it is both warm and light (each of which is a tactual quality); but that which is light is sweet, and hence that which causes growth is just that which has the gustatory quality of nutriment.

The whole argument rests upon the identification of τὸ κούφον (one of the ἀπτά) and τὸ γλυκῖ, the basal quality of τὸ γενετόν, and hence of τὸ τρόφιμον.

442 a 1. τρέφει κ.τ.λ. This is treated simply as a statement to be verified by observation. It is not a proposition established by any special proof elsewhere. It gives the first obvious definition of τὸ τρόφιμον.

For the facts cf. Problems, 930 a 34 and Meteor. ii. ch. 2, 355 b 7, also cf. note to l. 5 below.

442 a 3. ἡ ἀπλώς κ.τ.λ. We must not translate ‘whether pure or mixed,’ as thus we should assume that it was indifferent whether the sweetness was pure or mixed. As a matter of fact Aristotle, below in l. 12, says that pure sweetness makes the food indigestible.


442 a 5. αἰσχαίει must be used absolutely, much as it looks as though it should govern τροφῆν along with δημονργεῖ. Aristotle is discussing not the production of food but the growth of the body owing to feeding. For the process cf. De Part. Animal. ii. ch. 3, 650 a 2 sqq.: ἔπει δ’ ανάγκη πᾶν τὸ αἰειαύμειον λαμβάνει τροφῆν, ἡ δὲ τροφῆ πᾶσιν ἐξ ὕγροι καὶ ἔρημοι, καὶ τούτων ἡ τέψις γίνεται καὶ ἡ μεταβολὴ διὰ τῆς τοῦ θερμοῦ δυνάμεως...διὰ ταύτην (τὴν αἰτίαν) ἀναγκαῖον ἔχειν ἀρχὴν θερμοῦ φυσικήν.

The ultimate ἀρχὴ of heat in the body of sanguineous animals is seated in the heart. Cf. De Juvent. ch. 4, 469 b 9: ἀναγκαίον δὴ ταύτης τῆς ἀρχῆς τῆς θερμώτητος ἐν τῇ καρδίᾳ τοῖς ἐναίμοις εἶναι.

For Neuhäuser’s theory, that this σύμφισιν θερμοῦ, which seems to be the ultimate substratum both of the sensitive and nutritive soul, is also to be identified as the central organ of sensation, cf. Introduction, sec. vi.

For the connection of lightness and sweetness, bitterness and weight, cf. Meteor. ii. ch. 2, 355 b 4 sqq.: τὸ μὲν ἀλμυρὸν υπομένει διὰ
The bodily heat is, however, only the *συναίτιον* in the production of *τὸ αὐξάνεσθαι καὶ τρέφεσθαι*. The natural process due to heat is indefinite and has no direction. Fire burns on until its material is exhausted. But in living organisms there is a *πέρας καὶ λόγος μεγέθους τε καὶ αὐξήσεως*, *i.e.* there is a definite scheme and restriction in the development and this is due to *ψυχή* which is the real *αἰτίον*. Cf. *De An.* ii. ch. 4, 416 a 8–18.

In *De Resp.* ch. 20, 480 a 8 we hear that the blood *ἐν τῇ καρδίᾳ δημιουργεῖται*. Aristotle probably there refers to the very same process. We read in *De Part. Animal.* ii. ch. 4, 651 a 14: *τὸ δ’ αἷμα ἡ ἐσχάτη τροφῆ.*

442 a 8. *τὸ ἐν τῇ φύσει*. Cf. *De Juvent.* ch. 4, 469 b 6 sqq.: *πάντα δὲ τὰ μόρια καὶ πάν τὸ σῶμα ἔχει ταύτα σύμφων τοις θερμοτητας φυσικήν*: cf. also above and the passage there quoted from *Meteor.* ii. Aristotle is there talking to begin with of the evaporation from the sea, one of *τὰ ἔξω σώματα*. He expressly compares evaporation by the sun to the process of animal nutrition. The sea remains salt though the moisture which is evaporated from it and descends again in rain is not salt.

442 a 9. Cf. quotation in note to 442 a 5 above. He has now *explained* what was previously proved as a fact—that *χρύς τοῦ τροφίμου ἐστίν*, and he has done so by identifying flavour *παρ excellence* with sweetness. Positive flavour is sweetness, just as positive colour is white. Their opposites are *στερησεις*—defects of being.

442 a 11. *ταύτα* must refer to the latter—*τὸ ἀλμυρὸν καὶ ὄξυ*, or else it means simply ‘this fact.’

442 a 13. There is no one English word which will translate *ἐπι-πολαστικῶν*. It is almost the technical expression for ‘indigestible,’ but it implied a theory of indigestibility—that the food tended to rise too much. Cf. one of Aristotle’s illustrations of final causality. The final cause of taking a walk after eating is *τὸ μή ἐπιπολάζειν τὰ συτία*—*An. Post.* ii. ch. 11, 94 b 11 sqq.

Biehl’s reading *ἄντι πάντων* in l. 12 instead of *ἀντισπαν* *τὸ* is doubtless correct. It does not, however, alter the general meaning.

442 a 17. *κινήσεως*. It is not clear what exactly *κίνησις* refers
to—the sense stimulus caused by χυμός or the κίνησις which produces χυμός.

442 a 18. L S U and all editions prior to Biehl's have οὖτοι εν ἀριθμοῖς μόνον· ο μὲν οὖν λιπαρός τοῦ γλυκέος κ.τ.λ. But there is no reason for making Aristotle say that the pleasant flavours alone were due to proportionate combination. On the analogy of the corresponding theory about colours they would rather be the class where the ratio of the ingredients was a simple one. Cf. ch. 3, 439b 33 sqq. above.

442 a 22. All mss. give ἐπτά but Susmihl (Philol. 1885) argues that it is quite impossible to reconcile this with the rest of the passage. Yellow is assigned to white, as oily is to sweet; hence, if the two lists are to square, the number must be either six or eight, as Alexander too maintains. (It is by distinguishing φαίων from μέλαν and ἀλμυρόν from πικρόν that eight members are distinguished.) Hence, followed by Biehl, he boldly substitutes ἔξι for ἐπτά. The difficulty, however, disappears, when we recognise that τὸ ξανθόν is included in the list, though, as an afterthought, assigned to white.

In other passages the different position of grey from that of the true chromatic tones is not noticed. They are both said to be ἀνὰ μέσον τοῦ λευκοῦ καὶ μέλανος: cf. Categ. ch. 10, 12 a 18, Top. 1. ch. 15, 106 b 5, Metaph. x. ch. 5, 1056 a 27 sqq. The reason doubtless for ascribing grey to black rather than white when it is relative to both (cf. Physics, v. ch. 1, 224 b 31 sqq., and ch. 5, 229 b 17 sqq.) is that it is less positive than white, in a way a στέρησις of white, as black also is.

442 a 24. λείπεται κ.τ.λ. The ascription of yellow to white seems to be a recognition of its higher luminosity than that of the other colours. Cf. Plato, Timaeus 68 b, who brings in τὸ λαμπρόν into its composition. For the correspondence of the tastes and the colours generally and the ascription to sweet and bitter of τὸ λιπαρόν and τὸ ἀλμυρόν respectively, cf. De An. ii. ch. 10, 422 b 10 sqq. The ground for the identification of τὸ λιπαρὸν and τὸ γλυκύ seems to be the lightness of both. Cf. De Part. Animal. iii. ch. 9, 672 a 8 sqq. τὸ λιπαρὸν κοῦφον ἐστὶ καὶ ἐπιπολάξει ἐν τοῖς ύγροῖς. τὸ λιπαρόν is light because it is warm. Cf. also De Gen. Animal. ii. ch. 2, 735 b 25. Similarly τὸ ἀλμυρὸν and τὸ πικρόν are both heavy.

442 a 25. φοινικοῦ κ.τ.λ. Three of these are the colours of the rainbow (with ξανθόν intermediate between φοινικοῦ and πράσινον: cf. Meteor. iii. ch. 2, 372 a 8 sqq.). They alone are said not to be
obtained by mixing (other chromatic tones presumably); κουνοὖν is less frequently mentioned.

442 a 27. τοῦτον should naturally refer to τοῦ λευκοῦ καὶ μέλανος, but it is generally held to signify the other colours. Both statements would be in conformity with Aristotle's teaching.


442 b 1. ἀπτά. Cf. Theophrastus, De Sensu, 60-82, R.P. 199. Zeller, Presocratic Phil. ii. pp. 265-270. This is part of the doctrine of ἀπόρροια; the atoms which emanate from bodies actually impinge upon our sense organs and so cause sensation by contact. It is against this that Aristotle wishes to argue in the first place.

The transition to this discussion is not mediated by the distinction between αἰσχανεῖν and τρέφειν as Alexander thinks, but by the connection between taste and touch which suggests the Democritean theory that all sensation is effected by contact.

442 b 4. ἀδύνατον. Alexander (p. 83 [W.]) gives four separate reasons which might be employed. But the most important consideration is the fact that the other senses require an external medium. It is the absence of this that makes taste a kind of touch. The other senses do not act by contact (cf. De An. ii. ch. 7, 419a 26: οὐθὲν γὰρ αὕτων (sc. ψόφων, ὀσμῆς κ.τ.λ.) ἀπτόμενον τοῦ αἰσθητήριον ποιεῖ τὴν αἰσθησιν).

τοῖς κοινοῖς. For the distinction between the κοινά and the ἰδια αἰσθητά cf. De An. ii. ch. 6, 418a 17, iii. ch. 1, 425a 14, iii. ch. 3, 428b 22 and above 437a 8, etc. The former comprise motion and rest, figure, magnitude, number and unity. The latter are the qualities, e.g. colour etc., reported by the special sense organs. The κοινά αἰσθητά are known however in modern philosophy as the primary qualities of bodies (cf. Hamilton's Reid, note D). They must be distinguished from what the commentators call the 'primae qualitates' in the Aristotelian scheme viz. θερμῶν, ψυχρῶν, ἕπρων, ὑγρῶν. It has been pointed out (e.g. by Hamilton, p. 829) that these κοινά are hardly sense qualities at all and confirmation for this contention is drawn from Aristotle himself (cf. De An. ii. ch. 6, 418a 24: τὰ ἰδια κυρίως ἐστὶν αἰσθητά; and below b 14-15: ἡ οὐδεμίας...τὰ κοινά γνωρίζειν). They may be all described as the mathematical and dynamical qualities of body and, according to the Atomistic philosophers, these were the only objective attributes of things, all
the rest being merely changes in our sensibility. (Cf. Theophrastus, De Sens. 63: τῶν δ' ἄλλων αἰσθητῶν οὐδένος εἶναι φύσιν, ἄλλα πάντα πάθη τῆς αἰσθήσεως ἄλλοιομένης.)

This holds good without qualification of four of the senses, but to some tactual qualifications they did assign objective existence, e.g. τὸ μαλακόν, τὸ σκληρόν, τὸ βαρὺ and τὸ κόψφον, deriving these however ultimately from μέγεθος and σχῆμα; things that are light have more of void space in them than others. τὸ τραχύ and τὸ λεῖον with τὸ ὅξυ and τὸ ἀμβλύ seem to have been modifications of σχῆμα. Here Aristotle also treats the latter four attributes as belonging to the category of τὰ κοινά. He takes care to define τὸ ὅξυ and τὸ ἀμβλύ as τὸ ἐν τοῖς ὅγκοις (the word commonly employed also for the atoms themselves as well as for mass in general) as these are also the names for determinations of such ἴδια as ψοφός and χυμός. He commonly puts τραχύτης and λειώτης along with other σωματικά διαφοράι or σωματικά πάθη as μαλακόν and σκληρόν which are consequent upon the primary determinations—θερμόν, ψυχρόν etc. Cf. De Part. Animal. II. ch. 1, 646 a 17 sqq.: αἱ δ' ἄλλαι διαφοράι ταύταις ἀκολουθοῦσιν, ὅπως...καὶ λειώτης κ.τ.λ.

Among such, even μέγεθος is included in 644 b 14; but this is simply one of his rough general classifications. Aristotle did not, of course, mean to imply that σχῆμα and μέγεθος are in themselves tactual differentiae of the same nature as hard and soft, but it was his view that you do not have the concept of body without somecharacteristically tactual datum. It is impossible to construct bodies out of merely mathematical determinations, a point which modern Atomists do not sufficiently consider. You cannot analyse body into something that has no sensuous qualities, not even tactual ones.

If μέγεθος and σχῆμα are to be regarded as the ultimate characteristics of bodies, they must be treated as though they already possessed a tactual content, as though they were merely tactual differentiae, and this is exactly Aristotle’s point here. The Atomists treat determinations of figure as though they in themselves contained a reference to tactual experience—as though they were given by one special sense, that of touch, whereas as a fact they, though given in connection with tactual experience, are not simply to be identified with it, and in fact can be discerned by means of other senses, notably that of sight.

In the De Anima, III. ch. 1, 425 b 4 sqq., Aristotle points out
that it is owing to the fact that these mathematical and dynamical qualities of objects are given by more than one sense that they can be readily discriminated. Otherwise they would be confused with the special data of the single sense to which they were attached, just as he contends that, if the whole surface of the body gave the same sensations as the tongue (which discriminates both flavour and tactual properties) taste and touch would seem to be the same sense. For a discussion of ἀφὴ cf. De An. ii. ch. 11. Aristotle does not there fully debate the question of the plurality of the ἐναντιώσεις, e.g. θερμός and ψυχρός, ἔγχρως and ύπρός, μαλακός and σκληρόν, which touch presents to us, nor does he consider to what extent determinations like ὀξύ and βαρύ, τραχύ and λείων, which appear in φωνή apparently as ἀδια, must be treated as κοινά in the case of touch. His definition of τραχύ and λείων in Categ. 5, 10 a 22 sqq. confirms his inclusion of them here in the list of the κοινά—λείων μὲν τῷ ἐπ'] εὐθείᾳς πως τὰ μόρια κείσθαι· τραχύ δὲ τῷ μὲν ὑπερέχειν τὸ δὲ ἐλλείπειν; i.e. these qualities are due to variations in figure.

442 b 8. ἐὰν δὲ μὴ πασῶν. Cf. De An. ii. ch. 6, 418 a 10 κοινῶν πασῶν, where however he illustrates only in the case of ἀφὴ and ὀψις. Number and unity seem to be given by the exercise of any sense (cf. 425 a 20: ἐκάστη γὰρ ἐν αἰσθάνεται αἰσθησις). On the other hand all are said to be perceived by means of κίνησις (425 a 17) and, in the case of the mathematical qualities such as are mentioned here, the κίνησις which discriminates them can be nothing else than the motion of the only two sense organs which have a surface continuously graded in sensitiveness, the eye and the surfaces of the bodily members. Aristotle does not work this out, but hence, probably, the reason why the discrimination of size and figure is limited to sight and touch.

442 b 9. Cf. De An. ii. ch. 6, 418 a 15; iii. ch. 3, 428 b 18, 25, where he qualifies the statement that ἰδία αἰσθησις is true, by the expression ἦ ὅτι ἀλίγαςτον ἔχουσα τὸ ψεύδος. Apparently he did not know of colour blindness.

442 b 11. οἶ δὲ cannot mean another set of people as Simon and St Hilaire think. It is part of the same doctrine as the preceding one to reduce the ἰδία to the κοινά. The error is (1) to assume that all sensation takes place by means of contact; (2) not to discriminate universal qualities of objects from the purely tactual, i.e. to treat them all as the data of a single sense; (3) to reduce all the sense qualities to these quasi-tactual determinations.
442 b 13. σχήματα. Cf. Theophrastus, de Sensu, 65: τὸν μὲν ὀξὺν εἶναι τῷ σχήματι γωνιοειδὴ τέ καὶ πολυκαμπῇ καὶ μικρὸν καὶ λεπτὸν,...τραχύν δ' οὖντα καὶ γωνιοειδὴ...τὸν δὲ γλυκὸν ἐκ περιφερῶν συγκείσθαι σχημάτων, οὐκ ἂναν μικρὸν κ.τ.λ.

Angularity was a characteristic of the atoms which caused acid and harsh tastes, roundness of those that caused the sensation of sweetness; but their size and their difference of impact on the body together with the heat supposed to be thus caused (vid. loc. cit.) played a part also.

For the Democritean theory of colour cf. Theophrastus, 73 and 80. The behaviour of the atoms relative to the πάροι (cf. above on Empedocles, ch. 2, 437 b 12) also was a determinant, as well as the density of the atmosphere, according to Democritus.

442 b 14. Alexander says that the preference is given to sight rather than touch because the latter does not perceive διάστημα (distance outward) and πλῆθος (a multitude of units). But surely the clause τὰ γούν κ.τ.λ. contains the reason. The illative force of γούν is continually backwards. The clause τὰ γούν κ.τ.λ. cannot, of course, be a consequence of εἰ δ' ἄρα...τῆς γεύσεως μᾶλλον. It must be the ground for it. Hence the construction is loose; after μᾶλλον should follow ἔχρυν without ὡστε and the τὰ γούν κ.τ.λ. clause should succeed. But that would make the argument too long and lumbering. Hence the τὰ γούν clause is brought up and has the additional function of confirming the καίτοι ἡ οὐδεμιᾶς κ.τ.λ. clause. It is clear that if it confirm the εἰ δ' ἄρα clause, it will, whether intended or not, support the previous one. Aristotle argues 'if it is the function of taste to discriminate the κοινά,' and this we should infer from the atomist theory that taste discriminates the most minute spatial difference——τὸ τραχύ and τὸ λεῖον in particles imperceptible to the other senses, then it must in addition to perceiving the other κοινά be the best judge of figure.

But if the claim of taste to perceive best the κοινά rest on the fineness of its discrimination (falsely asserted), surely the real delicacy of the sense of sight is the cause of its justifiable claim.

The superiority of the sense of sight is as a rule assigned to its intellectual character: cf. ch. 1, 437 a, Metaph. 1. ch. 1, 980 a 25, De An. iii. ch. 3, 429 a 3, ch. 13, 435 b 21. In the Problems, 886 b 35, we read that sight is ἑναργεστέρα than hearing, which comes to much the same thing as ἀκριβεστέρα in the sense of distinct. It is not said that touch generally is the most delicate of the senses; it is only
contended that relatively to the senses of the other animals it is most delicate in man (441 a 2-3).

It looks, of course, strange to assign the discernment of the common sensibles to one sense when they are said to be common. Aristotle no doubt means their accurate discrimination. Simple experience would show that this is best obtained by sight.

442 b 20. ἐναντίως. Cf. De An. ii. ch. 11 and below ch. 6, 445 b 26 sqq.

442 b 22-26. Surely an account of proportionate elements in figure could be given analogous to the theory of proportionate numbers which he accepts.

442 b 28. Aristotle's treatise on plants is not extant. Two by Theophrastus survive, De Causis Plantarum and Historia Plantarum.
CHAPTER V.

442 b 29. Τὸν αὐτὸν κ.τ.λ. Alexander maintains that this refers to ch. 4, 440 b 30, where smell and taste are said to be σχεδόν τὸ αὐτὸ πάθος. He is now to explain the analogy between the two. Its objective basis is the fact that the process involved in the genesis of each is the same; it is ὁδὸν βαφῆ τις καὶ πλύσις (445 a 15); it is a process of infusion or solution. Add to this the fact that in both cases τὸ ἕηρον is the agent, with the sole difference that in taste it is not already modified, but in producing odour it must have been previously mingled with liquid. Further, as the vehicle of taste is τὸ ὑγρὸν, so that of odour is ὑγρῶν, for, as pointed out in 443 b 6, air as well as water is ὑγρός. Heat also seems to be operative or rather co-operative in the production of both (cf. 443 b 17 and note).

Here Aristotle calls the agent operative in the production of odour τὸ ἐγχυμόν ὑγρῶν. Elsewhere he names it τὸ ἐγχυμόν ἕηρον, and cf. De An. ii. ch. 9, 422 a 6: ἐστὶ δὲ ὁ δαμὴ τοῦ ἕηροῦ. Hence Thurot, Torstrik, De An. p. 158, and Neuhäuser (Aristoteles' Lehre von dem sinnlichen Erkenntnissvermögen und s. Organen, p. 25) propose to read ἕηρον here instead of ὑγρῶν, and Susemihl (Burs. Jahresb. xvii. p. 266) has lent his support to this conjecture. But, as Alexander points out, it makes no difference whether we call the agent here ἕηρον or ὑγρῶν. We can call it either dry substance mixed with liquid or liquid mixed with dry. The main point is, that it must be μεμιγμένον τι ἢ. τὸ ἢ ἕηρ χυμὸν ἔχον.

442 b 30-31. ἐν ἄλλῳ γένει. The new γένος is the identical element in air and water of which it is the function to form a vehicle and medium for odour. Alexander (p. 89, l. 2 [W.]) has named this τὸ διόσμον (following Theophrastus) on the analogy of the term τὸ διαφανές which is applied to the common constitution of air and water which enables them to form media for light. Cf. De An. ii. ch. 7, 419 a 22 sqq., where however he says (l. 32) that the medium of smell has no special name.

The expression ἐν ἄλλῳ γένει is, however, quite vague and may
mean merely ἐν τῷ δοσφραντῷ—'in the domain of odorous quality.'
tὸ δοσφραντὸν is the object of smell as τὸ ἀκουστὸν is the object of
hearing.

443 a 1–2. ἡ πλυντικὸν ἡ ῥυπτικὸν. Cf. ch. 4 ἐναποπλύνοντες
441 b 17, and beneath 443 b 8 ἀποπλύνομεν and 445 a 16 πλύσις.
πλύνω is to wash; ῥύπτεω seems to contain more definitely the idea
of scouring; the Latin rendering for it is abstergere. In the ex-
amples of its use in Aristotle (e.g. Problems, 935 b 35) it takes the
accusative of the thing cleansed. Hence evidently ῥυπτικὸν ἐξηρό-
tητος means 'able to cleanse, by scouring off and absorbing the
surface of dry substance.' St Hilaire translates ἡ πλυντικὸν ἡ ῥυπτικὸν
'en tant qu'il peut transmettre et retenir,' Hammond, 'by virtue of
its capacity to exude and throw off (dry savour),' But these render-
ings are impossible.

443 a 3. καὶ ἐν ὑδατι. Cf. De An. ii. ch. 9, 421 b 10: καὶ γὰρ
τὸ ἐνδόρα δοκοῦσιν ὅσμὰς αἰσθάνεσθαι, and beneath passim.

443 a 4. ὀστρακοδέρμων. Testacea must not be taken as a
modern zoological designation. Any animal with a shell from the
turtle to the sea-urchin is ranked under the ὀστρακοδέρμα: cf. Hist.
Animal. viii. ch. 2, 590 a 19 sqq. Aristotle is, no doubt, thinking
here of shell-fish. An example is afterwards given in 444 b 13—
(αἱ πορφύραι) the purple-murex which, he asserts in Hist. Animal.
viii. ch. 2, 590 b, goes in pursuit of its prey and feeds on minute
fishes.

443 a 5. ἑπιπολάξει. Air rises upwards by a 'natural' motion.

443 a 6. οὖτ' αὐτά κ.τ.λ. Aristotle thought the motion fishes
make with their gills was not breathing. It is the expulsion of the
water, which is taken in with their food, and which performs the
'cooling' function effected in respiring animals by the air. Cf. Zeller,
Aristotle, ii. pp. 43, 44, and Aristotle, De Resp. 476 a 1 sqq. especially
10: τὰ δὲ βραγχία πρὸς τὴν ἀπὸ τοῦ ὕδατος καταφύξειν.

331 a 5, etc.

443 a 8. φώις. Cf. note to 442 b 30–31. Mr Cook Wilson
(Journal of Philol. xi. p. 119) conjectures πλύσις instead of φώις.
This is possible but not necessary. τὸ δοσφραντὸν is indifferently the
πάθος of the thing that smells and the odorous thing itself.

443 a 11. ἁσμα. Cf. 437 a 22, 441 b 14 and notes. For the
sources of the whole discussion cf. Meteor. iv.
443 a 12. For the doctrine contained in this statement cf. De Gen. et Corr. ii. ch. 2, 329 b 11; the elements differ only κατὰ ἀπτὴν ἐναντίωσιν.

443 a 14. χυμὸν καὶ ξηρότητα. Cf. De Gen. Animal. 761 b 9: ἡ θάλασσα ύγρὰ τε καὶ σωματώδης. The dry element is of course the salt contained in it; cf. 441 b 4: οἱ γὰρ ἄλεξ γῆς τι εἴδος εἶσον. The reference for λίθος below is Meteor. iv. ch. 7, 383 b 20: (λίθος) γῆς μᾶλλον, for ἕλαλα also ch. 7 and for χρυσός etc. chs. 8, 9, 10.

443 a 15. ἑλαίον. Either the oil said to be extracted from salt has more smell than that which comes from natron and so the previous statement is directly verified, or there is a greater quantity of this product derived from salt and thus the strong smell of salt is explained by the fact that it contains more ψυρόν than the other substance.

What the process referred to is, one can hardly tell. Aristotle in Prob. 935 a 8, talks of τὸ ἐν τοῖς ἑλαίοις ψυστάμενον ἑλαίον, and this should mean a deposit or sediment. ἐξικραζον should point to some process in which heat was employed. νίτρον was compounded with oil to form soap. Perhaps something similar was done with salt. Impure salt and oil may have been boiled together, and the product which distilled over collected. This would rather confirm the suggestion that Aristotle is referring to the stronger smell of the one compound than of the other.

νίτρον is any salt of sodium or potassium that has a strong alkaline reaction. It is not potassium nitrate—our salt-petre.

443 a 20. τὸ ψυρὸν. For ἄργυρος, καττίτερος cf. Meteor. iv. ch. 10, 389 a 8. Anything that melted with heat was held to be aqueous. We must remember however that the concepts of τὸ ψυρὸν and ὅδωρ are wider than what we understand by moisture and water. They correspond more nearly to the modern concept of the fluid state of matter. Hence Aristotle could talk of τὸ ψυρὸν in metals without meaning exactly that water, the actual particular substance known as such, was found in them. He was under the necessity of using popular terms with a more or less restricted denotation and a particular intension, for wide and far reaching scientific generalisations. To our mind this inevitably suggests both a fancifulness in the generalisation and a vagueness in the concept of the particular substance which permitted the name for it to be so widely applied. Both those characteristics are true of all primitive theories for, as Aristotle himself remarks (Phys. i. ch. 1, 184 a 21): ἐστὶ δ’ ἡμῶν πρῶτον
δήλα καὶ σαφῇ τὰ συγκεχυμένα μᾶλλον. τὸ υγρὸν is fluidity or the fluid element generally, of which ὑδωρ is the typical example. The concept corresponds, as modern science shows, to an important objective distinction in the condition of matter. The peculiarity of the Aristotelian theory lies in regarding τὸ υγρὸν not as a state into which matter may pass but as a quality which certain species of matter (ἄηρ and ὑδωρ) always possess.

443 a 23. Cf. above ch. 2, 438 b 26 sqq. and notes. ἀναθυμίασις (cognate of Latin funus) is used in two senses: (1) in its generic meaning it corresponds more exactly to our word reek; it is any vapour which rises up and is wafted upwards from a substance. As such it has two species (cf. especially Meteor. ii. ch. 4, 359 b 27 sqq.) which are distinguished as being respectively moist and dry or at least as containing a greater proportion of υγρὸν or ἔριδον respectively. The former is steam or moist vapour, the latter is more accurately described as smoke. Aristotle expressly proposes to use the general term to represent the latter variety (as he does in i. ch. 3, 340 b 27 sqq.) and this (2) is its second and more restricted meaning. Both species of ἀναθυμίασις are hot by nature. The dryness of the smoky kind comes from the earth which enters into its composition (340 b 26).

443 a 24–25. καὶ τάντες...ὄσμῆς. This seems to be a case of dittographia of the passage beneath l. 27. In consequence of the scribe's mistake l. 27 was mutilated and hence we must restore to it, with Christ, the ἐπὶ τοῦτο which appears here.

443 a 25. Heraclitus, fragment 37 in Bywater's edition: cf. Burnet, Early Greek Phil. p. 136. Hence Heraclitus must have held that odour was smoke.

443 a 28. ἄτμιδα. Cf. Meteor. i. ch. 9, 346 b 32: ἐστὶ δὴ ἡ μὲν ἐκ ὑδατος ἀναθυμίασις ἄτμις. Cf. also note to 443 a 23.

443 a 34. ὄσματα κ.τ.λ. Cf. De An. ii. ch. 9, 421 b 10 sqq.

443 b 2. ἀπορροήας. If the sense of smell were stimulated by effluxes it would be really a sense of touch, cf. 440 a 21 and note. Another reason against the efflux theory (noticed by Alexander) is given in Problems, 907 a 33. If that theory were true, odorous objects would evaporate away in time. Aristotle does not deny that smoke and vapour are odorous (cf. above ch. 2, 438 b 26 and Prob. 906 a 21 sqq. where he talks of the odorous qualities of θυμίαματα); he only means that exhalations are not the mechanism for transmitting odour. The sensation of smell is not caused by the evapo-
rated substance impinging on the sense organs (cf. De An. 421 b 16). The μεταξύ in respiring animals is the air, and when that enters the nostrils it can be described as an ἀναθυμίας indeed, but it is πνευματώδης (cf. below 445 a 29)—a waft of air.

Aristotle has, however, great difficulty in not regarding odour as a gas or the analogous diffusion of a solid in a liquid. Cf. 438 b 26 and below ἄτμιδος 444 b 33, De An. 421 b 24, and below 444 a 24 sqq.

443 b 4. πνεῦμα—air or wind—is more especially the air we breathe.

443 b 7. ὀμολόγος. Between what is the similarity? Aristotle is explaining the correspondence between tastes and odours; he has already pointed out one identity—the ὑγρότης of the vehicle of both. Now he asserts that the process which generates the two is identical—ἀπόπλωσις. The argument is ‘If in this case—the production of odour—the action of dry substance on moist is the same as in the production of taste—ἀπόπλωσις, then we can explain the analogy of the two.’ He is not comparing the effect of τὸ ἔχηρον on air with its effects on the fluids proper, otherwise he would have said ἐν τοῖς ἀλλοις υγροῖς after just pointing out that ἄνερ ὑγρὸν τὴν φύσιν ἔστιν. He means τοῖς υγροῖς to include air and then gives air as the example of τὰ υγρά which is most important for present purposes. It is a very common function of καὶ in Aristotle to coordinate the generic and the specific, the latter coming second and illustrating the former or defining it more exactly (cf. Bonitz, Ind. p. 357). Cf. in this treatise 439 a 18 sq.: τὴν ἀλήθησιν καὶ τὴν ἑνέργειαν, 441 a 10 sq.: τὸ θερμὸν καὶ τὸν ῥήμαν, 441 b 19 sq.: τὸ ἔχηρον καὶ τὸ γεώδες, etc.

The above is Alexander’s interpretation, but he suggests that the argument may be intended to compare the action of τὸ ἔχηρον ἔχηρον in producing odour in air and in the fluids proper. If it is the same, then, assuming already that odour is produced by flavoured substance, we could explain why the odours we are cognisant of (which are propagated in air) correspond singillatim to flavours (which exist in liquid), Alex. 94, 1. 20 (W.): κατὰ γὰρ τὰς τῶν χυμῶν διαφορὰς ἐστονται καὶ ὅσμων διαφοραι, εἶ γε ὅπο τοῦτον ἐκεῖναι γίνονται, ὡς ἐπεστήμεν ἐκεῖνῳ ὃ φίλον ἐκεῖνῳ, εἰ αὐτῶν ἐξοι.

One thing seems certain, that Aristotle is not comparing the action of τὸ ἔχηρον in producing tastes in water, with its action in diffusing odours in air, for in that case all mention of the propagation of odour in water would be omitted, and it would be natural
to infer that it did not exist in water: but this is the reverse of the theory for which he contends.

443 b 8. ἀνάλογον κ.τ.λ. Cf. De An. ii. ch. 9, 421 a 16–18: ἐσθε ἄνω τοῦ μὲν γὰρ ἀνάλογον ἕξεν πρὸς τὴν γεώσιν καὶ ομοίως τὰ εἰδὶ τῶν χυμῶν τοῖς τῆς ὀσμῆς. But further on (loc. cit.), in 26 sqq. he points out that though smells are distinguished as γλυκό, πικρόν, δριμύν etc., the epithets applied to taste, yet not all objects have the taste and smell designated by the same name—τὴν ἀνάλογον ὀσμήν καὶ χυμόν. Some are sweet, both to taste and smell, others not.

443 b 15–16. Cf. Meteor. iv. ch. 3, 380 b 2, where unripe flavours are said to be ψυχροί. Cold generally is the principle which counteracts heat (ἀντιστροφὸν τὴν θερμότητα De Gen. Animal. ii. ch. 6, 743 b 28), which is the great principle of life or activity according to the Aristotelian philosophy.

443 b 17. κινοῦν καὶ δημιουργοῦν. Cf. the similar rôle played by heat in the development of taste and nutrition (chapter 4 especially 442 a 5). Its function in producing odour is not brought into such prominence; but cf. 444 a 26: ἡ γὰρ τῆς ὀσμῆς δύναμις θερμῆ τὴν φύσιν ἐστίν and 438 b 27 and also Problems, 906 b 37: ἡ ὀσμὴ θερμότητας τῆς ἐστὶ, and elsewhere for the influence of heat in producing smell.

443 b 19. εἴη...δέο. It is unlikely that Aristotle here refers to τὸ ἴδιον καὶ τὸ λυπηρόν as Hammond (p. 173) thinks. If that were so it would mean that odour per se was exhaustively divided into two species, the pleasant and the unpleasant, but nothing is said to confirm this. Aristotle certainly implies that all odours are either pleasant or unpleasant, but he does not elevate those epithets into specific differences. Alexander (De Sens. p. 97, l. 23 sqq. [W.]) conjectures that perhaps τὸ ἴδιον and τὸ λυπηρόν are the primary species of that kind of odour which is independent of taste, and that the others are subsequent to them and, possessing no names of their own, correspond to the particular flavours and perfumes from which they originate.

This would make the classification of odours per se pleasant and the reverse correspond on the whole to the classification of the species of the other sense qualities. But it is hardly possible that τὸ ἴδιον and τὸ λυπηρόν can be regarded as objective determinations like γλυκό and πικρόν. Besides, it is clear from De An. ii. ch. 9, 421 b 1 sqq. that the same epithets mark the species of odour per se pleasant as those which distinguish the varieties dependent on taste. Among odours per se pleasant are included the scents of flowers.
COMMENTARY

1. 30 below) and to these in the De Anima are applied the terms γλυκὸς, δρυμὸς etc.—ἡ μὲν γὰρ γλυκεία [ἀπὸ τοῦ] κρόκου καὶ μέλιτος, ἡ δὲ δρυμεία θύμου καὶ τῶν τοιούτων.

The smell of honey is, no doubt, one of the class of odours which follow the taste. That of crocus or saffron is a scent per se pleasant, for the taste of the substance is not sweet. Probably Aristotle would have explained the phenomenon that many things did not have the corresponding odour and flavour by this distinction between the two different orders of smell. The problem is, however, not worked out.

Alexander, though lending some colour to the suggestion that τὸ ᾱδὴ καὶ τὸ λυπηρὸν are the species of odour per se pleasant and the reverse, yet does not hold that ἐίδος here refers to them. Aristotle is referring to the two great divisions of odour—οἴσμη καθ' αὐτὴν ᾱδεία, and that which is only κατὰ συμβεβηκός ᾱδεία. The latter is called τὸ θερετικὸν ἐίδος in 444 b 10. It is true it should rather be a γένος and that term is employed in 444 a 32 and b 4, but Aristotle frequently uses γένος and ἐίδος indifferently to designate a class.

Here it certainly looks strange that Aristotle after using ἐίδος to denote a wide group should in the next line employ it to refer to infimae species, but this is characteristic of the carelessness of his style. He says 'There are two species of odour' meaning by that two divisions, and then the word 'species' suggests to him the fact that some people have denied the existence of any species at all in odour.

443 b 23. κατὰ συμβεβηκός, i.e. indirectly: cf. note on κατὰ συμβεβηκός chapter 1, 437 a 5, 11.


Perhaps there may be a hit in comparing to φακῆ what would be left if the meretricious additions were removed. μῦρον is a perfume, not a spice. Cf. Cic. ad Att. 1. 19, 2.

Perhaps the force of the taunt may be thus rendered: 'Don't put hair-oil in your soup!'

444 a 1. νῦν. Aristotle is not necessarily to be regarded as mourning the degeneracy of his own time. The νῦν need not have that signification.

444 a 2. βιάζονται. Anything contrary to nature (φύσις) is
βιάως: cf. the famous βιάως τις or βιγ τοσίς in Nic. Eth. 1. ch. 3, 1096 a 6.

The idea here seems to be that gourmets get a pleasure from odour which appears to arise from taste. It is in the exercise of the latter sense (along with that of touch) that men are intemperate. Cf. Prob. 949 b 6, etc. and Sir A. Grant, Ethics of Aristotle, ii. p. 49.

444 a 4. ἵδων here and in l. 9 below is interpreted as μάλιστα ἵδων by Alexander who, influenced by 21-24 below (q.v.), thinks that other respiring animals also perceived, though in a less degree, this kind of odour. But in 21-24 Aristotle is talking merely of odour in general and explaining why it is perceived by means of inhaling the breath. It is because of its higher function in man that odour is drawn in with the breath, and the same mechanism is provided for animals (in which the higher functions are lacking) in order that Nature might not have to devise a new organ for them (444 b 5).

Independently, however, of the influence of ll. 21-24, there was some reason for Alexander interpreting ἵδων as μάλιστα ἵδων, for otherwise Aristotle appears to make an absolute qualitative distinction in sensation depend upon a mere quantitative difference—the greater size of the human brain as compared with that of other animals.


444 a 13-15. This is obviously the same account of the origin of catarrh as is given in De Sommo, ch. 3, 458 a 2. The ἀναθυμίασις is not an exhalation from food as it exists outside the body; it arises from the food that has been eaten. The process by which the nutritive element in food is diffused into the blood is called by Aristotle an ἀναθυμίασις—volatilisation—in 456 b 3. It is an excess of this exhalation which, when carried up to the brain, produces a flow of phlegm.

ψγεία is defined in Phys. vii. ch. 3, 246 b 5; Prob. 859 a 12, etc. as a συμμετρία—balanced proportion—of heat and cold (cf. beneath l. 36).

444 a 18 sqq. Cf. above ch. 4, 441 b 30. Food is always a mixture. Alexander explains that it is always the cold associated with the liquid element in food which is the cause of its unhealthiness. He, however, identifies the ἀναθυμίασις from food which causes catarrh with the odour which is connected with taste. There is, however, nothing in the text to justify this and Aristotle has just refused to identify odour with ἀναθυμίασις. Probably in
order to get my translation οὖςα should be inserted after νηρα. This is ugly but possible. If we render ‘whether dry or cold’ there is no point and, indeed, there is disagreement with the doctrine that all food has both characteristics.

Aristotle is probably thinking of the supposed efficacy of some perfumes in expelling colds and warding off infectious diseases.

444 a 20. ἡδια must be understood, if not read, after ἦ καθ' αὐτὴν. It appears after εὐώδους in mss. L S U. Alexander interprets ἡδια ὀσμή and Aristotle does not elsewhere talk of ἦ καθ' αὐτὴν ὀσμή, but of ἦ καθ' αὐτὴν ἡδεία (ὀσμή): cf. 443 b 30. Bekker’s text is ἦ δ' ἀπὸ τῆς ὀσμῆς τῆς καθ' αὐτὴν εὐώδους ὄσωσον κ.τ.λ.

If we retain this reading the missing substantive after εὐώδους cannot be τροφή as Bonitz (Ind. p. 533 a 3) suggests. Aristotle is discussing not the food but the odour which is ὀφέλιμος. Hayduck (Prog. Kön. Gym. zu Meldorf, 1877) suggests ἡδονή after εὐώδους, as also does Mr Cook Wilson (Journal of Philol. xi. pp. 119-120); but it is doubtful whether ἡδονή could designate the objective quality of odour which is supposed to promote health. The latter also suggests ἦ δ' ἀπὸ τῆς ὀσμῆς τῆς καθ' αὐτὴν ἡδείας εὐωδία.

I suggest ἦ δ' ἀπὸ τῆς ὀσμῆς καθ' αὐτὴν εὐωδία. Cf. 445 a 1: αὐτῆς ἐκ καθ' αὐτὴν τῆς δυσωδίας οὐδέν φροντίζουσιν.

Aristotle could quite well talk of εὐωδία καθ' αὐτὴν and δυσωδία καθ' αὐτὴν. ἦ καθ' αὐτὴν εὐωδία would mean odour essentially pleasant, whereas ἦ καθ' αὐτὴν ὀσμή would mean smell which is essentially pleasant. But Aristotle does not wish to show that the opposite kind of odour is not essentially odour, but that it is not essentially pleasant.

444 a 21. διὰ τούτο. Because of its function in maintaining health in man who is the final aim and end of all the endeavour of nature. Aristotle is talking of smell in general; he does not mean that its higher function is shared by any of the animals.

444 a 23. μετέχει κ.τ.λ. Aristotle seems to think of the air as entering into the constitution of the body. Certain organs e.g. that of hearing (cf. ch. 2, 438 b 21 and De Gen. Animal. v. ch. 2, 781 a 24 sqq.) seem to contain air. Animals that do not breathe have a σύμφυτον πνεῦμα which performs the same function as the breath. (Cf. De Somno, 2, 456 a 12.) The probably spurious writings περὶ πνεύματος and περὶ ξώον κυήσεως also declare that there is a σύμφυτον πνεῦμα in the lungs of respiring animals and in
the heart. This doctrine may be a legitimate deduction from such passages as the present. Cf. 481 a 1, 27, 482 a 34, 703 a 15 etc. Cf. Introduction, sec. vi. and the passage there quoted where the σύμφυτον θερμόν is also called πνεῦμα.


444 a 27–31. There is no reason for considering that κατακέχρηται...κίνησιν should be postponed till 444 b 7 as Susemihl (Philol. 1885) and Hammond think, or for deleting it as Hayduck (op. cit.) wishes. It is certainly better to postpone it than to delete it and it comes in quite well at b 7, but it may stand here quite well as a note to amplify what has been already said. It points out the double function of ἀναπνοή, the operation which has just been under discussion.

ὡς παρέργῳ. Cf. De Resp. 473 a 24. The windpipe is the essential organ for conveying the breath. When it is closed death ensues. Not so in the other case.


444 a 35. χαίρει. St Hilaire (p. 61) has a marvellous notion that Aristotle in distinguishing the higher kind of odour is erecting a personal liking into a theory. But for evidence that the distinction was widely recognised cf. Eth. Eud. iii. ch. 2, 1231 a 11: διὸ ἐφεξής Ἐστρατόνικος τὰς μὲν καλὸν ὀξεῖας, τὰς δὲ ὑδόν.

444 b 3. Biehl and Bekker read διὰ τὸ ἀναπνεῦσις which, of course, must be taken along with ὀσμὰ πλεῦσον ἔχει. In that case we must understand διὰ τὸ ἀναπνεῦσις to be equivalent to ἀναπνοῆς ἐνέκειν because we learn from De Resp. 476 a 7 that breathing is the final cause of the existence of the lung (ὁ μὲν πλεῦσων τῆς ὑπὸ τοῦ πνεύματος καταψύξεως ἐνεκέν ἐστιν); the determining cause in the ordinary sense both of the existence of the lung and of ἀναπνοῆς alike is rather the greater vital heat of respiring animals (cf. 477 a 14).

But if we take this reading, the sense becomes very difficult. The sentence τοίς δ’ ἄλλοις...δύο ποιῇ 11. 2–5 will mean that Nature gave the rest of the respiring animals the kind of smell not necessarily connected (for health reasons) with the head, in order not to make two organs and one of them have no functions. The thought will be that the animals, having nostrils, may as well smell by them. This is to make ὀποῖος μὴ αἰσθητήρια δύο ποιῇ equivalent to the well known Aristotelian doctrine that Nature does nothing in vain. But this doctrine may be variously interpreted; here it would mean that,
having once made a thing, Nature must assign it a use. But such a maxim is hardly to be identified with the principle of parcimony —‘entia non sunt multiplicanda praeter necessitatem’—which is surely the true import of the Aristotelian doctrine. If Nature really does nothing in vain and does not wish to make a superfluity of organs, it would surely be better not to give the lower animals nostrils at all if the species of smell connected with food has no necessary connection with the upper part of the head. A still greater objection to the above interpretation is, that αἰσθητήρια has to be taken as referring (1) to the organ of smell and (2) to the organ of breathing—the windpipe which is not an αἰσθητήριον at all (Alexander notices this).

It is as above that St Hilaire, following most commentators, takes this passage, but Simon proposes to detach δ'α τὸ ἀναπνεῖν from what precedes and connect it with what follows translating as I have done. The reading must thus, of course, be δ'α τὸν ἀναπνεῖν which is the version found in mss. P U pr. S. This is also supported by Mr Cook Wilson (Journal of Philol. XI. p. 120). Cf. De Resp. 475 b 19: (τὴν κατάψυξιν ποιεῖται) δ'α τὸν ἀναπνεῖν καὶ ἐκπνεῖν. The argument then is, that Nature made respiration the means of perceiving odour in the case of the other respiring animals in order to avoid making a separate sense organ for them. The αἰσθητήρια δ'α are the nostrils in man and the problematical new organ of sensation in the other animals. Nature, in making the lower respiring animals perceive odour by means of the nostrils, avoided making a second sense organ of a new type—a type not found in man, her chief creation. But in the case of the non-respiring animals, as he goes on to say, probably some other contrivance has to be resorted to. It is thus that Alexander interprets from ἀπόχρη onwards; hence it is strange he does not notice the ineptitude of the reading δ'α τὸ ἀναπνεῖν.

444 b 5. ἀπόχρη κ.τ.λ. Biehl, following E.M.Y, strikes out ἐπείπερ before and ὦς after the καὶ which precedes ἀναπνεούναι. These stand in Bekker's text, which if retained will hardly give the sense required. St Hilaire renders—‘et il leur suffit, quoiqu'ils respirent les deux espèces d'odeurs comme les hommes, d'avoir uniquement la perception de l'une des deux,’—a mistranslation.

Hammond—'It is enough for these respiring animals that they have the sensation of only one class of smells,' etc. But this is merely an obvious and insipid deduction from what has been said
about the greater size of the human brain, and besides it throws no light, as it should, on the previous clause.


444 b 13. κνῆται. Not the species known by the name knipes in modern Zoology, which is a ‘beetle allied to the Cryptarcha.’ Cf. Hammond, p. 176.

444 b 13–14. αἱ πορφύραι. Not ‘purple sea-fish’ nor ‘les rougets de mer.’ Aristotle asserts in Hist. Animal. viii. ch. 2, 590 b 2 sqq., that ἥ πορφύρα is among the class of shell-fish that move and that it is caught by a bait, as it feeds on small fishes.


τὸ γὰρ κ.τ.λ. Cf. De An., loc. cit. 21–23. It is strange that Wallace (Aristotle’s Psychology, p. 246) should think that Aristotle did not really mean that the manner of perceiving smells was different in respiring and non-respiring animals when he quotes (§ 7) the passage from the De Sensu here beginning οὐ τὸν αὐτὸν τρόπον.

By a difference in ‘manner’ Wallace must mean a difference in the quality of the sensation. He blames Aristotle for being ‘misled by language’ in assuming that odorous quality should be perceived by the sense of odour.

But Aristotle throughout proceeds on the principle that the only way for establishing the identity of sensations is the identity of their objective ground. It is really impossible to tell whether the qualitative character of the mere subjective affection is identical in any two people or any two species. We have to assume that, where the objective content is the same, the quality of the sensation is the same. Thus I believe that my sensation when I enjoy the perfume of a rose is the same as my neighbour’s. We apprehend something that is chemically identical.

Now, though Aristotle knew nothing of chemical qualities in our sense, he tries to prove the objective identity of that which is perceived both by respiring and non-respiring animals. He points
out in De An., loc. cit. 23, that it has the same physiological effect. Strong odours—and he meant by odours practically chemicals diffused either in air or water (cf. note to 443 b 2 and Introduction, sec. vii.) have a destructive action upon both classes alike and hence are the same. This inference was all the more easily made because he conceived their effect to be exercised upon the organ of smell or, at least the head, the region in which it is situated and out of the material of which it is formed (cf. beneath l. 34 καρφιθαρωσι).

That there should be chemical qualities apart from taste or smell, and qualities of any kind which are not perceived by some of the senses, would have appeared strange to Aristotle and the normal Greek mind, for which had not been shattered the harmony between Nature and man, in whom evolution has developed senses to give warning of most of the ordinary collocations of qualities which affect his well-being. But, if Aristotle had discovered that any quality, not distinguishable directly by man, still had an effect upon the sentience of some other form of life (e.g. the ultra-violet rays on ants), he would have been bound by his own principles to assume the existence of a new sense in these creatures, if the quality which affected them had a sufficient amount of objective difference from the qualities which stimulate human sensibility.

444 b 24–25. ἀφαίρει k.t.l. Cf. De An. 421 b 26–422 a 6, for a closely parallel account. 422 a 1: τοῖς δὲ τὸν ἀέρα δεχομένους ἔχειν ἑπικάλυμμα, δ ἀναπνεόντων ὄποκαλύπτεσθαι.


Alexander and all other editors read ἐκ τοῦ δυνατοῦ ὅραν αὐτῷ εὐθὺς. In that case the meaning would be ‘from the possession of the faculty’ or ‘from the time when the faculty (of seeing) exists.’ The ancient Latin translation has ‘a facultate existente.’

444 b 31. δοξαραίνει. In Hist. Animal. ix. ch. 40, 626 a 26 he points out that bees dislike unpleasant smells. He probably is thinking of this here and below in l. 35—θέιον.

But in the De An. iii. ch. 13, we hear that excessively strong odours, colours, sounds do not destroy life except κατὰ συμβεβηκός, 435 b 10.

The flesh (cf. De An. ii. ch. 11, especially 423 b 26) really forms a medium for touch. But the difference between this and an external medium forms an important basis for classifying the senses. Cf. De An. iii. ch. 12, 434 b 15, and ch. 13, 435 a 16 sqq.

445 a 11. καὶ ἐν ἀέρι κ.τ.λ. Because the objects of sight and hearing exist in air and water. Alexander says that so far as the γένεσις of ὀσμή is due to ἐνθρόνης it is related to taste and touch, so far as ἐν υγροῖς γὰντες it is related to the externally mediated senses.

Note below τῶ διαφανεί = τῶ δρατῳ: cf. chapter 3.

445 a 15. οἶον βαφῇ τις. Note that Aristotle does not say that this is anything more than an analogue to the process which produces odour.


445 a 21. Alexander thinks that Aristotle means that, because περιττόματα (περίττωμα = excrement) are both dry and liquid, they show that the food from which they are secreted is composite, i.e. consisting of both γῆ and ὕδωρ. (This must be so indeed according to the doctrine of the Περὶ μακροβιότητος, ch. 3, 465 b 18–19, where περίττωμα is said to be ὑπόλειμμα τοῦ προσέρον, i.e. the food.)

But probably the argument does not run quite in this way. Aristotle says that food must be composite. But probably he means a little more than merely μεμιμένον as in chapter 4, 441 b 30 sqq. σύνθετος when applied to the objects of sense tends to mean more than merely composite, but refers continually to things that have density: cf. Meteor. iv. ch. 5, 382 a 26 sqq.: ἀπαντά ἄν εἴῃ τὰ σώματα τὰ σύνθετα καὶ ωρισμένα οὐκ ἄνευ πτέρεως. τὸ σύνθετον = τὸ συνεστίκως. Cf. συνησίμωμεν below. σῶμα once more tends to have the same application: cf. beneath l. 25: ἐτί τολὰ ἦττον ἐνυλογὸν τὸν ἀέρα σωματοῦσθαι, and σωματώδες above. Though all the four elements, fire and air included, are σώματα, yet we hear in Prob. 932 b 2: πυκνότερον ἡ θάλαττα καὶ μᾶλλον σῶμα. σωματώδης and γεώδης are constantly conjoined: cf. Bonitz, Ind. p. 745 b 21 sqq.

Now δομή is nothing crassly material in this sense; cf. Prob.
COMMENTARY

193

Hence he must prove that yrj,
oovxrj ov o-wju-arwSr;?.
TJ
865 a 21
the most bodily of the elements, is an essential constituent of
Hence he is probably thinking of Treptrrw/xa as something solid (it
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Tpo&amp;lt;f&amp;gt;ij.

heavy element

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is

with

identified

7/7,

442 a

7),

the heaviest element;

cf.

food

in

(cf.

and hence is to be
De An. in. ch. 13),

less ytwScs, and yfj is
The argument is the
rjpd.
excrement proves that in the compound of which food consists there
must be solid matter. But it might be objected that the water in
it
(and water is one of the media of odour) is the really nutritive

and more or

element.

so,

No, says

more

of the
still

less

Aristotle, water alone

does not nourish

elements must be mingled with
likely is it that air, which cannot be
solid

it

and,

some

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that

if

is

should

solidified,

support life. The reasoning is very much condensed. Water,
cannot nourish a solid body.
But cannot it be solidified?
6V,
Not unless something yewScs is mixed with it. This would be true

&amp;lt;X/UKTOI&amp;gt;

(cf.

441 a 30: 6pfj.aii 6iJLVov ovScv &amp;lt;au/Tai Tra^woyuei/oi/ TO v8wp} except
case of freezing, which would certainly not produce a nutritive

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Still

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residue in plants

The waste

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26.

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4453

29.

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stance as gum, the bark and in a

445 a

On

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Alexander explains, such sub

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ava0v[ii&amp;lt;xo-es.

d

cf.

leaves, etc.

De

Soinno,

3,

456 b

note to 443 a 23 and

cf.

444 a

Aristotle allows the ai/aflu/xiWis theory in this modified form.

medium may be
(

described as an aVa^v/uiWts.

something from previous
the case of breathing animals at

a gas, in
not an exhalation from the odorous substance.
is

24.

The

Just as in the previous

hapters, here also he adopts

The medium

3:

2,

TOUS SCKTIKOVS TOTTOVS.

theories.
least,

but

But he can only
With
explain odour as a quasi-diffusion of substance in this gas.
Aristotle, however, it is difficult to distinguish medium and object
(cf. above 445 a 14 where he identifies TO oparov and TO Sta^c^e s),

and so we should be bound

some

sort

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cf.
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to say

Introduction, sec.
is

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odour was an aVa^v/xtWts of
That is however not quite

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TO StW/xov or the Kou/r)

seems here to have

in a

o-is
&amp;lt;/&amp;gt;v

way

to both gases and liquids
of the two to Aristotle.

anticipated the discovery of the

truth that the diffusion of a substance in a liquid

behaviour as a gas.
R.

Once more he

differs

is analogous to
from modern theory

13

its

in


regarding τὸ δίοςμον as a κοινὴ φύσις which had a permanent existence of its own instead of as a mere state, or disposition to act, of matter which may cease to be so characterized.

445 a 32. αἰσθήσεως. This perhaps points to some subjective experience of his own.

445 b 1. As Biehl suggests, περὶ τῶν αἰσθητῶν must have fallen out or must at least be presupposed before καθ’ ἐκαστὸν αἰσθητήριον. Aristotle has not discussed the αἰσθητήρια since chap. 2, except incidentally in chap. 5, and at the beginning of chap. 3 (439 a 7) he proposes to give an objective account περὶ τῶν αἰσθητῶν τῶν καθ’ ἐκαστὸν αἰσθητήριον.
CHAPTER VI.

445 b 3. ei πᾶν σῶμα κ.τ.λ. This is a principle with Aristotle. Cf. De Coelo, i. ch. 1 ad init. σῶμα is μέγεθος ἐπὶ τρία—a tridimensional magnitude. More strictly μέγεθος is the quantitative determination that all bodies possess. μέγεθος is that which is divisible into continuous parts (cf. Metaph. v. ch. 13, 1020 a 11: μέγεθος δὲ τὸ εἰς συνεχῆ (διαπερτῶν)). The continuous (τὸ συνεχὲς) is that which is infinitely divisible. Compare De Coelo, 268 a 6: συνεχὲς μὲν ἐστὶ τὸ διαπερτῶν εἰς αέ άει διαπερτά, σῶμα δὲ τὸ πάντη διαπερτῶν. Cf. also Phys. iii. chs. 6, 7. There Aristotle tells us that μεγέθη are infinitely divisible only; i.e. though the process of division can be carried ad infinitum there are no actually existing infinitely small parts. Compare μέγεθος l. 10 below, συνεχὲς l. 29, etc.

445 b 4. παθήματα, a variant for πάθη: cf. Bonitz, Ind. p. 554. In De Coelo, i. ch. 1 Aristotle tells us that the objects of physical science are μεγέθη καὶ σώματα with their πάθη and κινήσεις, and the ἀρχαί, i.e. the elements.

445 b 7. ποιητικόν. Cf. ch. 3, 439 a 18: ποιήσει τὴν αἰσθήσειν etc. This is not intended as an argument for the alternative ἀδύνατον, but is rather a development of the positive thesis that infinite divisibility of the σῶμα entails infinite divisibility of the πάθος.

445 b 9. τὴν τε αἰσθήσιν. Infinite divisibility of the παθήματα αἰσθητά means infinite divisibility of the αἰσθησις. Hence all bodies, however minute, will cause sensation and be perceptible.

445 b 10. ἀδύνατον κ.τ.λ. This looks as if it established not the proposition to be proved but its converse. But the reasoning no doubt is—'could we not have αἰσθησις, extremely minute, which is not the perception of a body?' 'No,' says Aristotle, 'we cannot have any perception, take colour for example, in which the content is not a quantum and hence a determination of σῶμα.' Cf. below ch. 7, 449 a 22: τὸ αἰσθητὸν πᾶν ἐστὶ μέγεθος κ.τ.λ.

445 b 16. τῶν μαθηματικῶν, e.g. lines, points, planes etc. It had been part of the Pythagorean doctrine to give these substantial existence and to make everything consist of them. (Cf. Metaph. i. ch. 8,
989 b 29 sqq., and also Metaph. xiii. ch. 1.) Aristotle distinguishes the objects of mathematics from those of physics in Phys. ii. ch. 2, and elsewhere. They are determinations of number and magnitude taken in abstraction from the concrete—τὰ ἐξ ἀφαιρέσεως (cf. De An. i. ch. 1, 403 b 15) and more particularly considered apart from the motion or change of the objects to which they belong. Compare also Metaph. vi. ch. 1, 1026 a 7 sqq. They are not really separable from the things of sense like the object of metaphysics but are considered as such. Cf. De An. iii. ch. 7, 431 b 15: τὰ μαθηματικὰ οὐ κεχωρισμένα ὥσ κεχωρισμένα νοεῖ (ὁ μαθηματικὸς). The argument is that if the constituents of sensible objects are not themselves sensible, the only alternative left is that they are mathematical entities.

ἐτι κ.τ.λ. We must take this as a further argument against the existence of imperceptible bodies.

It has been conceded that if sensation is not divisible ad infinitum the ultimate constituents of bodies are not objects of sense, and further they cannot be objects of consciousness at all, as they cannot be merely mental entities—νοητά. We know objects either by ἀισθησίς or by νοῦς or, as in the case of mathematical entities (already ruled out of court), by a union of the two.

445 b 17. νοῦς is that faculty of the soul which is peculiar to man among mortal creatures and which receives the εἴδη—forms or intelligible character—of things without their matter (ὁλη). Cf. De An. iii. chs. 4–8. The objects of νοῦς are νοητά and these evidently are simply conceptual contents, as they are said to have their concrete existence in the sensible forms of things. Cf. De An. iii. ch. 8, 432 a 2 sqq. νοῦς in operation (ἐπιγείᾳ) is identical with its objects (431 b 17, Metaph. xii. ch. 7, 1072 b 21).

οὐδὲ νοεῖ κ.τ.λ. These insensible objects are the constituents of external bodies and hence must be external. They must be σῶματα and contain ὅλη, and ἀισθησίς is indispensable for the apprehension of such objects. Cf. Metaph. viii. ch. 1, 1042 a 25: αἱ δ᾿ ἀισθηταὶ οὐσίαι πᾶσαι ὅλην ἔχουσιν. They must be καθ ἐκκοστα, and these are the objects of ἀισθησίς: cf. De An. ii. ch. 5, 417 b 22, etc.

Though Aristotle does not employ this argument here against the existence of imperceptible magnitudes, it raises a difficulty which besets all modern theories of atoms, ether etc. Physical scientists of a certain school continually talk of the atom as a mere concept. They do not explain how it is possible for solid bodies to be composed of concepts. Cf. Karl Pearson, Grammar of Science, ch. vii. passim.
445 b 19. The theory of atoms lies at the basis of the doctrine of ἀπόρρωμα previously discussed, chapter 4 ad fin. It consists in finding the reality of physical bodies not in their sensuous characteristics, but in some quantitative determination of their minute parts. But Aristotle refuses to entertain the theory that there are bodies with no sensible and only mathematical qualities, and in particular that they are atoms in the strict sense of bodies perfectly indivisible.

445 b 21. τοῖς περὶ κινήσεως. The reference is to the Physics—frequently styled τὰ περὶ κινήσεως, and in particular, as Alexander says, to the last books. Thomas is still more explicit and says the sixth, where indeed the chief discussion of the doctrine of indivisible magnitudes is to be found. The theory that magnitude is infinitely divisible will be found in the third book, chs. 6 and 7 (cf. note to 445 b 3) and the definition of continuity which, being the characteristic of all magnitude, entails its infinite divisibility, is to be found in Book v. ch. 3. Things that are continuous have a common boundary—ὅταν ταῦτα γεννάται καὶ ἐν τῷ ἑκατέρῳ πέρας οἷς ἀπτονται (227 a 11). This is practically repeated in vi. ch. 1: συνεχὴ μὲν ὅν τὰ ἐσχάτα ἐν (231 a 22), where he goes on to show that nothing continuous can be made up of indivisible parts. Indivisible parts must be either entirely discrete or entirely coincident, and so cannot compose the continuous.

Hence Aristotle arrives at another definition of the continuous. It is that which is divisible into parts themselves infinitely divisible—λέγω δὲ τὰ συνεχή τὸ διαμετὸν εἰς ὧν διαμετά (232 b 24). Since continuity is the universal characteristic of magnitude, this yields us the further proposition that magnitude is that which is divisible into magnitudes—πᾶν μέγεθος εἰς μεγέθη διαμετῶν (232 a 23). Aristotle shows in addition that, if magnitudes were composed of indivisible parts, motions would be impossible; every distance would be traversed as soon as entered upon if motion, like magnitude, were made up of indivisible parts. Motion is continuous and likewise time.

Those proofs, it is obvious, affect only atoms that are held to be spatially indivisible. To the modern theory which recognises that the atom must have a definite bulk and even a composite structure Aristotle’s refutation does not apply. The atoms are only physically not spatially discontinuous, and there is no more difficulty in imagining minute discrete bodies than in the perception of discrete masses appreciable to sight. Aristotle’s other objections to an
atomic theory are to be found mostly in the De Coelo and the De Generatione et Corruptione (cf. Zeller, Aristotle and the Earlier Peripatetics, Vol. 1. pp. 430 sqq., pp. 445 sqq.). As Zeller says, without the modern theories of chemical, molecular and gravitational attraction, it was difficult to see how discrete atoms could cohere in a solid body, and hence Aristotle's criticism of the ancient atomists was justified. At the same time also, the arguments in the Physics form a valuable corrective to such modern thought as regards all the individual things of sense as really discrete in structure and only apparently continuous. They are only discrete from one point of view; relatively to the molecule or the atom they are discrete, but relatively to other composite structures water and iron are continuous. To be continuous is to be thought of merely as a magnitude so far as internal structure is concerned. So elastic balls may have many properties and many forms of action on each other and on other things; but these are relations to external things that affect them as a whole; when regarded in this way they are considered as being internally merely magnitudes, i.e. as continuous. The atom itself relatively to which they are discrete must itself relatively to them be regarded as merely a magnitude, i.e. as continuous. One does not inquire what makes the parts of the atom cohere together and, if one did, one would have to think of the atom as being composed of smaller atoms which again must be continuous. But there comes a point where this continual division and subdivision of matter ceases to have interest. Hence we cannot look to the discreteness of matter for its reality. The reality of objects must lie, as Aristotle said, in the 'form' or, as modern theory would put it, in the law of the combination of their elements and the qualitative difference to which that gives rise.

445 b 24. ὁν μὲν γὰρ κ.τ.λ. The passage where we find the doctrine expounded is in the Posterior Analytics I. ch. 20, 82 a 21 sqq. (Cf. also ch. 22, 84 a 29.) There, however, it is set forth in another connection. Aristotle shows that the number of terms to be interposed between the subject and predicate of any proposition which we desire to demonstrate, is not infinite. If it were, the proposition could never be proved, as it is impossible to traverse the infinite. All the terms in the series must be contiguous, with nothing intervening between them...ἐχθενα ἄλληλων ὅστε μὴ εἶναι μεταξύ (82 a 31). If there were an infinity of terms to be inserted at any point in the series, it would constitute a break and the terms would not be
contiguous. (For the definition of ἐχόμενον cf. Phys. v. ch. 3, 227 a 6—ἐχόμενον δὲ δὲν ἐφεξῆς ὅν ἀπτηταί, and 226 b 23—ἀπτεσθαί δὲ ὕν τὰ ἄκρα ἄμα.)

There is some difference, however, between a series of terms bound together by the identity of the subject of which they are predicated and a number of specifically diverse but generically identical qualities. According to Aristotle, in both cases they are to be considered as a series arranged between two extremes. In the case of qualities these extremes are the members of the series with least specific resemblance and, if one takes seriously the spatial designation (τὰ ἐντὸς or τὰ ἀνὰ μέσον) applied to them, the intermediate members of the group must be thought of as being arranged in accordance with the amount of the resemblance they each possess to the extremes. We have seen, however, (chapters 3 and 4) that Aristotle does not prefer to think of them as forming a continuum like a line, but as being formed by different proportions in the admixture of the two fundamental extreme qualities, e.g. black and white, sweet and bitter. Though forming a linear series, they do not constitute a uniformly continuous line. Thus though he may, as here, talk of opposites (ἐναντία) in terms of spatial relation and call them ἐσχάτα (cf. Categ. ch. 6, 6 a 17: τὰ πλείστων ἀλλήλων διεστηκότα τῶν ἐν τῷ αὐτῷ γένει ἐναντία ὀρίζονται) qualitative difference is really other than spatial diversity. It is this that causes the number of species in a genus to be limited in number. If a genus were really a spatial whole, its parts, the species, would need not merely to be ἐχόμενα—contiguous, but συνεχῆ—continuous, and hence capable of resolution into an infinite number of subdivisions (cf. note to 445 b 21). If the members of the series were not merely contiguous but had a common boundary, as things continuous have, it would mean that there was no reason for drawing the boundary between any two at one point rather than another. The only common boundaries are spatial existences—point, line and surface, and these can be drawn anywhere. It is magnitude that is per se continuous, but in so far as genera are not magnitudes they are not per se continuous (καθ' αὐτὸ συνεχῆς, l. 30) and besides do not present this aspect of infinite divisibility.

445 b 25. ἐσχάτα. Cf. notes to ll. 21 and 24 above.

τάν δὲ κ.τ.λ. Cf. 442 b 20.

445 b 28–30. Division into unequal parts is, Alexander tells us, progressive division of the parts which the first division yields into the same fraction as that which they are of the whole, e.g. the division
of a line into two and again of the half into two and so on. This is the special example of 'unequal division' which Aristotle, in Phys. viii. ch. 8, 263 a 3 sqq. in reply to Zeno, shows to be infinite—in δε τῶν συνεχῶν ἕνεκτι μὲν ἀπειρα ἡμίση, ἀλλ' οὖκ ἑνελεχτείρα ἀλλὰ δυνάμει (263 b 28). Any actual division of a continuum into distinct parts is finite. In order for the parts to be distinct the termini of adjacent parts must be, at least, reckoned as distinct. Hence the whole, which was continuous, by the division ceases to be so and ipso facto loses that capacity for infinite division which, as continuous, it possessed.

True the parts again can be divided, but any division of them into distinct elements which can actually be realised is once more finite.

All this seems to point to the conclusion that the very spatial determinant by which we are able to construct a continuum, e.g. a line, and to consider it as resoluble into distinct parts, is itself a qualitative distinction (e.g. direction right or left) which exists over and above the characteristic of magnitude, which is the universal attribute of spatial quantity. Aristotle goes so far as to say (263 b 7) συμβεβήκε γὰρ τῇ γραμμῇ ἀπειρα ἡμίσηα εἶναι, ἦ δ' οὖσα ἐστὶν ἑτέρα καὶ τὸ εἶναι. Thus, not only has a line (with all other figures) a non-quantitative aspect, but the possibility of determining it as a quantity depends upon this qualitative character. (Cf. also for the general doctrine iii. ch. 7, 207 b 10: ἀπειροϊ γὰρ αἱ διῳστομίαι τοῦ μεγέθους.)

The result, however, of this is that anything considered as a continuum divides into a limited number of units (ίσα can mean little else than units; all things considered as units are held to be equal) but an infinite number of diminishing fractions. Units are the constituents of a continuum, species of a genus.

445 b 30. τὸ δὲ μὴ κ.τ.λ. Cf. note to l. 24 above.


445 b 32 sqq. There is a somewhat similar passage in Phy. vii. ch. 5, 250 a 20 sqq. The sound which one single grain of millet makes in falling exists as a separate sound (καθ' αὐτῷ) only potenti- ally in the whole, i.e. it is not actually a separate sound—οὐδὲ γὰρ οἶδέν ἐστιν ἀλλ' ἡ δυνάμει ἐν τῷ ὀλῳ (250 a 24). For the general question as to how far Aristotle by his distinction between potential
and actual settles the difficulty about petites perceptions and subconsciousness generally, cf. Introduction, sec. viii.

446 a 2. διέσ. A quarter of a tone was the least interval taken notice of in Greek music. Hence, I fancy, ὁ ἐν τῷ διέσει φθόγγος must be a sound with difference in pitch from that of the one before it within, i.e. less than, a quarter-tone. Aristotle means that the interval of a quarter of a tone is not thought of as resolvable into parts, as larger intervals are. The parts of an interval are not however sensations. Hence this phenomenon is hardly parallel to that in the illustration from sight or that quoted in note to 445 b 32 above from the Physics. In those instances we have sensations which per se are not actually appreciable when existing concomitantly, being merged in the whole of which they are elements.

For διέσ cf. Anal. Post. 1. ch. 23, 84 b 38: ἡ ἀρχή (i.e. ultimate simple (ἀπλοῖν) constituent) ἐν μέλει διέσις. In Metaph. xiv. ch. 1, 1087 b 35 it is called ὑποκείμενον ἐν ἀρμονίᾳ.

446 a 3. συνεχοὺς δύτοσ. The notes are still continuous in time.

446 a 4. ἀνθάνει. Hence there seems to be no μεταξῦ; the notes seem to be ἐχόμενα ἄλληλων, i.e. contiguous but separate, and hence the continuity of the scale is broken up.

446 a 6. δυνάμει κ.τ.λ. The difficulty in this obscure passage is increased by the discrepancy between the mss. E M Y read ὅταν μὴ χωρίς ὅ; ὅταν χωρισθῇ is the reading given by most others and by Alexander. I have followed that of E M Y, which is supported by the ancient Latin translation, because of the difficulty of giving any sensible intepretation to the following sentence, καὶ γὰρ...διαμεθέσα, if we read χωρισθῇ; the sense it gives does not really conflict with what is said later on.

Aristotle says that the very minute parts of the objects of sense, if not separated, are perceived only potentially and not actually. But this does not commit him to the statement that, if severed from the whole, they are actually perceptible. This is no doubt the general rule; an object like a one-foot measure which has only potential existence in a larger whole is made actual by being marked off. It then becomes an explicit object of consciousness, not merely a potential one. But, he goes on to say, very minute fractions cannot exist in isolation from the whole, as the larger parts of a whole can when broken off. They lose their identity (cf. note to 446 a 9 below, De Gen. et Corr. 1. ch. 10, 328 a 24 sqq.) and become parts of the new substance into which they are absorbed, and increase its bulk.
As such they cannot be even merely potentially perceptible as parts of the substance to which they belonged originally. They are, no doubt, potentially perceptible parts of the new substance but, if they have lost their εἴδος, as Aristotle says in De Gen. et Corr., loc. cit., they cannot be on the same footing as elements which have entered into a true mixture and which, on resolution of the mixture, become actually what they were before.

These considerations make it clear that, when in l. 11 ἦ τῆς αἰσθήσεως ὑπεροχή is mentioned, Aristotle means the minute sensation which can be even potentially per se perceptible only when coming from a part of the object which is not separated from the whole. He argues—the minute αἰσθησίας which has only existence in a more distinct sensation (ἐν τῇ ἀκριβεστέρᾳ) and, as such, is only potentially in its individuality a sensation, is not per se actually perceptible and hence capable of isolation; hence the similarly minute object of sense (τὸ πτικῶτον αἰσθητόν), which causes it, must be in the same case. It is not per se actually perceptible, but added to and taken along with the other parts of the whole it is actually perceptible and, since that is so, it, even in its individuality, must be thought of as being only potentially an object of sense.

It is, I suppose, προσγενόμενον (l. 16) which has prompted some interpreters to think that Aristotle is considering the fortunes of the minute part of the grain of millet in actual isolation. But, if it were per se potentially perceptible when in actual isolation from the whole to which it belongs, one would expect that the change caused by addition to the whole would be to raise it, as such, to actual perceptibility; but this Aristotle will not allow. προσγενόμενον, as we see from l. 20 below and Phys. 250 a 24, just means ἐν τῷ ὀλίβῳ. There is no reason why it should not be used of intellectual as well as of actual addition.

τὸ αἰσθητὸν χωρίστὸν αἰσθάνεσθαι (l. 14) does not imply that the αἰσθητὸν exists χωρίς; it means, practically, to perceive it καθ’ αὑτό. Similarly things that exist χωρίς—χωριστά—are identified with ὁύσια, the independent existences which are the subjects of predication, and which Aristotle in Anal. Post. 1. ch. 4, 73 b 9 calls καθ’ αὑτά. Cf. Metaph. v. ch. 3, 1029 a 28: τὸ χωριστὸν καὶ τὸ τὸδε τι υπάρχειν δοκεῖ μάλιστα τῇ ὁύσῃ.

We can easily explain the substitution of χωρισθη for μὴ χωρίς ἦ by an editor who read on and found that χωρίς the minute parts of objects were not actually perceptible, and indeed could not exist
and retain their previous character, if his logic led him to believe that ‘if not separate then not actually perceptible’ contradicted the statement ‘if separate not perceived’ (χωρίζομεναι κ.τ.λ.). Such statements are only apparently in opposition. If we retain χωρίσθη, we shall have to translate ‘they are potentially perceptible but not, when in isolation, actually so. [This is different from the case of] the one-foot measure which exists potentially in the two-foot rule and actually when bisection is made.’ But the ellipse to be supplied is so extraordinary that one might justly, with Biehl, suspect the authenticity of the whole clause if χωρίσθη is to be read. Its genuineness, if we adopt the better attested reading, is confirmed by the force of καὶ γὰρ. Aristotle is pointing out that even in the case of large objects like the one-foot rule the same thing holds good as of τὰ μικρὰ πάμπαν.

446 a 8. διαφεβεῖσα is here equivalent to ἀφαφεβεῖσα if it is to make any sense. It is not the one-foot rule which is bisected but the two-foot measure. Hence one would expect διαφεβεῖσῃ (Bywater, J. of P. xviii. p. 243) or διαφεβεῖσης ταύτης. But perhaps this sense of διαφεῖ is idiomatic. Cf. note to ch. 3, 439 b 20 διελομένους.

446 a 9. καὶ διαλύοιντο. In addition to being so very minute as to surpass (ὑπερέχειν) the discrimination of the sense, these minute particles lose their self-identity on being isolated.

ὑπεροχῇ is, as the commentators notice, employed in rather a different sense from the usual. It naturally means excess in greatness: cf. chapter 3, 439 b 31.

For the doctrine cf. De Gen. et Corr. i. ch. 10, 328 a 24 sqq.: ὁσα εἴδειαρτα, πολλὰ μὲν ὀλίγους καὶ μεγάλα μικροὶς συντιθέμενα οὐ ποιεῖ μικρῶν, ἀλλὰ αὐξῆσιν τοῦ κρατοῦσιν: μεταβάλλει γὰρ θάτερον εἰς τὸ κρατῶν, οἷον σταλαγμός οἰνον μυρίων χοικῶν ὕδατος οὐ μέγυται· λιῆται γὰρ τὸ εἶδος καὶ μεταβάλλει εἰς τὸ πάν ὑδωρ.

446 a 11. The minute fraction of substance in isolation from the rest is not perceptible at all. Aristotle goes on to discuss what happens when we do perceive it in some way—when ἐπελήλυθεν ἡ ὄψις.

446 a 12. δυνάμει γὰρ. We are not now discussing the separate existence, but the separate perceptibility of the object—τὸ αἰσθητὸν, but in the sensation (αἴσθησις) to exist and to be perceptible is the same; hence it is indifferent which of the two we assert to be potential.

446 a 18. ἐνπάρχειν means practically to form a constituent; cf. Metaph. v. ch. 13, 1020 a 7: ποιον λέγεται τὸ διαμετὸν εἰς ἐνπάρ-
χοντα and Anal. Post. 1. ch. 22, 84 a 14 sqq.; 'odd' ἐνυπάρχει in the definition of number, while number ἵπαρχει—belongs to, or is a predicate of, odd. Cf. also the definition of ὅλη—ἐξ οὗ γίνεται τι ἐνυπάρχοντος, etc., cf. Bonitz, Ind. p. 257. Hence it is probable that Aristotle is thinking of the μεγέθει which compose finite bodies as the subject here, as ἐνυπάρχειν is generally used of that which stands to anything in the relation of ὅλη.

Perhaps, however, he is thinking of χρώματα etc. as the subject. In that case the translation will run—'But when determinations of colour, taste or sound, existing in the concrete are so related to each other as to be also actually perceptible and perceptible, not merely in the whole but individually, they must be limited in number.'

This would mean that he is talking once more of the πεπερασμένα εἰδή of sense qualities. But they have already been accounted for, and this seems to touch on the only case left undescribed—the distinguishable parts of a continuum, which are ἐνεργεία perceptible not merely in combination but in isolation. If this be the interpretation, the argument is that, in the case when the constituents of the objects perceived are distinct and individually perceptible and hence limited in number, the qualities presented by them must have the same limitation. χρώματα etc. are but items of sensuous determination, though, no doubt, Aristotle is thinking of the different colours and sounds etc., as presented in the form of segments in a continuum.

446 a 19 πρὸς αὐτὰ. Alexander reads τοσαῦτα which perhaps, if understood as meaning 'of sufficient size or intensity,' i.e. τοσαῦτα τὸ μέγεθος, improves the sense. We must not understand 'sufficiently numerous,' i.e. τοσαῦτα τὸ πλῆθος, as no multiplication of the numbers of the insensible parts of objects makes the parts any the more perceptible per se. πρὸς αὐτὰ can, however, quite well mean 'in relation to each other.' Cf. ἓναντίον below ch. 7, 447 b 32.

446 a 24. ὅταν ἐνεργῶσιν may be taken either with the clause before or with ἀρκετοίνται.

τὸ μέσον = τὸ μεταξύ, which is defined in terms of this phenomenon in local movement in Phys. v. ch. 3, 226 b 23: μεταξὺ δὲ εἷς ὁ πέφυκε πρῶτον ἀρκετοίνται τὸ μεταβάλλων, ἣ εἰς ὃ ἐσχάτων μεταβάλλει κατὰ φύσιν συνεχῶς μεταβάλλων.

446 a 28. 'Ἐμπεδοκλῆς. Cf. De An. ii. ch. 7, 418 b 20: καὶ οὐκ ὀρθῶς Ἐμπεδοκλῆς...ὡς φερομένου τοῦ φωτὸς καὶ τεινομένου ποτὲ μεταξὺ τῆς γῆς καὶ τοῦ περιέχοντος, ἦμᾶς δὲ λανθάνοντος.
Aristotle goes on to say that it is asking too much to wish us to believe that light passes from east to west across the whole sky without the movement being detected. It was, of course, impossible without modern scientific instruments and methods to discover the movement of light. For the Empedoclean theory cf. chapter 3. Cf. also *R. P.* § 177, Zeller’s *Presocratic Phil.* (Eng. Trans.), ii. p. 158. According to Philoponus, on this theory light was a σώμα issuing from the illuminating body, *vide* below 446 b 30.


445 b 1. Time is infinitely divisible like motion and magnitude; cf. *Phys.* iv. chs. 11, 12; vi. 1, 2, 3 etc.; viii. ch. 8, 263 b 27: οὐχ οἶν τε εἰς ἄτομους χρόνους διαρέωθαι τὸν χρόνον.

446 b 3. ἀμα κ.τ.λ. This is equivalent to saying it is instantaneous. An act of perception is in this characteristic distinct from local movement, which cannot be instantaneous: cf. *Phys.* vi. ch. 1, 231 b 30: εἰ Θηβαζὲ τις βαδίζει, ἀδύνατον ἀμα βαδίζειν Θηβαζὲ καὶ βεβαδικέναι Θηβαζὲ. Perception is an εἴργεια, which as such has no γένεσις: cf. Alex. *De Sens.* p. 126 (W.) and above, Introduction, sec. iv.

446 b 5. The construction here seems to be defective. As I have translated, instead of οὐδὲν ηττον, οὐδὲν μᾶλλον should have been written; but it was natural to say ηττον when denying that they possessed the aspect of process any the less on account of the instantaneousness of the act of perception considered as a psychical event. Perhaps, indeed, Aristotle wrote μᾶλλον, for which by a blunder ηττον was substituted; or he may have written ἀλλ’ οὐκ εἰσιν.

Thomas and Simon, however, punctuate after γένεσις, making the apodosis begin at ὅμως. In this case we must regard δηλοῖ... ἀέρα, ll. 7–10, as a parenthesis and translate from l. 4 καὶ μὴ κ.τ.λ.—‘and if sensations have no genesis, but exist without coming to be, yet, as sound, etc..., is not the same true of colour and light?’ Cf. *Phys.* viii. ch. 6, 258 b 17, *De Coelo*, i. ch. 11, 280 b 27.

Aristotle means that the instantaneousness of the psychic act does not detract from the lapse of time in the physical process. Though there is no γένεσις in the former, there is in the latter. Hammond conjectures ὅμως for ὅμως and translates, ‘Also if every-thing at the same moment hears and has heard, and in a word perceives and has perceived, and there is no time process in sensa-
tions, nevertheless they lack this process in the same way in which sound, after the blow has been struck, has not yet reached the ear.' But I fail to see how a sound which is on its passage to the ear can be said to 'lack process' and how, if this were so, it would help Aristotle's argument. Moreover Aristotle does not say that we are unaware of the lapse of time which takes place while a sound is being transmitted. He implies the opposite. He only says that in the psychical act there is no process.

446 b 8. μετασχημάτισις is a change of shape: cf. De Coelo, ii. ch. 7, 305 b 29 (γίγνεσθαι) τῇ μετασχημάτισει, καθάπερ ἐκ τοῦ αὐτοῦ κηροῦ γίγνοι αὖ σφαῖρα καὶ κύβος. μετασχηματίζεσθαι is also conjoined with (though differentiated from) ἀλλοώσθαι. It consists in the rearrangement of elements which retain the same nature, while ἀλλοώσθαι indicates qualitative change.

μετασχηματίζεσθαι is that form of γένεσις that would specially suit an atomic theory and hence Aristotle applies it to the propagation of sound, which he conceives of in quite a mechanical way. He evidently thinks of the air taking on a different σχῆμα for every different articulate sound. These are subject to alteration in proportion to the distance we are from the person with whom we are talking. He is evidently thinking mainly of mistakes in following some one's words, not merely of inability to hear at all. That would rather be accounted for by the absence of definite σχῆμα than by change of σχῆμα in the air which communicates the motion or in the motion transmitted.

446 b 11. τῷ πῶς ἔχειν. Alexander interprets—τῷ κατὰ σχέσιν εἶναι. He distinguishes three classes of relata:

(1) Those which are κατὰ σχέσιν, e.g. ἵστα, ὁμοία etc., in which the mode of their relation (the σχέσις) does not depend upon their relative position in space.

(2) Those which are κατὰ σχέσιν, but where the σχέσις consists in spatial relation (ἐν ποιάθεσι), e.g. δεξιόν.

(3) Those, e.g. αἰσθησις and αἰσθητῶν, which, though requiring some σχέσις which consists in spatial relation (ὁχ...ὡς μηδὲν αὐτῇ (sc. τῇ ὑπεί) διαφέρειν τὴν θέσιν τῶν ὄρωμένων καὶ τὸ διάστημα πρὸς τὸ ὅραν) are not strictly ἐν σχέσει, like τὸ δεξιόν, but require a δύναμις ἀντιληπτική on the part of the αἰσθησις. Light might travel from object to eye on account of the spatial relation of the two, but vision would not result unless the eye were endowed with a certain faculty. This, in the minds of certain other commentators, e.g. Simon and
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Thomas, seems to connect with the distinction drawn between certain classes of relata in *Metaph.* v. ch. 15, 1020 b 26 sqq.

In this chapter there are likewise three main divisions of relata:

(1) τὰ κατ’ ἀριθμὸν λεγόμενα, e.g. τὰ ἢς. Things are equal of which the quantity is *one* (ἰςα δὲ ὁν τὸ ποσὸν ἡν, 1021 a 12).

(2) τὰ κατὰ δύναμιν λεγόμενα, e.g. τὸ θερμαῖον πρὸς τὸ θερμανόμενον.

(3) Such as τὸ ἐπιστητόν and ἐπιστήμη, αἰσθητόν and αἰσθησις.

In the first two classes (cf. Bonitz, *Metaph.* p. 261) the whole notion of the relata can be discovered in the relation. A is understood by being referred to B, and B by being referred to A. In the third class, however, the relation is not mutual; one of the terms requires independent explanation; τὸ αἰσθητὸν can be explained by referring αἰσθησις to it, but αἰσθησις requires other definition than reference to τὸ αἰσθητὸν. We advance no further by saying that vision is relative to those things of which there is vision, διὸς γὰρ ταῖτὼν εἰρημένον ἄν εἶ (1021 a 32).

Aristotle’s meaning, however, is no more than this, that ὁψις is not explained by being regarded as relative to τὸ ὅρῳμενον, but if we refer it to χρῶμα it can very well be defined and we obviate any useless repetition. Hence the distinction does not affect the real relation of the object of vision (χρῶμα) to vision (ὁψις), but only the mental way of relating them when the former is styled not χρῶμα but the object of vision—τὸ ὅρῳμενον.

Thus there is no justification for Simon’s attempt to connect this distinction with that here. He says, the ‘ratio’ in a relation of this kind *pendet ab alio*, and hence there must be activity on the part of τὸ αἰσθητῶν which, hence, must be at a distance.

Nor is there necessarily a reference to the δύναμις ἀντιληπτικῆ of sense, as Alexander conjectures.

Aristotle simply states that seer and thing seen must occupy definite positions; their relation must depend to some extent at least upon their relative ἔσης. They are not like things of which the relation is purely non-spatial like equals. It is not the manner and mode of their being which relates them, as in the case of equal quantities, but something else which entails a definite spatial position.

We cannot translate πῶς purely indefinitely as ‘anyhow.’ Things that are equal do not exist ‘anyhow’ but ‘somehow.’

The result of the argument is to establish the necessity of determinate spatial position for seer and thing seen and hence it advances
a plea in favour of the transmission of light in the same way as sound is carried to the ear. The last argument had shown that the object which sounds and the hearer must be in determinate spatial positions.

446 b 12. If we do not read ᾄν before ἐδεί the clause will refer to ὑπαρ not to τὸ ὅρων καὶ τὸ ὅρωμενον, and becomes identical in meaning with the following one and πῶς above will have to be translated as 'utcumque.' 'It is not by being anywhere etc.' But this is not possible.

446 b 16. The air which is ψαθυρός (as water also is: cf. above ch. 4, 441 a 28) is made continuous by being struck by an object that is smooth of surface and so continuous; it is thus that sound is transmitted: cf. De An. ii. ch. 8 passim. Sound is caused by a movement (a blow, which involves φορά or spatial movement, occasions it, cf. 419 b 10–13) which is quick enough to strike the air and make it continuous. If the movement is too slow the air dispurses (419 b 20 sqq.). It is hard and smooth bodies which, when struck, have this effect upon the air, though apparently the air itself when imprisoned in any closed or partially closed space can function in the same way—as in the case of the echo (419 b 25 sqq.).

Sound is this movement (ἔστι γὰρ ὁ ψύφος κίνησις τοῦ δυναμένου κινεῖσθαι τὸν τρόπον τοῦτον ὄντερ τὰ ἀφαλλόμενα ἀπὸ τῶν λείων, ὡσαν τίς κρούσῃ, 420 a 21), or rather this movement is sound, for Aristotle does not, like the modern physicists, think of sound as being merely a movement when outside the ear; its peculiar quality seems to exist objectively though entirely relative to the act of hearing (cf. Introduction, sec. iv. and De An. iii. ch. 2, 425 b 26 sqq.).

At the same time it will not do to go so far as Rodier (Traité de l’Âme, Vol. ii. p. 286) and say that sound is not to be identified with the motion that causes it but is an objective quality in the same way as, according to Aristotle, colour is to be regarded, and that its transmission to the ear is not a movement any more than the transmission of light is.

(Rodier appears to me to misunderstand μετασχημάτωσις; it (cf. note to 446 b 8) is not qualitative change and, even if it were, his argument would not be advanced any the further. Aristotle distinctly says above (l. 10) that, in the transmission of sound, the air experiences φορά, and if in 7–10 Aristotle were describing the increase in faintness in sound (which he is not) it would be only
caused by a transition of the air from a state of motion to some other condition.)

At the same time there is a difficulty here. In the De Anima Aristotle describes the φορά, the movement which causes us to hear, as a rebound and quivering of the air all in one mass—ὦστε τόν ἄερα ἄθροιν ἀφάλλεσθαι καὶ σείσθαι (420a 25) and again in 420a 1 he says τότε δὲ (when struck) εἰς γίνεται ἄμα. That would make this φορά have the same characteristics as that species of ἀλλοίωσις which, below, in 446b 32 sqq., he wishes to distinguish from φορά (and among them the φορά which constitutes sound) as being instantaneous—ἐνδέχεται γὰρ ἄθροιν ἀλλοίωσθαι, καὶ μὴ τὸ ἦμιν πρότερον, οἷον τὸ ὑδωρ ἄμα πάν τῇ γέννυσθαι (447a 2 sqq.). It seems then that in the De An. Aristotle is simply emphasising the assertion that the air is rendered one and continuous throughout the whole extent of the space between the sonorous object and the ear—ἐνὸς ἀέρος συνεχεία μέχρις ἀκοῆς. ἄθροιν need mean no more than this; but ἄμα, if by ἄμα is meant ‘at the same moment’ (vide Rodier, ad loc. cit.), is putting the point too strongly. Here he plainly affirms that though the medium is continuous, the movement (in which it becomes continuous) falls into successive parts, just as qualitative change may also betray succession, as appears from the passage below and Phys. vii. chs. 4 and 5 esp. 250a 31 sqq.: καὶ τὸ ἀλλοίωσι καὶ τὸ ἀλλοιούμενον ὡσαύτως τι καὶ ποσόν κατὰ τὸ μᾶλλον καὶ ἤτοι ἡ ἀλλοιώσι, καὶ ἐν ποσῷ χρόνῳ, ἐν διπλασίῳ διπλάσιον κ.τ.λ.

It is indeed necessary to grant this, as ὀσμή is an ἀλλοίωσις and occupies successive times in propagation.

446b 17-18. τὸ αὐτὸ κ.τ.λ. On a theory which reduced all the senses to ἀφῇ this could not be so; each person would perceive only the tangible things that impinged upon his own sense organs.

ἐστι μὲν ὡς...ἐστιν δ' ὡς. This continually means ‘in one sense...and another’ not ‘at one time and at another’ as Bender and Hammond take it. Cf. Meteor. iii. ch. 6, 378 a 32 and cf. πῶς μὲν...πῶς δὲ, Phys. iii. ch. 6, 206a 13, πῶς...πῶς above 446a 17-18; cf. also Phys. viii. ch. 8, 263b 5, etc.

If the κίνησις has μέρη, then the πρῶτος is in contact with one μέρος, ὁ δεύτερος with another. Hence in one sense it is not τὸ αὐτὸ which they perceive.

446b 19. ἀπορία. Hammond seems to regard this as a new problem. But τούτων naturally refers to what has just been said.

R.
446 b 20. There is no need for adding 'in the same way' as Hammond does; ἀλλὰ cannot bear such a meaning. The doctrine controverted is the unqualified assertion that the same thing can be perceived by only one person. It seems to be an echo of nominalism. It was left to Aristotle to resolve the difficulty by pointing out that there are different ways of perceiving the same thing.

446 b 25–26. τὸ δὲ δὴ ἦδων. Alexander explains this as τὸ προσεχές καὶ ἦδον μέρος τοῦ ἀέρος ἢ τοῦ ὑδάτος, and so Simon also. It is the part of the medium in contact with the sense organ—what he might have called τὸ ἐσχατον κυνωμένον (cf. De An. III. ch. 12, 434 b 33) as opposed to the sense object which is τὸ πρώτον κυνῶν (ἐσχατον can, however, be used in both senses, that of nearest and of farthest; cf. Phys. vii. ch. 2, 244 b 1 sqq. and De Gen. et Corr. i. ch. 7, 324 a 26 sqq.). The meaning is, that this nearest part of the medium is numerically different in each case, though it is qualitatively identical in all; the qualitative change or motion produced in the medium by propagation outward from the sense object must be numerically a different πάθος or a different μέρος of the κίνησις when issuing to the right and to the left and when near and far, but it is of the same kind. Aristotle, it must be remembered, thinks of the sense quality, and that is to him an αἰσθητόν, as existing objectively in the medium. The word to be supplied after ἦδων is no doubt αἰσθητόν and, as a sense quality is an αἰσθητόν to him, perhaps he is thinking of τὸ ἦδον more as quality—the quality relative to the special sense, than as the portion of the medium which is nearest. We might paraphrase his meaning thus—'The qualitative affection of sense proper (ἵδα αἰσθησις) is numerically different for each person though specifically, i.e. quà quality, identical, while an object numerically one and identical is perceived by all.' ἀριθμός and ἐν are among the contributions of κοινῆ ἀισθησις. Hence perhaps Aristotle is obscurely hinting that, as ἵδα αἰσθησις gives an object numerically different in each individual, it is the function of κοινῆ αἰσθησις to introduce numerical identity and hence real objectivity into the perceptible world.

446 b 26–27. ἀμα πολλοί. This is an additional point; if perception is due to κίνησις of the medium, and numerical difference in the κίνησις directly affecting the sense does not necessitate difference of τὸ πρῶτον κυνῶν, perception of it—τὸ πρῶτον κυνῶν—may be simultaneous in different people.
446 b 28. If sound etc. were σώματα then, in perception, the object would really be 'divided from itself' as a body can only be in one place at the same time. According to the ἀπόρροια theory, the sound, scent and light are σώματα—material particles.

446 b 29. οὖς ένευς σώματος, i.e. the κίνησις or ἀλλοίωσις which is propagated in different parts must be the πάθος of a σῶμα (which has μόρια). The plurality of the sense experiences depends upon the medium having μόρια and hence being a σῶμα. Thus this sentence refers merely to what goes before. As we shall see it makes no sense if taken with what follows.

446 b 30. τῷ ένευαι γάρ τι φῶς ἐστίν. I have here followed Alexander and cod. P, as no other reading seems to give an adequate meaning. Alexander connects this with the doctrine in De An. ii. ch. 7, 418 b 16 sqq. where light is defined as the παρουσία...πυρός ὡς τοιοῦτον τινός. Cf. also above ch. 3, 439 a 21 sq.: ὅταν γάρ ἐνὶ τί πυρώδες ἐν διαφανεί, ὡς μὲν παρουσία φῶς. The argument, then, is, that though light is due to the presence of something, yet it is not, as one might expect, a movement set up by it. It is hence, if not a movement, an ἐνέργεια as said before (418 b 9). ἐνέργεια in the proper sense is not κίνησις (cf. De An. ii. ch. 5, 417 a 16) nor even ἀλλοίωσις. Compare also Phys. vii. ch. 3, 246 a 10 where it is said that bodily and mental ἔξεις are not ἀλλοίωσις. Light is described as a ἔξεις in De An. ii. ch. 7, 418 b 19 and iii. ch. 5, 430 a 15. The change from δύναμις to ἐνέργεια in the proper sense is not mere alteration from one quality to its opposite, but is a movement ἐπὶ τὰς ἔξεις καὶ τὴν φύσιν. A positive ἔξεις like virtue is a τελείωσις, or state which reveals the true nature of the thing which possesses it. It is Alexander's contention that light is something of this kind and is not to be described as an ἀλλοίωσις like odour. Hence it does not require time for its propagation. Cf. Introduction, sec. vii.

If we read τῷ ένει we shall have to render with the vet. tr.—'per esse enim aliquod lumen est' which Thomas expands into—'per unum aliquod esse, id est, per hoc quod totum medium sicut unum mobile, movetur uno motu a corpore illuminante.' Or else we must suppose that there is some contrast between being and motion. This, however, is not an Aristotelian doctrine, though there were other theories which identified motion with τὸ μὴ ὄν: cf. Phys. iii. ch. 2, 201 b 20: ἕνιοι, ἅτερότητα καὶ ἀνισότητα καὶ τὸ μὴ ὄν φάσκοντες εἶναι τὴν κίνησιν.
Bender (p. 29) renders 'das Licht ist Licht durch ein gewisses Sein,' which seems to require some such explanation as the above.

St Hilaire (p. 81) gives rather a different interpretation. Light exists because it is 'un être particulier.' Hammond (p. 184) seems to follow him in rendering 'Light has a substantial nature.' εἶναι τι may mean to be an οὐσία—something χωριστὸν. Cf. Phys. iv. ch. 6, 213 a 31—οὐκονν τοῦτο δεὶ δεικτεῖναι, ὅτι έστι τι δ ἄηρ. But, if it meant that there, it would imply that light was something concrete, a σῶμα, which it is not. To imagine, then, that Aristotle here declares that light is a σῶμα as opposed to sound and smell which he has just declared not to be σῶματα, is quite unwarranted and besides it does not in the least help us to understand how the transmission of light is instantaneous.

Perhaps we might translate τὸ εἶναι (it should possibly be τὸ εἶναι) as frequently elsewhere (cf. 449 a 19) by 'in aspect' and render 'In aspect light is something real' i.e. 'light may be regarded as something real'; it is not concrete—οὐσία—in the ordinary sense, but οὐσία ως εἶδος (as the soul is said to be in De An. ii. ch. 2, 414 a 13 sqq.). Light is an εἶδος or ενέργεια. If this be the interpretation and we adhere to the reading τὸ εἶναι it will give exactly the same meaning as Alexander requires, who gets it by other means.

The difficulty remaining, however, is how what is said in the first clause should lead one to expect that light is a movement. The presence of οὐ in the ἄλλα clause gives the Greek this sense. On Alexander's reading there is some ground for expecting light to be a κίνησις, which it is then denied to be; not so much according to my interpretation of the other reading.

I suggest τὸ κινεῖν γάρ τι φῶς εἶστιν τι, i.e. light shows its reality by stimulating something. Light κινεῖ—stimulates—something—τι—viz. the sense, but is not a movement itself.

446 b 31. ἄλλα οὐ κίνησις. The question here is—What does Aristotle mean by κίνησις? Does he mean 'un simple mouvement' (St Hilaire) i.e. φορά, or motion generically, i.e. μεταβολή? It is quite impossible, from Aristotle's use of the term, to decide whether he employs it here in its specific or its generic signification. In the Physics κίνησις is continually used in the sense of φορά but, where he has occasion to distinguish the various kinds of change, he employs the specific terms if there is any likelihood of confusion arising. Cf.
Phys. iii. ch. 1 for the distinction between the four kinds of change—γένεσις καὶ φθορά, ἄλλοιωσις, αὔξησις καὶ φθίσις, φορά. They are divided according to the categories respectively of οὐσία, ποιόν, ποσόν and ποῦ, which have nothing in common. Hence the diversity alluded to here—ὅλως κ.τ.λ. l. 31. If the light is to be identified as a kind of ἄλλοιωσις, as Thomas thinks, then this latter statement is brought forward in support of the former. The argument runs—light is an ἄλλοιωσις, which may be (cf. below 447 a 1—2) instantaneous, and hence not φορά and hence not κίνησις, for κίνησις ἰσχύερ is φορά. Cf. Phys. viii. ch. 7, where it is contended that φορά is πρώτη τῶν κινήσεων.

On the other hand, as we have seen, if Aristotle is in earnest about light being an ἐνέργεια, it cannot be even ἄλλοιωσις. This is Alexander's contention and according to his interpretation, ὅλως... φοράς must come as a reply to a possible objection—'Is it not true that ἄλλοιωσις is different from φορά, i.e. κίνησις κατὰ τότου, and that hence light may be an ἄλλοιωσις?' Aristotle replies 'It is true that they are distinct, for ἄλλοιωσις may take place in all parts at once; however (οὐ μὴν ἄλλα, 447 a 3 sq.), when the quantity is large (of substance to be changed) this is impossible. Hence light is not an ἄλλοιωσις and hence not a κίνησις at all.'

As against this theory and in support of the former view we have these statements in the De Anima, viz.—the medium κνεῖται by the object of vision and again itself κνεῖ the sense. There κίνησις is apparently used vaguely in its generic sense without distinction from ἄλλοιωσις, so that it seems necessary to hold that, if, in the stimulation of the sense by the object of vision, a κίνησις, in the strict sense of φορά, is not set up in the medium, at least ἄλλοιωσις is. Cf. De An. ii. ch. 7, 419 a 13 sqq.: ἀλλα τὸ μὲν χρώμα κνεῖ τὸ διαφανὲς, οὖν τὸν ἀέρα, ὑπὸ τούτου δὲ συνεχοῦς ὄντος κνεῖται τὸ αἰσθητήριον; iii. ch. 12, 434 b 30 sqq.: ὥσπερ γὰρ τὸ κινοῦν κατὰ τότον...οὕτω καὶ ἐπι ἄλλοιωσεως and 435 a 4: ὡς ἄρη ἐπὶ πλεῖστον κνεῖται καὶ ποιεῖ καὶ πᾶσχει...βέλτιον...τὸν ἀέρα πάσχειν ὑπὸ τοῦ σχήματος καὶ χρώματος...διὸ πάλιν ὄντος τὴν ὄψιν κνεῖ. Cf. also Phys. vii. ch. 2, 244 b 10 sqq. esp. 245 a 6.

The explanation of the difficulty seems to be that Aristotle regards light in two different ways which are not properly reconciled. (1) According to his own peculiar conception it is the ἐνέργεια τοῦ διαφανοῦς caused by the presence of fire. This is the concept of the objective nature of light. It is a qualitative determination of certain
objects and, considered as such, it has absolutely no connection with any such thing as motion or transmission. Light is the colour of the medium realised, its true activity, just as the soul is the true activity of the body. This is its teleological definition. But (2) Aristotle likewise inherited from previous philosophy and popular thought the theory that light was something passing between seen thing and seer or *vice versa*. He allows that there must be some action whether mechanical or qualitative exerted by the object directly upon the medium and indirectly upon the sense.

According to the popular idea this exactly was light. So, when the question was raised—'does light take time to travel?,' Aristotle, if he had wished to identify light with the *kíνησις* or *ἀλλοίωσις* that stimulates sense, should have answered in the affirmative or admitted that it was at least possible. But, instead, he recoils upon the teleological definition of light to which the notion of movement is irrelevant. Hence his doctrine really is, not that it is an 'instantaneous movement' but rather (what that really is) no movement at all.

But, as his opponents mean by light a movement between the eye and the object, it appears as if, in denying that light is a movement, he were denying his own theory that an actual movement of some kind did take place between object and eye. Without doubt too there was a confusion in his own mind on the subject. His raising it in connection with sound and odour shows this. Naturally the fact that there is no noticeable interval between the production of any object and our seeing it led him practically to contradict his previous assertions.


We cannot say that all qualitative change proceeds continuously (συνεχῶς) or is συνεχὺς in the full sense of the word which is explained in Phys. v. ch. 3, 226 b 27 sqq. It is not sufficient that the time should be continuous but that the action should be continuous also (μὴ τοῦ χρόνου (οὐδὲν γὰρ κωλύει διαλείποντα, καὶ εὐθὺς δὲ μετὰ τὴν ύπατην φθέγξασθαι τὴν νεάτην) ἀλλὰ τοῦ πράγματος, ἐν ὃ κινεῖται). Themistius (Paraph. ad Phys., loc. cit.) explains that movement such as the galloping of horses is not continuous, though the time in which the movement takes place is. Qualitative change seems to be more comparable to this and appears to take place by a series of
successive bounds. There seem to be ultimate sections in the process which are instantaneous and not divisible into smaller sections each diverse in point of time.

So it is too with ἀψιθος καὶ φθίσις. If a drop wears away so much of a stone in a given time, the half of it does not perform so much of the attrition in half the time. It does it in no time. What is washed away is divisible, but its parts were moved not separately but all together.

In Phys. vii. ch. 5, 250a 28 sqq. it had been admitted (cf. above) that, in general, qualitative change falls into different time sections just like κίνησις proper, yet the half of the cause of change need not cause a change of half the extent. But this is true also of κίνησις proper. Though two men push a boat so far in a given time, one man need not be able to move it at all. The point here is different. It is, as said, that often change either in quality or bulk proceeds in sections.

447 a 3. πῆξις is congelation of any kind (cf. Meteor. iv. chs. 5–7) and is produced either by heating or cooling. θερμαίνεσθαι and ψυχεσθαι are examples of ἀλλοίωσις (cf. Phys. vii. ch. 3, 246a 7 sqq.). Compare also Phys. 253b 25 quoted above. By τὸ θερμαίνομενον καὶ πηγνύμενον (cf. note to 443b 7 on the function of καὶ) no doubt the thickening of milk or some such substance by heat is indicated.

447 a 8. ὀμή seems to be propagated by an ἀλλοίωσις and is admitted not to be instantaneous (l. 10 beneath). The instantaneousness of the sections of qualitative change does not make the ἀλλοίωσις as a whole instantaneous in this case. Obviously there is ‘much’ to be changed. If light is conceived of as an ἀλλοίωσις, then the whole distance from object to eye must be thought of as being one section. How this can be reconciled with οὐ μὴν ἀλλ’ ἀν ἃ τολύ κ.τ.λ. it is difficult to see, for, if a considerable quantity of water cannot undergo qualitative alteration all in one moment, a fortiori the vast extent of medium intervening between eye and object should require a long time to transmit the light. If the words οὐ μὴν ἀλλ’ κ.τ.λ. only affect such qualitative changes as θέρμανωσις, Aristotle should have pointed out in what respect those differ from the ἀλλοίωσις involved in light and should have ascribed the slowness of the change in these cases to those peculiarities. γείσις is brought in as a qualitative change too which would be perceived in the same way as odour if we were surrounded by water.
As we have seen, Aristotle does not distinguish between the diffusion of a quality in that which serves it as a vehicle and its transmission through a medium. The difference between the mediated sense qualities and the others is, that in the former their vehicle is a medium always in contact with the sense organs, while in the other cases it is not so. Special contact has to be effected between the body possessed of the quality and the sense. Hence one reason why the latter are both called tactual senses.

Aristotle’s declaration here is interesting, because from it we may infer what we already know from ch. 4, 442 a 29 sqq., that he did not conceive even taste to be a diffusion of the actual particles of the flavoured substance, since he would not allow that to be the means of producing smell, and the only difference between taste and smell is due to the fact that we do not live in water.

Hence we must lay stress on the fact that diffusion is only a metaphorical term for the process by which odour and flavour alike are propagated; cf. 441 b 17: ὀστερ ὄν τι ἐναπολύοντες; 443 b 7 sq.: οἶον ἀπολυνόμενον; 445 a 15 sq.: οἶον βαφή τις καὶ πλύσις.

447 a 9. μεταξὺ. Cf. 445 a 8, 436 b 20, De An. iii. ch. 12, 434 b 15: αἱ γὰρ ἀλλαὶ αἰσθήσεις δὲ ἐτέρων αἰσθάνονται, οἶον ἀσφρησις ὅψις ἀκοή, etc.

447 a 11–12. As we have seen, his customary way of stating the matter is, that χρώμα causes sensation, while without φῶς, which is the ἐνέργεια of the medium, colour cannot stimulate the sense (De An. ii. ch. 7 passim). That τὸ διαφάνεις should be illuminated is a precondition of the perception of colour. (Cf. Rodier, op. cit. Vol. ii. p. 281.) In that sense it could be said ποιεῖν τὸ ὄραν. From another point of view φῶς is the χρώμα τοῦ διαφανοῦς and as such is the object of sense itself and ποιεῖ τὸ ὄραν. Thus Aristotle might use this expression without thinking of light exactly as the κίνησις which produces sight (cf. above notes to 446 b 30 sqq.). τὸ αἰσθητὸν means both the quality spread over the medium and τὸ πρῶτον κινοῦν itself. Cf. above note to 446 b 25 sq. But in so far as the sense object which causes sensation is a quality and hence an εἴδος and hence also an ἐνέργεια, process cannot be imputed to it. Though due to an ἀλλοιώσις it is not, itself, an ἀλλοιώσις; it is an ἐνέργεια. But all sense qualities may be so regarded and hence there should be no grounds for supposing that in the case of one sense there was not to be found that process of transition by which the objective quality was realised in the particular consciousness in the case of the others.
CHAPTER VII.

447 a 15. ἀτόμῳ. Alexander explains that this is not an absolutely atomic time, for such according to Aristotle does not exist, but a time which, when divided, does not yield one part qualified by one sensation—another by another: cf. beneath 448 b 22.


447 a 19. Cf. note to ch. 1, 436 a 5 for the interpretation of ἐπο-κείσθω.

μᾶλλον κ.τ.λ. This seems to be a self-evident principle with Aristotle, but perhaps it might be held to be in antagonism to such passages as De An. i. ch. 1, 402 b 21 sqq.: ἄλλα καὶ ἀνάπαλιν τὰ συμ-βεβηκότα συνβάλλεται μέγα μέρος πρὸς τὸ εἰδέναι τὸ τί ἦστιν. Aristotle would, however, distinguish between the two cases. The entering of one sensation into relation with another by means of combination alters the essential nature of the sensation. You no longer have the same sensation to investigate but a new one—a compound. Hence we may say that the original sensation may be more adequately perceived per se when in isolation than when in composition.

αἰσθάνεσθαι. αἰσθησις is a δύναμις κριτική (cf. Anal. Post. ii. ch. 19, 99 b 35) and by it we recognise a thing as what it is. We must, as Alexander points out, remember that αἰσθησις has two aspects, one of πάθος the other of κρίσις. Its function as κρίσις is the function of mind in general and hence, as e.g. above in ch. 6, 445 b 16 sqq., we get the terms applicable to mind in general (κρινοῦμεν, γνωσόμεθα) applied in the special case of sense perception. Cf. also De An. iii. ch. 9, 432 a 16: τῷ τε κριτικῷ, ὁ διανοια ἐργον ἐστὶ καὶ αἰσθήσεως.

447 a 23. τούτο, i.e. in the case of harmony when the two tones combine to form a third thing—a concord. Aristotle is arguing against the simultaneous perception of two things which remain diverse. His point is that, if they are to be perceptible at one and
the same time, they must combine or, in some way, form a third thing. The combination is obvious in the case of harmonies.

\[ \text{De Gen. et Corr. I, ch. 10, esp. 328 a 32.} \]

\[ \text{De An. III, ch. 1, 425 a 30 sqq.: τὰ δ᾽ ἄλληλων ἱδια κατὰ συμβεβηκός αἰσθάνονται αἴ αἰσθήσεις, . . . ὅπερ χολῆ ὅτι πικρά καὶ ξανθή. The union is union in one thing, not a qualitative union of the sensations.} \]

\[ \text{De An. III, ch. 2, 426 b 8—427 a 16.} \]

\[ \text{447 a 31. \( \text{ἐν ψ \ συμβεβηκός} \). Alexander explains that he is excluding such cases as those mentioned in ch. 6, 446 a 8 sqq. where there is no proper mixture but an absorption of a minute volume of one thing into the substance of the other. \( \text{φ συμβεβηκός} \) \text{would give the sense required more easily than \( \text{ἐν ψ} \).} \]

\[ \text{447 b 3. \( \text{κατὰ συμβεβηκός} \). This is a case in which the perception of the object of one special sense may be effected indirectly, through the instrumentality of another. Cf. De An. III, ch. 1, 425 a 30 sqq.: τὰ δ᾽ ἄλληλων ἱδια κατὰ συμβεβηκός αἰσθάνονται αἴ αἰσθήσεις, . . . ὅπερ χολῆ ὅτι πικρά καὶ ξανθή. The union is union in one thing, not a qualitative union of the sensations.} \]

\[ \text{447 b 4. \( \text{αἰσθάνεσθαι} \). He is arguing once more from the absence of objective unity to the absence of subjective unity.} \]

\[ \text{447 b 7. Reading \( \text{έπει} \) with Biehl we should have to regard this clause as an explanation of the reason why we can argue \( \text{a fortiori} \) from the case of objects falling under a single sense to the case of heterogeneous senses. It is not a confirmation merely of the previous clause.} \]
If we read ςτι with Alexander and LSU, the sequence of the argument is not so clear, but the possibility of connecting this with the previous clause too intimately is removed.

447 b 10. κίνησις. By the κίνησις is indifferently meant either the sense affection or the stimulus. We may therefore translate—‘the stimuli are more closely located.’ This clause forms a premiss on which the previous one rests. It, itself, seems to be an accepted topical maxim which connects the possibility of simultaneous functioning with the physical connectedness of the two elements; they are both κίνησις in the same organ and hence ἀμα in space. Aristotle means more than that they are similar, as Alexander interprets.

447 b 12. ἀν μὴ μιχθη. This contention—that if not combined two things cannot be simultaneously perceived, i.e. if simultaneously perceived then combined—is not proved by the clauses which immediately follow but by the section from καὶ εἴ μία 1. 16—αὐτά l. 18. Lines 12-16 rather prove the simple converse—that, if combined, sensations are perceived ἀμα.

The argument runs—A mixture is a unit. Perception of a unit is unitary and a unitary perception occurs in a unitary time, i.e. ἀμα. For support of the statement that perception of a unit is unitary (i.e. the last premiss) we get δτι μι...δύναμν μία in lines 14-16. The perception of a unit with which we are concerned, the perception that occurs in unitary time, is explicit perception (ἐνέργεια) and the explicit perception of a unit is numerically one, i.e. unitary; it is of a specific unity that the potential perception is single.

(This is the very idea of ἐνέργεια—to be complete in one and the same moment, not to be a κίνησις which varies from moment to moment. Cf. De An. II. ch. 5, 417 a 16–17 and Rodier, ad loc. cit.)

447 b 15. ἐνδα κ.τ.λ. By saying that it is of the specifically single that the implicit perception is one, Aristotle means that the perception of various white objects is specifically identical. It is the same qualitative affection; but actual perception is the perception of this particular white object here and now; it is numerically different from the perception of any other white object. It is only as a faculty that the sense of white colour is a unity and its unity is the specific unity of the various sensations of white. Again, relatively to black and white taken as numerical units the sense of sight itself is a specific unity.
447 b 16. καὶ εἰ. Here the proof of the proposition first laid down begins. The sequence of the argument is best seen by beginning at the other end—l. 22, μία δὲ ἡ δύναμις. We are, by agreement, considering the case of a single faculty, e.g. sight. The act of vision must occur in a unitary time—l. 21 μᾶς γὰρ εἰσάγαγεν κ.τ.λ.; when the faculty is single and the time a unit, the act of sense or vision must be unitary—l. 19, ἀλλὰ κατὰ μίαν δύναμιν. Going back to l. 16, καὶ εἰ μία κ.τ.λ., we find it further stated that if the act is single the objects perceived by it must be single. We still lack the completing premiss that if two things are perceived as one they must be combined. This is not explicitly stated unless, instead of ἂρα before μὴ in l. 18, we read γὰρ. If we read γὰρ we make the train of reasoning complete and much improve what is at best a very ill-arranged argument.

447 b 24. ἀδύνατον. Cf. above l. 7 and beneath 449 a 4.

447 b 27. Consciousness is here an adequate interpretation of ψυχή, though the term ψυχή has generally a wider meaning.

This sentence—φαίνεται γὰρ κ.τ.λ.—seems merely to support the argument generally or rather one of the previous statements viz., that if you perceive simultaneously it is a unit which must be perceived.

447 b 28. εἰδέι. Alexander will have it that here Aristotle includes generic identity. The different qualities falling under one sense are specifically distinct, merely generically identical (cf. l. 30), and according to Alexander it is these which have their relative identity recognised by the same sense, while it is a single sense functioning in a certain manner which recognises actual specific identity. This latter contention is correct, but Alexander can hardly be right in saying that here generic identity is included in specific. The train of thought is rather as follows—Specific identity is perceived by a single sense functioning in a certain manner (cf. De An. iii. ch. 1, 425 a 20: ἕκαστῇ γὰρ ἐν αἰσθάνεται αἰσθησις). ‘I add the latter qualification,’ says Aristotle, ‘because a single sense without specifying the manner of its functioning merely recognises generic identity (the identity e.g. of black and white) not specific; (the function of a single sense is to discriminate the specifically diverse. Cf. De An. iii. ch. 2, 426 b 8 sqq. esp. 10: καὶ κρίνει τὰς τῶν ὑποκειμένου αἰσθητού διαφοράς); but, in recognising various white things as white, i.e. as possessing specific identity, it operates in a definite different mode, and one other than that by which it recognises the
contrary quality black. There is a corresponding difference of mode in which each sense recognises the corresponding positive qualities e.g. white and sweet, and the corresponding negative qualities like black and bitter.

Thus the conclusion is, that it is the same sense functioning in a definite manner which is different in the case of each of two contraries, though corresponding in the various senses according as the contraries are ἐξεις or στέρησεις. As Alexander points out, numerical difference of the sensations can be discerned only by temporal difference of the perception, specific difference by the difference of the manner, generic by the difference of the sense faculty.

447 b 32. συστοιχία. Cf. beneath 448 a 17–18, cf. Bonitz, Ind. p. 736 b 61, συστοιχία 'ea sunt, quae in eadem serie continentur.' The 'series' (συστοιχία) need not be a genus; generally it is not. Aristotle here ranks the opposed qualities of all the generically different senses under the two heads of ἐξεις and στέρησεις. It is these which form the titles of the two series. Cf. Metaph. iv. ch. 2, 1004 b 27: τῶν ἐναντίων ἡ ἠτέρα συστοιχία στέρησεις. Cf. also the Pythagorean distinction of two συστοιχίαι, the one headed by τὸ πέρας the other by τὸ ἀπειρον. Metaph. i. ch. 5, 986 a 23 sqq.

(The use of συστοιχία in Metaph. x. 1054 b 35 and 1058 a 13 seems to be somewhat different.)

For the use of ἕαυταις cf. above ch. 6, 446 a 19: πρὸς αὐτὰ.

448 a 2. ἐτ. This section further shows that the opposition of the κινήσεις of the respective sense affections which are specifically distinct makes simultaneous perception of them impossible.

448 a 3. ἄμα κ.π.λ. Cf. De An. iii. ch. 2, 426 b 29: ἄλλα μὴν ἀδύνατον ἄμα τὰς ἐναντίας κινήσεις κυμεώθαι τὸ αὐτὸ ἢ ἀδιαίρετον καὶ ἐν ἀδιαίρετῳ χρόνῳ. εἰ γὰρ γλυκά, ὁδὲ κινεῖ τὴν αἰσθησιν ἢ τὴν νόησιν, τὸ δὲ πικρόν ἐναντίως. This comes in the De Anima in a different connection; there he is proving that there must be something unitary which distinguishes the opposed sense modifications, something which is only in aspect divisible (cf. beneath at the end of the chapter). Cf. also De Coelo, ii. ch. 13, 295 b 14: ἄμα δ' ἀδύνατον εἰς τάναντα ποιεῖσθαι τὴν κινήσιν.

Alexander understands χρόνῳ after αὐτό (l. 4). The whole discussion, he thinks, is one about time. We are not at present raising the question of the unity of what perceives as in the De Anima. But this restriction of τὸ αὐτὸ to time is impossible. It must be one thing that is diversely affected if there is to be any
controversy as to the possibility of the two affections being simultaneous (ἀμα). Aristotle denies as a general principle that they can be so.

448 a 7. τὰ μὴ ἐναντία. These are evidently the intermediate qualities. It is not quite clear whether the theory about them here is quite the same as that presented in earlier chapters. There they are held to be mixtures of the two extreme qualities and, if by saying that some can be assigned to one extreme, others to the other, Aristotle simply means that there is a greater proportion of the one element in one case, of the opposite one in another, then the two theories can be reconciled. This is Alexander's explanation.

On the other hand τὰ μεμυγμένα seem to be introduced in l. 10 as a fresh class and are explicitly illustrated only by musical examples.

But probably there is no real discrepancy between this chapter and previous ones. By τὰ μὲν and τὰ δὲ in l. 7 he probably refers to τὸ ἕανθὸν and τὸ φαιόν which are assigned to white and black respectively, ἀλμυρὸν and λεπτῶρον which are claimed by πικρὸν and γλυκῷ (cf. ch. 4, 442 a 18 sqq.); and by τὰ μεμυγμένα to the other qualities.

448 a 9–10. Though τὰ μεμυγμένα are illustrated only by musical examples, Alexander thinks that the words in which he describes the ratio between the components of these compounds make it evident that he is thinking of colours and tastes as being composed by the intermixture of various amounts of two original components. Cf. l. 13: ὁ μὲν πολλὸν πρὸς ὀλίγον...14: ὁ δὲ ὀλίγον πρὸς πολὺ. But this is to confuse the matter. When Aristotle says it is impossible to perceive τὰ μεμυγμένα ἀμα, unless as one, he does not mean to repeat that we cannot perceive their components simultaneously unless as one. He has already said that contraries cannot be perceived simultaneously unless perceived as one, i.e. unless they form an intermediate colour, taste, etc. Aristotle is here asserting that we cannot perceive two intermediate colours simultaneously unless they coalesce.

448 a 10–11. τὸ διὰ πασῶν κ.τ.λ. By this Aristotle surely means the harmony of the fifth with the tonic and of octave with tonic. It is difficult to see how the different notes of the scale could be regarded as mixtures.

This is, in fact, the case in connection with which a difficulty is raised beneath in 448 a 21 sqq.
The chords in question are, in modern terms, composed of two sets of vibrations, one of which is in the case of the octave concord, twice as rapid, in the case of the fifth, $1\frac{1}{2}$ times that of the other.

448 a 12. εἰς λόγος. Aristotle's point is that two blended sounds, e.g. the chord of the fifth or the octave, themselves depend upon a relation between tones of different pitch and hence cannot themselves be simultaneously perceived unless they form a new combination. If they do there is a single ratio formed once more, but if not we shall have the impossible task of presenting together two incompatible relations, that of the fifth—3 to 2—i.e. odd to even—and that of the octave—2 to 1 or even to odd, and this is impossible.

The only difficulty left is to explain why Aristotle seems to identify the former relation with that of much to little and the latter with that of little to much. But probably he does not mean to identify them. The explanation will be, as Alexander suggests, that by the mention of the ratio of much to little he is indicating the composition of some mixed colour, e.g. red, which contains a large proportion of one quality, e.g. white, and, by the relation of little to much, another colour, in which the proportion of white is small compared with the other component.

Alexander and most of the commentators seem to think that Aristotle is in this passage discussing, not the simultaneous perception of qualities themselves composite but of the components in composite qualities. This (cf. note to ll. 9-10 above) is erroneous and makes them distort the sense and take ἐσται γὰρ ἄμα κ.τ.λ., l. 13, as explaining the οὖτως...γίνεται, l. 12, not the ἄλλως δ' οὐ. They would translate 'Thus and not otherwise we get a ratio between the extremes, for there will be in the one case the simultaneous presentation of the relation of odd to even, etc., in the other case of even to odd, etc.' As Alexander explains, Aristotle is referring to the difference of the single ratio in each case. But the point is, that the simultaneous presentation of two such diverse ratios is impossible. Besides, the other interpretation requires us to take ἄμα as applying separately to both clauses ὅ μὲν κ.τ.λ. and ὅ δ' ὀλίγον. But there is no sense in saying that the relation of odd to even is simultaneous; the simultaneity must apply to the two ratios.

In my interpretation I am on the whole in agreement with Hammond.

448 a 16. γίνεται. It is wrong to confuse specific and generic difference as Hammond does. The point is that, if specific diffe-
rence renders simultaneous perception impossible, *a fortiori* generic
does.

448 a 19. πλείον κ.τ.λ. We now proceed to a still wider diver-
gence. Sweet and white, though heterogeneous, are still in the same
συντοιχία; sweet and black lack even that connection. Torstrik’s
conjecture of τοῦ λευκοῦ for τοῦ μέλανος and τὸ μέλαν for τοῦ
λευκοῦ weakens the sense. It makes this clause merely a deduction
from the principle quoted above and not an advance on it. Bekker’s
reading of τὸ λευκὸν for τοῦ λευκοῦ brings a perfectly irrelevant pre-
miss into the argument.

τῷ εἴδει, deleted by Torstrik, is unnecessary and, if allowed
to stand, can only be translated vaguely in the manner given.
Still it is quite in Aristotle’s manner to change readily from the
restricted to the wider use of a technical term, and we must bear in
mind the essential identity of the notion of εἴδος as species, and
εἴδος as form. We might render—‘in ideal content.’

448 a 21 sqq. The case cited is apparently not the simultaneous
perception of two different chords but of the two tones in one
concord. The theory put forward is that really the perception is
not simultaneous but only apparently so. With the first part of the
conclusion Aristotle does not disagree, if it be meant that the two
tones cannot be heard together as two separate units. But, on the
other hand, when they form a συνφωνία they have coalesced and are
heard simultaneously. Thus his argument becomes an attack on the
doctrine that the coalescence is not real but apparent merely.

448 a 23. φαίνονται. The contention is, that the union of tones
is merely apparent, just as it was contended in the juxtaposition
theory of colour in ch. 4, 440 a 22 sqq. that the union of elementary
tints which produced an intermediate one was of the same nature—
that it was effected by a mixture πρὸς αἰσθήσεων merely (cf. notes *ad loc. cit.*). The means by which such an apparent union can be obtained
is in both cases the same; it is owing to the interval between the
sensations being imperceptible that this happens. Without this being
granted the theory will not hold, and, accordingly, Aristotle proceeds
to argue against the existence of a χρώνος αἰναίσθητος.

448 a 25. If the theory, that imperceptible moments of time
exist, is true, it will be as possible to have simultaneous sensations of
sound and colour as of different tones. But this conclusion is
repugnant to Aristotle. Sensations of different senses cannot com-
bine—hence cannot be simultaneously presented.
This is the first ground on which he rejects the theory.

448 a 26–28. We must remember the principle laid down in *Physics* iv. ch. 14, 223 a 16 sqq., that apart from ψυχή time cannot exist. Hence a time in which we are not conscious is not time. A χρόνος ἀναισθητός is strictly a time in which we are not conscious, for, as Alexander points out, time is not perceived καθ’ αὐτό but by means of the events which happen in it. Aristotle expresses this frequently when he says, e.g. *De Gen. et Corr.* ii. ch. 10, 337 a 23, that time does not exist apart from change.

The argument here is derived from the continuity of time (cf. *Physics* iv. ch. 11, 219 a 13, etc.), which itself depends upon the continuity of the change apart from which it cannot exist. If in a single continuous time there are sections in which no consciousness occurs, the continuity of the consciousness will be broken; but, when one is continuously conscious, one is not aware of breaks.

Alexander apparently reads εἰ ὀρῷ καὶ οὐκ αἰσθάνεται (l. 32), the latter words merely repeating the sense of λανθάνων ἄν (l. 32).

Simon follows the reading καὶ οὐκ αἰσθάνεται καὶ αἰσθάνεται, which simply states more explicitly the contradiction implied above.

448 b 1. The ancient Latin version does not translate καὶ εἰ αἰσθάνεται (l. 33), nor does Alexander read it. It is probably a gloss. In that case we should have to remove the comma after ἐτὶ, making the sentence start with that word.

If we retain the clause, the sense will be—“But if there are no breaks in our consciousness and we still perceive whatever object is before us during the whole of the time even though certain sections of it are imperceptible, then we shall have to say that perception throughout any whole time is really always effected by perception in some part of it only.” Thus, as Alexander says, we do not perceive this time ἀπλῶς καὶ κυρίως, but only indirectly. We do not perceive a whole as a whole. The argument then goes on to show how by subtracting the χρόνου ἀναισθητον from any whole and from the remainder successively *ad infinitum*, you could show that no time, however small, was, *per se*, an object of consciousness.

448 b 2. πράγμα. Bound up with and illustrative of the proof we have just outlined (note to 448 a 26–28) of the non-existence of insensible moments of time, there runs a parallel proof of the non-existence of insensible material magnitudes. Alexander explains their conjunction by making out that it is the supposed σώματα ἀναισθητα καὶ ἀμερή which have motions in imperceptible times. These have
already been disposed of in chapter 6 and in the *Physics* etc. But it is obvious that this proof which shows that there are no *χρόνοι ἀναίσθητοι*, will equally well get rid of *σώματα ἀναίσθητα*, indeed of insensible magnitudes of all kinds, for the discussion is carried on wholly in terms of *μέγεθος*.

Here the two cases are argued out concurrently, and so closely interwoven that they seem to get confused.

448 b 5. τὴν ἀληθ. It is absurd to make this refer to τὴν γῆν (l. 8) as Bender and Hammond do. How can CB be taken away from the whole earth? Alexander correctly explains that Aristotle is illustrating both magnitudes, the temporal and the spatial, by a line AB, and the feminine inflection here refers to the γραμμή.

The contention of the whole passage leads to the conclusion that here, as in many cases, our text consists of notes either written for or taken from a lecture in which there were many cursory explanations and asides, which have not come down to us. Probably by this stage in the proof Aristotle had already drawn the line on something analogous to our blackboard, and this explains the sudden appearance of the feminine inflection in the adjective without the previous introduction of any feminine substantive for it to agree with.

If we make the apodosis begin at καὶ we must say that Aristotle implicitly, if not explicitly, identifies perception of a whole time with perception during a continuous time, *i.e.* during the whole of it. That is in fact what he means by the latter, and what he frequently expresses, *e.g.* in 448 b 2 by αἰσθάνεσθαι ἐν: cf. also l. 9 ἐν τῷ ἐνανττῷ = during a whole year, and ἐν ὑπὸ ἡσθάνετο l. 7, 448 a 29 ἐν συνεχεί κρόνῳ.

For this way of translating τῶν νῦν τοὺτων, cf. *Phys.* vi. ch. 6, 237 a 16, iv. ch. 10, 218 a 15.

448 b 7. In order to carry on the parallel proof affecting an extended magnitude he should have added to ἐν ὑπὸ ἡσθάνετο. The reference to the extended magnitude appears once more, however, in the next clause—ἡ ταύτης τι.

448 b 8. ἐν ταύτης τινι ἡ ταύτης τι. We must remember that the same line is representing indifferently either a temporal or a spatial magnitude.

τὴν γῆν κ.τ.λ. Simon and St Hilaire rightly say that this is the *reductio ad absurdum* of the theory that, by perceiving a part, we can perceive the whole. On this interpretation we must render ἐν τῷ ἐνανττῷ—during the whole year, ‘totum annum,’ Simon, p. 257.
Alexander does not give quite the same interpretation. He thinks that ὁστερ τὴν γῆν is an illustration of how we may have indirect (κατὰ μέρος) perception of a whole. We may, in an improper and unqualified way (ἀπλῶς), say that we perceive the whole earth by perceiving a part, or assign the Olympic contest to such and such a year because it occurs in a certain time falling within the year.

Whichever interpretation we follow, the result is the same. Such perception is only indirect perception of a whole, not of a whole per se, and, if there are imperceptible moments, it alone is possible, and we can never have perception of a whole as a whole.

448 b 10. οὖθεν αἰσθάνεται. This is doubtless put in as a reply to an objection that the line AB by which he was illustrating was perceived as a whole

(A C B).

He reminds the objector that they have agreed that CB shall represent an imperceptible part.

448 b 14. ἀπαντά μὲν οὖν κ.τ.λ. We must understand that the conclusion reached in the previous clause is rejected. For the doctrine cf. chapter 6, 445 b 30 sqq. where he shows that the minute parts of objects, though not per se actually perceptible, are still perceptible ἐνεργείᾳ in the whole, i.e. when taken in conjunction with the other parts, and that even per se they are potentially perceptible (446 a 15 sq.: δυνάμει τε γάρ ἐστιν ἡ ὅθη, καὶ ἐνεργείᾳ ἦσται προσγενομένων).

The doctrine involved in both passages is the same and the conclusion the same, viz. πᾶν μέγεθος αἰσθήτων.

448 b 16. ἀλλ' οὐ φαίνεται ὅσον—ἀλλ' ἐνιστε ἀδιάφρετον, ὥρα 8' οὐκ ἀδιάφρετον. This should probably be connected with what is said in De An. iii. ch. 3, 428 b 29 sqq. about the falsity which may attach to φαντασία. φαντασία may be exercised along with sensation (παρούσης τῆς αἰσθήσεως). In the case of the perception of size (and the other κοινὰ αἰσθητά) which may itself be erroneous, the φαντασία which results from this perception may also be false, whether the perception is present or not, καὶ μάλιστα ὅταν πόρρω τὸ αἰσθητὸν ἦ. If, with Freudenthal (Über d. Beg. d. Wort. fant. b. Arist., p. 12), we take πόρρω as referring to spatial distance, as πόρρωθεν does here (but cf. Rodier, Vol. ii. p. 433), then Aristotle is instancing the error which attaches to our idea of distant objects. Cf. also 428 b 3: οὖν φαίνεται μὲν ὁ ὧλος ποδαῖος and De Insom. ch. 1, 458 b 28, and ch. 2, 460 b 18. But though, in the above
passages, the discrepancy between φαντασία and belief (πίστις) is discussed, we nowhere meet with an explanation of any conflict between imagination and perception of the common sensibles which goes so far as to assert that something which is imperceptible is yet imageable.

Hence we may conclude that, when Aristotle says that magnitudes sometimes appear to be indivisible, he would not probably refer the act of mind to φαντασία in the strict sense defined in De An. III. ch. 3 (καίνησις ὑπὸ τῆς αἰσθήσεως γιγνομένη 429 a 1) or as the faculty of images (cf. 428 a 1). It is rather to be classed as a mistaken opinion and to be ascribed to δόξα. In fact φαντασία is here used vaguely, and κατὰ μεταφοράν (cf. 428 a 2), but in a sense which is very common (cf. above 448 a 23 and frequently elsewhere) as implying ‘appearance’ in the modern sense, as opposed to reality. (For a discussion of the minimum visibile cf. Introduction, sec. VIII.)

448 b 18. ἐν τοῖς ἐμπροσθεν. I hold (following Alexander’s second alternative) that this refers to ch. 6, 445 b 11: ἀδιάνατον γὰρ λευκὸν μὲν δρᾶν, μὴ ποσὸν δέ, not to the subsequent discussion (cf. note to 448 b 14), for the principle involved is not πᾶν μέγεθος αἰσθητόν but πᾶν αἰσθητόν μέγεθος, the simple converse, which is also discussed at the end of this chapter, 449 a 22 sqq.

448 b 19. This passage from 448 b 19 to 449 a 22 presents very serious difficulty. In the first part of it the text has been practically reconstructed by Biehl, who attaches great authority to MSS. E M Y. Consequently the interpretations of Alexander and most commentators who follow a very different version have to be in many places discarded. This in itself is small loss, as it can hardly be said that those interpretations were consistent either among themselves or with the previous part of the treatise. But the difficulty still remains of extracting the exact drift of the argument from the cramped Greek of the reconstructed and, it is supposed, more ancient version. Down to 449 a 10 runs an argument to which we can find no strict parallel in the De Anima, and it is here that the textual reconstruction takes place. From this point onwards we can trace an identity between the reasonings here and those passages in De An. III. ch. 2, 426 b 8—427 a 16 and ch. 7, 431 a 19 sqq., which are themselves already so famous for their obscurity. Consequently the advantage resulting from a greater unanimity as to the text is annulled by a greater divergence of opinion as to the purport of the argument.

In order to arrive at a conclusion as to the general meaning of
the passage we must, as it were, take our bearings and recapitulate the results attained in the previous part of the chapter together with the main conclusions arrived at in the De Anima.

The solution already given of τῆς πρῶτης λεχθείσης ἀπορίας is, that consciousness of two sensations simultaneously is only possible when the two combine to form a unitary product (447 b 11: τῇ μὲν δὲ [αἰσθήσει] ἀμα δυών οὐκ ἕστιν αἰσθάνεσθαι ἄν μὴ μιχθῇ). Only sensations, however, belonging to the same sense can give a unitary product (447 a 32 sqq.), and, as an illustration of this unitary product, he gives the concord which two different tones compose and, though Aristotle does not explicitly mention them (cf. notes to 448 a 7 sqq.), everything points to his having in his mind the composite colours, odours and flavours which in previous chapters he asserted to be formed by the combination of the two qualities which in each sense are most opposed to each other (ἐκ μὲν ἐνίων γίνεται τι...μίγνυνται γὰρ ὅν τὰ ἐσχάτα ἐναντία). Qualities of diverse senses do not combine (ἐκ δὲ ἐνίων οὐ γίνεται, τοιαῦτα δὲ τὰ ὑφ᾽ ἑτέρων αἰσθητῶν...οὐκ ἔστιν δ᾽ ἐκ λευκοῦ καὶ ὄξεός ἐν γενέσθαι ἄλλῳ ἣ κατὰ συμβεβηκός). This statement is repeated again in the passage we are to discuss 449 a 9–10: οὐδὲν γὰρ ἐκ τούτων [γλυκεῖος καὶ λευκός] ἐν.

The conclusion then is, that sensations of different senses cannot be simultaneously present in consciousness, while those belonging to the same sense escape the same disability only by sacrificing their individuality and merging in a compound (μίγμα) in which they are not ἑνεργεία, actually, discernible.

Now, in view of the opposition between this conclusion and the passages in the De Anima as well as the solution finally come to at the end of this chapter (ὡςτε καὶ αἰσθάνοντ᾽ ἄν ἀμα τῷ αὐτῷ καὶ ἐνί, 449 a 21), which is evidently Aristotle’s final opinion, how are we to treat the arguments in the earlier part of the chapter? Are they merely dialectical? Or do they merely emphasise a point of view which, while so far legitimate, is modified and transcended by the final presentation of the subject? To us who have followed Aristotle’s method of developing an argument in previous chapters, this seems the more likely answer, but whether he has made the relation between the two points of view quite plain, and whether indeed he was clear about it in his own mind, is another question.

In the passages in the De Anima there is no mention whatsoever of the sensations coalescing with each other. The question is raised how we distinguish the various sense qualities, and the word chiefly
used for this action is κρίνειν, which is paraphrased once (426 b 14) by αἰσθάνεσθαι ὁτί διαφέρει [τὰ αἰσθητὰ]. The reply is, that they must be distinguished by something unitary and in a unitary moment of time (انيا). If the first condition were not fulfilled, consciousness would be divided into independent parts, separate like the minds of different individuals; if the moment of their distinction were not a unit, qualities could not be pronounced to be distinct at one and the same moment.

Obviously Aristotle is there not discussing qualities which have merged with each other and lie indistinguishably commingled in their product. It is noteworthy also that, apparently, he finds the greatest difficulty in explaining the simultaneous distinction of contrary qualities, not of those belonging to diverse senses. (Cf. Rodier, Vol. ii. pp. 388 sqq. and pp. 501 sqq. On the whole I follow Rodier and Alexander.) (1) The first explanation proposed is, that what perceives is in aspect or mode of existence (τῶ εἶναι) diverse, though a numerical and spatial unit (τότῳ δὲ καὶ ἀριθμῷ ἀδιαίρετον 427 a 5), just as things have various diverse qualities, but yet are numerically and spatially one (cf. beneath 449 a 16: τὸ γὰρ αὑτῶ καὶ ἐν ἀριθμῷ λευκῶν καὶ γιλκῶν ἐστὶ). (I agree with Rodier and Alexander in identifying the second solution in this chapter of the De Sensu with the former of the two explanations in the De Anima in iii. ch. 2.)

But (2) it is only potentially that contrary qualities (as distinguished from those merely diverse) can form a unity. When actual they cannot be realised in the same subject. When forming a mixture they have potential existence and thus can be realised in the same subject. Hence we must think of the soul, not as being analogous in this case to a thing in which diverse qualities are combined, but rather to something incorporeal, e.g. a point, which is at one and the same time actually one or two, according to the way in which it is viewed. A point per se is a mere unit and indivisible, but, viewed as the end of one line and the starting point of another, it is two. In the line AB which is intersected at the point C

A ——— C ——— B

C is employed in two ways at the same time, as the terminus of AC and the starting point of CB (ὅσο γὰρ τῷ αὑτῷ χρῆται σημεῖῳ ἀμα 427 a 12).

This is, without doubt, the same solution as that mentioned briefly below in 449 a 12 sqq. 'In so far as that which perceives
sweet and white is actually indivisible it is one, in so far as actually divisible it is diverse.'

Note that in the De Sensu Aristotle applies the explanation, which he had reserved in the De Anima for contraries, to mere differents like white and sweet, afterwards returning to the more general solution which he had given in the De Anima (ἡ ὁσπερ ἐπὶ τῶν πραγμάτων αὐτῶν ἐνδέχεται, οὕτως καὶ ἐπὶ τῆς ψυχῆς 449a 14–15) and which seemed to be inadequate to account for the perception of contraries. This need not mean a recoil on Aristotle's part from the teaching in the Psychology. From the discussion there in III. ch. 7, it appears that he thought the cases of contraries and of differents not to be fundamentally diverse. (I follow here Rodier's text and interpretation.) Vide 431 a 21: ἔστε γὰρ ἐν τι, οὕτω δὲ καὶ ὁς ὁἄρ. καὶ ταῦτα, ἐν τῷ ἀνάλογον καὶ τῷ ἀριθμῷ ὁν, ἐχει πρὸς ἑκάτερον, ὡς ἐκείνα πρὸς ἀλλήλα. τι γὰρ διαφέρει τὸ ἀπορεῖν πῶς τὰ μὴ ὁμογενῆ κρίνει; ἢ τὰ ἐναντία, οὗν λευκὸν καὶ μέλαν; κ.τ.λ.

Here we find (1) that that which discerns the sensibles is ὁς ὁἄρ, as it were a limiting point (cf. πέρας in the previous passage); (2) that the sensations (ταῦτα) are, in virtue of this principle, related to each other as the qualities (ἐκείνα) are among themselves; (3) that this numerically identical consciousness relates the various pairs of ἐναντία in an analogous fashion (as we can gather also from De Sensu, ch. 7, above 447 b 32 sqq.: ὁς δ' αὕτως ἐναντίας τὰ σύστοιχα κ.τ.λ.). Hence, if white bears to black the relation that sweet bears to bitter, the proportion will be transposable, as we may say that white is to sweet as black to bitter. Here now we are relating to each other τὰ μὴ ὁμογενῆ and hence it follows that the mode of distinguishing them is not essentially different from the way in which we discriminate contraries.

It follows, then, that Aristotle's final opinion contained both elements and that the two are really complementary to each other (cf. Rodier II. p. 501), viz., (1) that the relation of sensations in consciousness is the same as that of objective qualities in things, (2) that the only parallel we can find for the relating consciousness is the mathematical point with its double function of oneness and duality.

Notice that Aristotle is confident that this perception of two qualities is simultaneous, while it must be different from the only kind of simultaneous perception of qualities yet accounted for (up to 448 b 17) in the De Sensu. This was the perception of qualities in fusion; that is the distinction (κρίσις) of the different sensations.
It is true that in *De Sensu*, ch. 7, 447 b 28 sqq. Aristotle says it is the function of a single sense to discriminate specifically different and opposite qualities like white and black. But there is no indication at that point that this discrimination must be instantaneous; the drift of the argument seems rather to be that what is perceived at a single instant must be a numerical unit. Alexander (*De Sensu*, p. 167, ll. 10 sqq. [W.], p. 352, ll. 10 sqq. [Thurot]) professes to find the account given of the perception of contraries here unsatisfactory. It is merely, he thinks, the same as that first hazarded in the *De Anima* and there set aside. The same thing cannot be both white and black, and hence, if the union of sensations in the soul is similar to the union of qualities in things, we have left the case of contrary sensations unexplained. Hence he thinks that either discrimination of contraries can only be effected by means of memory, not by present sensations, or that it is by the central organ (the heart) being affected in different parts simultaneously (just as it must be different parts of the same object that have contrary determinations) that we can at the same time distinguish different sensations. Hence, though the simultaneous *experience* (πάθος) of two opposite qualities is not possible, simultaneous discrimination (κρίσις) is.

This seems to me to be an untenable position. Though, in perception, there can be distinguished the two different aspects of discrimination and experience or reception of the sensations, yet they cannot exist apart from each other; at any rate the discrimination of the diversity cannot exist without the presentation of the differents, and simultaneous discrimination of the differents cannot exist without simultaneous modification of the same thing by the differents.

Besides, this theory seems to be exactly that which Aristotle, in anticipation of his final solution, is going to disprove below in the passage from 448 b 19—449 a 9: ἄμα μὲν, ἐτέρῳ δὲ τῆς ψυχῆς αἰσθάνεσθαι. This is impossible, he says, even though the different parts belong to one continuous whole—οὗτω δ' ἀτόμῳ ὡς παντὶ ἄντι συνεχεῖ (cf. *infra* 23 sqq. and notes). This would be a good description of the central organ functioning by means of different parts.

The way out of the difficulty is found by paying close attention to the conclusion established in *De An.* iii. ch. 7.

There is no essential difference, Aristotle says, between the discrimination of differents and of contraries. Similarly we might add there is no essential difference between the way in which both classes of qualities are realised in things. Incompatible qualities must, if
realised in one thing (by belonging to different parts of it), meet in a common point which is two or one according to the way of looking at it, just as much as a particle of matter which is both sweet and white has both a dual and a unitary aspect.

If this is Aristotle’s final opinion, what is to be thought of the purport of the earlier part of this chapter? It might be suggested that in the De Sensu he is talking of αισθάνεσθαι in the sense of πάσχειν, in the De Anima as κρίνειν. But this can hardly be accurate; the final verdict in the De Sensu is the same as in the De Anima, while there is no indication that he is at the end thinking of αισθησίς merely as κρίσις. As we have seen, there cannot be simultaneous κρίσις without simultaneous πάθος, while again sensation is always with him a δύναμις κριτική, always cognitive. Perhaps the meaning to be extracted from the discussion is as follows—Sense qualities as such cannot be perceived simultaneously. True, if the sensations they give rise to can combine, as they may do if they belong to the same sense (since the corresponding stimuli are in closer proximity than in other cases—μᾶλλον γὰρ ἄμα ἡ κίνησις 447 b 9 sq.), they can both be experienced. But in combination they cannot be discriminated, hence not perceived. But since, as we learn in the De Anima, to be discriminated they must be simultaneously apprehended, it is to their objective realisation in things, to their unity κατὰ συμβεβηκός, i.e. as accidents of the same substance, that we must look for the grounds of the possibility of their discrimination, while their discrimination is effected by a consciousness which has a unity, not like that of different spatial parts in a whole, but like that of the different qualities in one object.

If this be the meaning of our author, it forms a remarkable fore-shadowing of the psychological doctrine that discrimination and objectification go together and, if objects can exist only in space, it is an argument for the necessity of the spatial form of things for the development of knowledge.

Aristotle says that this faculty which distinguishes the sense qualities belonging to the different genera is still a form of sense, for the qualities distinguished are sense qualities (αἰσθητὰ γὰρ ἐστιν, De An. iii. ch. 2, 426 b 15). Yet it cannot be ἰδία αἰσθησίς, which merely discriminates qualities belonging to a single sense. It is not located in the organ of any special sense, nor in the flesh. Its organ he calls τὸ κύριον αἰσθητήριον, which is evidently to be identified with what he elsewhere calls τὸ κύριον αἰσθητήριον, De Som. ch. 2,
455 a 21 sqq., τὸ πρῶτον αἰσθητήριον ibid. 456 a 21, etc., and τὸ κοινὸν αἰσθητήριον De Juvent. ch. 1, 467 b 28, ibid. ch. 3, 469 a 12, namely the heart or some constituent found in it. This is the organ of the κοινὴ αἰσθητήσις, one function of which we have already discussed, namely the perception of the 'common sensibles,'—number, figure, magnitude, motion, and unity. If we look however to De Som. ch. 2, 455 a 13 sqq. we find that the faculty by which we distinguish the various genera of sensations, e.g. white and sweet, is also called a κοινὴ δύναμις ἀκολουθοῦσα πάσας, and this it is, too, which enables us to be not only conscious but self-conscious (ἡ καὶ ὅτι ὁρᾶ καὶ ἀκούει αἰσθάνεται). It resides in the κοινὸν αἰσθητήριον (τινὶ κοινῷ μορίῳ τῶν αἰσθητηρίων πάντων).

Hence we come to the conclusion that the faculty by which we discriminate and hence objectify sense qualities is also the same as that in virtue of which we are self-conscious, a striking anticipation of Kant’s doctrine of the objectifying function of the ‘transcendental unity of apperception.’ Cf. Introd. sec. IX.

448 b 22. ἀτόμῳ χρόνῳ. Cf. note to ἀτόμῳ above 447 a 15; this has been the sense in which Aristotle has used ‘individual time’ throughout. Cf. Physics viii. ch. 8, 263 b 27: οἷς οἶνον τε εἰς ἀτόμους χρόνους διαιρεῖσθαι τὸν χρόνον, cf. also vi. ch. 9, 239 b 8.

448 b 23. ἐτερῳ δὲ. This seems not to be exactly the theory rejected in De An. iii. ch. 2, 426 b 17 sqq.: οὖτε δὴ κεχωρισμένος ἐνδεχεσθαι κρίνειν ὅτι ἐτερον τὸ γλυκὸ τοῦ λευκοῦ, κ.τ.λ.

There it was shown in general terms that it is not by separate organs or faculties that the soul discriminates diverse sensations. Here it is proved that not even though the different organs were to form a continuous whole could it be said that through them the distinction of the sensations is effected.

In short, both arguments are directed against the contention that it is by means of spatially different parts that the simultaneous presentation and discrimination of two different sense qualities is rendered possible. In the De Anima these different parts seem to be regarded as the various end organs, but as it might have been objected that they need not be regarded as separate in that way, since, on Aristotle’s own theory, the various sense organs all connected with the heart, and the real organ of discrimination might hence be the various parts of that member, Aristotle here refutes this second version of the theory.

448 b 24. οὗ τῷ ἀτόμῳ. This is omitted by mss. L S U and
also by Alexander, who reads, instead of the subsequent οὐτώ δὲ ἀτόμῳ, καὶ οὕτως ἀτόμῳ ὡς παντὶ ὑπὶ συνεχεῖ. This he takes to refer to the ἀμα in l. 21 above and to be a second attempt to define the sense in which the organ is individual (Alex. p. 157 ll. 17 sqq. [W.], p. 331 l. 7 [Th.]). This reading and interpretation is supported by Thurot and also Baumker (Jahrh. für Class. Philol. 1886, p. 319) who, of course, assign the οὐ τῷ ἀτόμῳ to dittography. But, if the interpretation is to be supported and οὕτως ἀτόμῳ is to be referred to time, we must read either καὶ ἐν οὐτως with Thurot or κἂν οὕτως with Baumker. However, it is impossible that ὡς παντὶ ὑπὶ συνεχεῖ can elucidate the meaning of ἀμα or be a relevant description of the atomic time mentioned above (cf. previous notes). That is a time which relatively to the two sensations is atomic, which is such that the two sensations are not subsequent to each other, but both experienced concurrently throughout the whole duration of the time. But, though the time is continuous, one sensation may quite well be subsequent to another, for the time uniting two events in immediate succession is continuous.

It is true that the time in which the sensations are presented must be continuous, i.e. must be capable of resolution into still briefer times: cf. the general discussion of continuity in the notes to ch. 6, 445 b 3 and 28 sqq.

But to point this out in no way shows how the sensations are ἀμα; on the contrary, it would lead one to believe they were not really ἀμα, i.e. ἐν τῷ ἀτῷ χρόνῳ (Physics iv. ch. 10, 218 a 25, Categ. ch. 13, 14 b 25) in the sense of being concurrently present in all parts of it, but that one was υστέρον, the other πρότερον. Cf. Physics, loc. cit.—ἀμα εἶναι κατὰ χρόνον = μήτε πρότερον μήτε υστέρον τὸ ἐν τῷ ἀτῷ εἶναι.

Hence, if it was said that the individuality of the time in which two sensations were presented consisted in its being composed of continuous parts and that they were 'together,' ἀμα, merely in the sense of occupying different parts of this continuous whole, this would contradict the definition of their simultaneity given above in l. 22, which Alexander explains as not being merely immediate succession in time.

In short, if it can be asserted that a time of continuous parts is atomic in a sense (i.e. in the sense that no division in it has been made), yet this is not the sense in which the time in which sensations are simultaneously perceived is atomic.
Hence if ὥς ἄτομῳ refers to time, it is a misleading irrelevancy. It must refer to the organ or faculty of perception. (For the sense in which τῷ συνεχές is a unity cf. Metaph. x. ch. 1, 1052 a 19 sqq.) The ancient translation runs 'et non indivisibili, sic autem indivisibili ut omni existenti continuo.'

Biehl’s conjecture καὶ ὅν τῷ ἄτομῳ ἢ ὥς ὥς?[?] ἄτομῳ seems to give little visible improvement.

448 b 28. ταῦτα. All mss. except E M and all editors except Biehl read ταῦτα. Accordingly, following that reading we should have to interpret 'there will be a plurality of organs specifically alike.' Not only the interpretations but the readings also which we are to accept in the subsequent passage will depend upon our decision here.

Firstly, it is clear that whatever reading we accept we must not have the temerity to translate γένει in this line 'species.' Hammond reading ταυτά renders: 'it will then have parts specifically the same. For its repeated sensations belong to the same species.' This is certainly to cut the knot and leave the difficulty unsolved.

Supposing that ταῦτα be read, then we may, throughout the subsequent lines also, follow pretty closely the version of the class of mss. which gives us that reading.

Bekker gives καὶ γὰρ ὅν ἀισθάνεται, ἐν τῷ ἄιτῳ γένει ἐστίν, which we may render 'for the objects of a single sense belong to the same genus.' This does not seem to be a confirmation of the ταῦτα unless we remember that, though the actual sensation is identical with the sense quality as actually perceived and that, hence, as qualities are specifically diverse so are sensations, yet as a δύναμις the sense is specifically a unit. The perception of black and of white is δύναμει specifically one. What has a generic unity ἐνεργείᾳ has specific unity potentially.

The senses considered as faculties are only specifically distinct. Now the sense faculty and the sense organ are from many points of view one and the same thing. They are, of course, relatively to each other σῶμα ὄργανικόν and ἐξίς—the ἐξίς of the particular organ; but they are often referred to by the same term; ἀισθήσις is often equivalent to ἀισθητήριον (cf. above ch. 3, 440 a 20, and ὄψις is even used for ὄμμα: cf. ch. 2, 438 a 13: τὸ μὲν ὄν ὑπ’ τῆν ὄψιν ἐναὶ ὀφάτος ἀληθείς μὲν), and so ἄκοη for the ear, ὀφθαλμῆς for the organ of smell (cf. De An. iii. ch. 1, 425 a 4: ὥς ἄκοη ἄφρος, κ.τ.λ. and De Sens. ch. 2, 438 b 21–22 and note).
Hence we might argue that, corresponding to the specifically identical faculty which perceives objects specifically distinct, there is, if it requires a separate organ to apprehend every separate determination, a corresponding plurality of sense organs which yet are specifically identical, for, if the faculty is specifically one, so are the organs. Hence we should have to interpret ἐὰν δὲ ὅτι ὧς ὅδον ὁμοιά, κ.τ.λ. l. 29 sqq. in some such way as this—‘If it be said that this may very well be the case because (e.g.) the eyes are specifically alike, and so the soul may have a plurality of similar organs, it must be observed that the cases are not parallel.

‘The two eyes have an identical function, not two images but one alone is present when we see; but the case you try to explain is that of the perception of diversity.’ (This would require to be the sense to be arrived at, whatever reading we follow.)

‘Once more, if the organs are specifically alike, so will the faculty of perceiving black, white, etc., be specifically identical, i.e. you will have different sense faculties only numerically distinct (αἰσθήσεις αἱ ᾧται πλείους ἔσονται l. 33) which is like saying that there may be different sciences of the same subject.’

But this last argument is sufficient to throw suspicion on the whole proof. If it is the case that, as the authors of this interpretation would themselves admit, the perception of black and the perception of white are only as actualised specifically different, and ὁνόμαση, or as a faculty, they are specifically identical and only numerically to be distinguished as different possible acts of the same sense (cf. Alex. De Sens. p. 158, l. 15 [W.], p. 333, l. 6 [Th.]: τῶν γὰρ ἐν τῷ γένει ἡ αὐτῇ κατ’ ἔδος αἰσθήσεις. Alexander, however, shows some perplexing hesitation between οὕμοργενη and οὕμορειδή), then it is clear that Aristotle would not have the least objection to saying that the same sense faculty may be reduplicated, provided one understands what this means. If it mean, as is the only view consistent with the reading ταὐτά, that it is one sense faculty which is particularised and made determinate in the perception of black, white, etc., then this is precisely his theory.

(Compare 447 b 27 sqq. above. There he cannot maintain the unqualified assertion that, corresponding to a specifically identical object, there is a single (specifically identical) sense. A single sense corresponds to and discriminates specifically diverse objects (cf. 447 b 29). It is the single sense functioning in a determinate manner which gives specific identity in the object.)
Hence it would be Aristotle’s own theory that the different organs, by which we perceived white and black, if there were any, must be specifically alike, just as the eyes are alike.

But his argument is this—‘If you postulate a diversity of organs, you will have to make them specifically unlike each other. Where we have different organs, as is the case with diverse senses, the unity of the senses is only generic; hence here too, within one sense, if you are to have separate organs, they will only have a generic resemblance to each other. You object and say there are the two eyes, specifically alike, but yet serving the one sense—sight. I reply that these have a single function; the sensations given by each combine to form one product. So too the different sensations mediated by specifically identical (εἰδεὶ ἰδὲ l. 31) parts of the same organ may form a compound, e.g. black and white, and sounds of various pitch, which combine. But, when that is so, the different sensations are not discriminated. Your proposal was to account for the perception, i.e., discrimination of the sensations, by the diversity of the organs by which they are apprehended. If, as shown, a mere numerical difference in the organ does not render that possible, you will have to try specific disparateness. The different organs must be specifically diverse.

‘But, if so, contained within each sense there will be diverse faculties, distinct from each other as the various sciences are distinct and as the admittedly different senses are distinct. Distinct sciences have each an appropriate δύναμις and so have distinct senses. The perception, then, of (e.g.) different colours will, because each has, as shown, its appropriate δύναμις, be distinct in the way that the sciences are.’

This carries us down to 449 a 3, after which the argument takes a new turn.

448 b 28–29. τῶ αὐτῶ γένει. Cf. 447 b 29–30; where you have different organs you have only generic identity in the sense.

448 b 29. If we read ὁδὲν κολύει in this way as governing ὅτι (see translation), we must supply λέκτευν before ὅτι ἵσως in order to avoid an ugly anacoluthon. This, however, is very common in Aristotle. Cf. ἢ ὅτι πρῶτον l. 25 above. The ὅτι ἵσως clause can hardly be an argument against the suggestion that we may have different organs specifically alike, as in the case of the eyes; it will rather be in support of it. Alexander, however, wishes to take ὅτι ἵσως as an objection to a different thesis (cf. note to ταυτά above).
If it is intended as an argument in support, it can only be the plea of an intelligent supporter. He (the supporter) says—'here you have two eyes of identical construction functioning alike and cooperating in the act of perception.' Aristotle in the next sentence replies 'that is exactly the point, the objects they perceive are numerically one, not diverse as is required in the case of the organs which are to perceive both white and black simultaneously.'

448 b 31-33. Bekker reads ἐκεῖ δὲ, εἰ μὲν ἐν τῷ ἐξ ἀμφῶν, ἐκεῖνο τὸ αἰσθανόμενον ἔσται, εἰ δὲ χωρίς, οὐχ ὀμοίως ἔξει, following L S U P and Alexander.

Biehl's text is εἰ δὲ, ἵνα μὲν ἐν τῷ ἐξ ἀμφῶν, ἐν καὶ τὸ αἰσθανόμενον κ.τ.λ.; he bases his restoration on readings in E M Y. This would give us—'But if that is so, then, consequent to the unity of the product, the perceptive organ (faculty?) is single, while again if the sensations are separate the case is altered.' We may extract a meaning out of it somewhat like that which Alexander gets from the other reading—viz. that in the case of the eyes you have really a single psychic faculty functioning through the two organs and not two, as is claimed. This will give a sense satisfactory to our argument; but it is difficult to see how τὸ αἰσθανόμενον could be said to be numerically single when it is quite as naturally an epithet for the eye as for the faculty, and the eyes are manifestly double.

Hence I propose, while following Biehl and the older class of MSS., to read εἴδει δὲ εἰ instead of εἰ δὲ in 448 b 31, and interpret as in note to 448 b 28. The point is, that two perceptive organs specifically alike will account for the perception of a single object, but that to account for the perception of two things (simultaneously), the organs must be specifically unlike.

Hammond translates, following Biehl's text, "If, however, the continuation of both forms a unit, then that which is perceived will be a unit and, if they remain uncombined, then the result will likewise be uncombined.'

448 b 33. ἔτι αἰσθήσεις κ.τ.λ. For Alexander's interpretation cf. note to b 28 above.

449 a 3. It seems to be the universal practice to take ταύτης as referring to ἐνέργεια in l. 2. We thus get a syllogism—if αἰσθήσεις then ἐνέργεια, if ἐνέργεια then οἰκεία δύναμις; hence all αἰσθήσεις have their οἰκεία δύναμις. But perhaps there was no need to prove this. Whether we read ταύτα or ταύτα in 448 b 28, we might prefer αἰσθήσεις here to be taken in the sense which it has in 448 b
33—as a distinct sense (not as sensation as I have translated). Now a sense is by definition a δύναμις (cf. De An. III. ch. 9, 432 a 16) and more accurately a δύναμις in the sense of ἐξις (cf. De Sens. ch. 1, 436 b 5, and note to ch. 4, 441 b 25, and De An. II. ch. 5). A sense is like a distinct science, a determinate potentiality; the actual exercise of both alike depends upon this, which may be called the οίκεία δύναμις of the ἐνέργεια in each case. It may be of these principles that Aristotle reminds us here. It has already been shown that, if the organs by which we perceive white and black are distinct, they, and therefore the faculties which reside in them, must be distinct. Hence these latter will be distinct in the sense that sciences are distinct. The two clauses—οὖτε...δύναμεως, οὖτε...αἰσθησις—will then form only a single premiss in the argument which proves that a distinct sense is like a distinct science.

449 a 4. Unless μὴ be read before αἰσθάνεται we get a shocking piece of bad reasoning; though if B can be perceived, a fortiori A can be perceived, we cannot infer that if A then B (B = τῶν τῶν γενετ. έτέρων, A = τά ἐναντία). Besides the presence of μὴ does not incommode the argument, in fact improves it.

The best defence of this emendation (which though authorised by no text is seen to be necessary by Alexander unless τούτων = ἐκεῖνων, i.e. heterogeneous objects, ἄλλων = ὄμοιοι). So St Hilaire and Leonicus) is by Bäumker in the Jahrb. für Class. Philol. 1886, p. 320. He points out that though in classical Greek if μὴ is read we should expect οὐδὲ not καὶ after ὅτι in the next clause, yet we find instances of the contrary usage in Aristotle, e.g. De Coelo, I. ch. 11, 281 a 10: οὐν ὁ χίλια βαδίσατο στάδια μὴ δύναμεος, δήλων ὅτι καὶ χίλια καὶ ἐν.

The presence of the καὶ, being so contrary to common usage, probably led to the omission of the μὴ.

For the principle compare above 447 b 7 sqq. and 448 a 15 sqq. ἐν ἐνι καὶ ἀτόμῳ must refer to time (cf. 448 b 22–24 and notes). It is the simultaneousness of the perception which is under discussion, and which cannot be accounted for by the theory that the faculty or organ is diverse.

449 a 7. From ἦτοι, l. 7, to ἐκ τούτων ἐν, l. 9, the passage is almost hopelessly obscure.

tούτων, l. 7, must surely refer to γλυκέος and λευκοῦ. The phrase τὸ ἐκ τούτων continually refers to a compound. Cf. De An. II. ch. 1, 412 a 9, where οὐσία συνθέτη, consisting of ὅλη and εἴδος, is so
designated, and *Metaph.* vii. ch. 3, 1029 a 3, etc. Thus if here τὸ ἐκ τοῦτον refers to the organ or faculty of perception, it can hardly imply that it is a substratum or ὑποκείμενον, as Alexander (*De Sensu*, p. 162, l. 23 [W.], p. 343, l. 6 [Th.]) and Rodier (ii. p. 390) take it.

However, apart from this, all except Simon (Simon, *De Sensu*, p. 261) admit that (τὸ) ἐκ τοῦτων in l. 9 refers to a compound of qualities or sensations, and it is hardly likely that in three lines Aristotle would employ the same expression to refer to two different things. Moreover the meaning of τὸ ἐξ ἀμφοῖν in 448 b 32 above, as well as ἐξ ὧν 447 a 23, ἐκ...ἐνίων 447 a 32, etc., all point to this phrase referring to a fusion of sensations, and so St Hilaire takes it. On the other hand, Alexander, Thomas, Simon, and Rodier wish to take it as referring to the soul or the central organ, the heart. The only advantage resulting from this is that the connection of ἀλλ' ἀνάγκη ἐν and ἐν γάρ τι τὸ αἰσθητικόν ἐστι μέρος is quite clear, but it leaves the connection between the latter clause and those which follow it absolutely unexplained.

Simon is more consistent than others in thinking that the reference may be to the central sense and its organ throughout.

If we take τὸ ἐκ τοῦτων as referring on both occasions to a product of sensations, then the argument will be clear except as to the connection between ἀλλ' ἀνάγκη ἐν and ἐν γάρ τι τὸ αἰσθητικόν ἐστι μέρος. The only way I can see for explaining this is as follows: ‘It is claimed that we perceive black and white simultaneously by means of a single organ with spatially diverse though continuous parts. But in such a case the two sensations must coalesce and form a unity, and hence, if it is by the same means that we perceive sweet and white, then they too must form a unity. But such a unitary product does not exist. Hence it is not by the spatial diversity of the organ that those qualities are perceived simultaneously.’

The question is still as to the means of perceiving the two simultaneously (which he is sure can take place), and the objection to the solution proposed is not that it postulates different organs, for he admits that such exist (ἀλλ' ἐξ ἑνὸς δ' ἀλλου, l. 11), but that it is through a spatial diversity of the organ that they are supposed to be related in the same moment of time.

Thus, in the whole of this section from 448 b 19 onwards Aristotle has been working up to his own theory. He rejects the
solution proposed in the form in which it is offered but, more suo, abstracts from it the legitimate part. There are different faculties, but it is not quâ located in different physical organs that they are able to allow their different contributions to be correlated in a single consciousness.

449 a 8. ἀλλ' ἀνάγκη. If Aristotle is still discussing the solution hazarded in 448 b 23–25, as he must be, this is proof positive that according to that theory the soul must be a unity of a kind, and so our interpretation of οὗτως δ' ἀτόμως in 448 b 24–25 is confirmed. If it were under dispute whether what perceives is something unitary or not, Aristotle could not bring in without proof the very statement which was denied—ἐν γάρ τι τὸ οἰσθητικὸν ἐστὶ μέρος. Indeed if he knew this to be true and to be excluded by the other theory—ἀλλ' ἴπτερον ἀλλ' ἰδαν τῷ λεικοῦν οἰσθάνεται ἡ ψυχή μέρει—he would need to start with a direct proof of it.

449 a 10. Biehl proposes to read δὲ instead of ἄρα, no doubt because, apparently, all that has been said is in opposition to what follows. But, as we have seen (note to 449 a 7), what precedes is directed not against the doctrine of a unitary principle (indeed that has been affirmed in l. 8), but against the interpretation of it given.

449 a 12. ἦ μὲν ἀδίαιρητον κ.τ.λ. The meaning of this is elucidated in De An. iii. ch. 2, 427 a 10 sqq. Cf. note to 448 b 19 above.

449 a 17. Alexander reads, l. 17, εἰ γάρ μὴ χωρίστα κ.τ.λ. The sense then is—'One and the same thing numerically can be white and sweet and have many other qualities, for, though the qualities do not exist in separation from each other, yet in mode of existence they are different from each other.'

Bekker and Biehl both reject γὰρ, though Rodier accepts it. The latter also translates τὸ εἶναι by 'essence.' Cf. next note.

449 a 18. τὸ εἶναι. Alexander seems to countenance Rodier's translation of 'essence' by giving as equivalents λόγος and τὸ τί ἤν εἶναι. But, though not so far from λόγος in meaning, τὸ εἶναι is hardly as a rule equivalent to 'essential nature' or 'real being,' which is the special force of τὸ τί ἤν εἶναι. It is rather 'aspect of existence'; we might almost say 'existence for consciousness.' τὸ εἶναι almost = 'notionally': cf. note to ch. 6, 446 b 30, and for a typical case De An. iii. ch. 2, 425 b 27, where it is said that though the ἐγεργεια of the sense object and that of the sense faculty are one
and identical, yet in aspect of existence, *i.e.* as related to an external object in the one case and the human organism in the other, they are different—τὸ δ’ ἐλευθο ὦ τὸ αὐτὸ αὐταῖς.

We may take ἔνγο in l. 22 (with Bonitz, *Ind.* p. 221 a 60) as equivalent to τῷ ἐλευθο and translate ‘but notionally not the same,’ or we may take ἔνγο here as equivalent to ‘ratio’ and say ‘but not by means of an identical relation [to them],’ *i.e.* to the two sensations.

449 a 24. ἀπειρον. Aristotle cannot mean that the point from which a thing ceases to be visible is infinitely far away. Of course the point from which it ceases to be διναμει, *i.e.* potentially visible, is infinitely far away, *i.e.* is non-existent. This is a consequence of the doctrine, that every magnitude is sensible, discussed in the first part of chapter 6. But here we are discussing the converse proposition which answers the question raised in ch. 7, 448 b 17 and mentioned in ch. 6, 445 b 10. Simon (p. 256) is wrong in thinking that it is this issue which is raised in ch. 3, 440 a 29; it is the other statement, πᾶν μέγεθος ὑπατόν.

Alexander at first takes ἀπειρον as πολὺ τε καὶ σχεδὸν ἀπειρον, but later on gives the correct interpretation: ὦ γὰρ ἔστι λαβέων τὸ μέγατον διάστημα ἄφ’ ὦν ὡκ’ αἰσθανόμεθα (*De Sens.* p. 168, l. 27 [W.], p. 356, l. 6 [Th.]).

The argument is worked out in terms of sight, but applies to all other senses which employ a medium. It is—‘as the distance between object and seer increases, we arrive at last at a point beyond which the object is invisible, though short of it vision is still possible. This is a single mathematical point, and the object, as it diminishes, will, if indivisible to sight anywhere, be indivisible when this point is reached. But this point is the first in the series from which vision is possible, the last where it is impossible. Hence, when at this point, the object will be both visible and invisible; which is impossible.’

449 a 28. τοῦτο. Alexander takes this to refer to the μεταξ’, the mean point at which vision begins and invisibility ceases. Thus all others too. But, if we interpret it so, it is difficult to construe ὄντος, l. 30. The indivisibility of the point seems to be implied strongly enough in the last clause—ἐστι δὲ τι ἐσχάτου κ.τ.λ., and, at any rate, whether expressed or not, it is a necessary part of the argument that an indivisible αἰσθητόν will be found at this point if anywhere.

449 b 2. κοινή. For this sense of κοινός cf. ch. 1, 436 a 7.
DE MEMORIA

CHAPTER I.

449 b 4. *μνημονεύειν* is simply the verb corresponding to *μνήμη*, and means to have something (consciously and at the time) in one’s memory. It is paraphrased by *ἐνεργεῖν τῇ μνήμῃ* in 450 a 21 beneath. It is to be distinguished from *ἀναμνήσκεσθαι* which implies the active search for the memory of some particular item of one’s past experience. Though we employ ‘to remember’ for the former, ‘to recollect’ for the latter, the English words are hardly so sharply contrasted as the Greek; in fact, in ordinary use they are hardly to be distinguished, as is natural considering that both contain the prefix corresponding to the Greek ἄνα. But even in Greek, and sometimes in Aristotle himself, the terms are not used with perfect precision. Cf. Freudenthal in *Rheinisches Museum*, 1869, p. 403.

449 b 8. *μνημονικόλ. This is one of the characteristics enumerated in Aristotle’s hardly complimentary list of the peculiarly feminine qualities. Cf. *Hist. Animal*. ix. ch. 1, 608 b 13.

449 b 10. *ληπτέον =* we must make an assumption. Aristotle is going to show grounds for this assumption, but he could not say *ὑποκείσθω*, because that would imply that the grounds had been already shown. Cf. note to *De Sensu*, ch. 1, 436 a 5. This seems to be the distinction generally maintained between *λαμβάνειν* and *ὑποτίθεσθαι*.

449 b 12. *δοξαστικόν. δόξα*, as a faculty, means generally the power of forming opinions and thinking, in the widest sense of the term. When defined more closely, however, it takes rank as the lowest of the rational faculties; it is practically equivalent to *ὑπόλογις* in its most restricted application and is opposed to *ἐπιστήμη*, which has for its object necessary truth. Cf. *De An. iii. ch. 3; Anal. Post. i. ch. 33; Metaph. vii. ch. 15, 1039 b 32 sqq.

449 b 14. There is a special treatise *Περὶ τῆς καθ’ ὑπνον μαντικῆς* 462 b 12 sqq., on supposed prevision of the future by means
of dreams. Aristotle accounted for the phenomena in question by means of natural agencies.

449 b 16. Here Aristotle agrees with Locke (Essay, Bk. iv. ch. ii. §14 and ch. xi.) with whom ‘sensitive knowledge’ occupies pretty much the same place as αἰσθησις with Aristotle.

Though only the present is known by perception, this does not mean that only perception knows the present. In l. 18 beneath, τὸ θεωρούμενον is given as an example of τὸ παρόν.

449 b 17. Biehl prefers ὅτι before πάρεστιν instead of ὅτε, the reading adopted by all other editors. The point to be made on is that quid present an object of consciousness is not an object of memory. One might remember, while he was looking at a white thing, that he had seen it before; but he cannot remember that it is now present. This is the only point to be made out here, viz. that memory is the apprehension of a thing not as present but as past. How this is possible is discussed in 450 a 27 sqq. That which is present to consciousness when we remember, is not the object remembered but its copy (εἰκών). When the present object of consciousness is recognised as a representation of something in the past, then we have memory.

449 b 20. ἀνευ τῶν ἐνέργειῶν. Themistius and Michael read ἔργων. Themistius explains thus—ἔργα δὲ λέγω οἶνον τοδὲ τὸ ζῷον ἢ τοδὲ τὸ λευκὸν καὶ τὸ ἐν τῷ δὲ τῷ βιβλίῳ τρίγωνον, i.e. as practically equivalent to πράγματα = the real things. Whatever the reading be, the sense must be the same; ἐνέργειῶν must mean the actual operation of the real objects, or something similar; ἀνευ τῶν ἐνέργειῶν cannot mean ‘without actually having knowledge or perception,’ which would imply that only the ἔξεις providing for knowledge or perception existed, for these may persist throughout unconsciousness, e.g. in sleep. There really is perception or knowledge of something present whenever we remember; an ἐνέργεια is realised (cf. 450 b 30: ὅταν ἐνέργη ἡ κίνησις αὐτοῦ κ.τ.λ.), but to be memory it depends upon whether or not this ἐνέργεια is referred to something else (ἅλλου l. 32) existing in the past.

What is actually present in the act of memory we shall find to be a φάντασμα; a φάντασμα is a persisting sensation or sense content. Now, though it is true that this is in most cases the intermediary employed by memory, yet that intermediary might in certain cases be an actual perception, as e.g. when we see a thing for the second time and remember we have seen it before.
449 b 22. Biehl and Freudenthal (Rheinisches Museum, x: p. 394) wish to delete τὰς τῶν τριγώνων...ίσαι, on the ground that these words are left standing we shall have to translate 'he remembers that the angles of a triangle are equal to two right, in the one case because he learned or thought of it, in the other because he heard or saw it or had some sense knowledge of the fact.' But Freudenthal points out that we cannot have sensuous knowledge of any mathematical principle according to Anal. Post. i. ch. 31, especially 87 b 34 sqq.: οὖν ἐπὶστασθαι δι’ αἰσθήσεως ἐστιν. ἀλλὰ ἤλον οὔτι καὶ εἶ ἡν αἰσθάνεσθαι τὸ τρίγωνον κ.τ.λ.

Freudenthal quotes Themistius, who paraphrases 'he remembers that the angles of a triangle are equal to two right angles, and that Socrates is white, in the one case because he learned, in the other because he heard or saw it' (Themist. Sp. ii. p. 233, ll. 12 sqq.). The writer of the paraphrase, he thinks, felt the same difficulty and accordingly inserted καὶ τὸν Σωκράτην ὅτι λευκός as an example of sensuous memory.

This, however, is not convincing; it is not a case of knowing in the full sense of having scientific knowledge of a fact but of remembering it. Perception is of the particular, but there is no reason why we should not perceive in a particular case and without proof that the angles of a triangle are equal to two right angles; cf. Anal. Post. loc. cit. infra: we can perceive that the moon is eclipsed without knowing the reason. However, there is an additional reason for rejecting τὰς...ίσαι (which is such a common Aristotelian example that it might easily have crept into the text); it is the necessity of translating οὔτι before έμαθεν and ἡκονσεν by 'that,' not by 'because.' The point to be brought out is that memory refers to the past; we are not here explaining ωθύ memory takes place. Cf. next clause—δει γάρ...λέγειν, οὔτι πρῶτερον. The disputed words are probably a gloss that has crept in at the wrong place. Some such expression inserted after ἰθεώρησεν would be quite in harmony with the thought here.

449 b 27. ὑπόληψις is here used in its widest sense as equivalent to conceptual thought. It seems to include θεωρία: cf. l. 18 above and 450 b 25, 35 etc. The present objects of consciousness are objects either of αἰσθήσεις or ὑπόληψις, sense or thought, αἰσθήματα or νοήμαta.

In its more restricted application ὑπόληψις is the poorest of the intellectual faculties. Cf. De An. iii. ch. 3, 427 b 17, 25, 28, and Anal. Post. i. ch. 33, 88 b 37, and cf. Rodier, ii. p. 411.
of 449 b 29. Freudenthal (op. cit. p. 395) rejects καὶ πρῶτερον because these words cannot refer to a statement which immediately precedes, while here it is simply to the previous paragraph that reference is made.

Themistius, the ancient translation, and L MS U also omit the two words.

449 b 30. αἰσθησις. As we have seen above, ὑπόληψις also deals with the present; but Aristotle is here talking generally and, in fact, a sensuous element is always involved in knowledge of the present, because the object of thought, as we shall see, is always accompanied by imagery which, again, depends upon sense.

449 b 33. τοῦτο. The heart (or according to Neuhäuser, ί Introduction, sec. vi., the σύμφωνον πνεύμα contained in it) is the organ of the κοινὴ αἰσθησις: cf. De Juvent. ch. 3, 469 a 11, cf. also beneath 450 a 11 sqq. and notes.

At ἔτει begins a protasis, the apodosis corresponding to which is not reached till 450 a 15: ὁστε τοῦ νοητικοῦ κ.τ.λ. Φαντασία is treated in De An. iii. ch. 3. There it is defined as a (psychic) change due to sensation (κίνησις ὑπὸ τῆς αἰσθησίας τῆς κατ' ἐνέργειαν γεγομένη 429 a 1). Again we find in ch. 8, 432 a 9: τὰ γὰρ φαντασματα ὁστερ αἰσθήματα ἄστι, πλην ἄνευ ἀληθος, i.e., an image is identical in character with a perception except that in the former case the real concrete thing which contains ἀληθις is absent; only the έιδος of the sensible object is present. As Themistius (Sp. ii. p. 237, l. 18) says, it is that which is left over (after perception), and remains even though the sense object is not present, which is called φαντασία. Besides the fact of the absence of the real object in φαντασία, the only other difference between it and sensation seems to be its greater liability to error (428 a 26 sqq.), and that it is weaker in intensity: cf. Rhet. i. ch. 11, 1370 a 28: ἡ δὲ φαντασία ἐστίν αἰσθησις τις ἀσθενής. It is like Hume's 'idea' as opposed to his 'impression.'

On the other hand it does not seem to be perfectly necessary that the real object should cease to be present; e.g. in 428 b 2 the appearance of the sun as of a foot in diameter is given as a case of φαντασία, and again, from 428 b 28, it is clear that φαντασία and αἰσθησις can synchronize. But the φαντασία is probably to be distinguished as the κίνησις which has penetrated to the heart—the ἄρχη; cf. De Insom. ch. 3, 461 b 12, 461 a 6; cf. also ch. 2, 459 a 23 sqq.: at least special emphasis is laid on this aspect. Sensations
or stimuli travel from the end organ to the central one and persist after the exciting object is removed, καὶ ἐν βάθει καὶ ἐπιστόλησ. It must be the former which is the φάντασμα proper, for we hear in 450a11 sq. below that it belongs to the κοινὴ αἰσθήσις and the πρῶτον αἰσθητήριον (cf. note to 450a11).

This all goes to emphasize the sensuous character of imagination, but however they are to be related to each other, we must not go so far as Themistius, who practically makes φαντασία a genus, which is known as αἰσθήσις if the object is present, as μνήμη if it is absent, and makes the φαντασία in both cases the presentation of a τύπος. But, after all, τύπος is only a metaphor to Aristotle. The αἰσθημα (sensation) is not strictly a τύπος; it is rather the λόγος of the αἰσθητόν, and the φάντασμα present in memory is not per se a τύπος, but only in so far as it represents the original perception. Even then it is only ὁ σωματική. Themistius himself sees that, according to his theory, only the very vaguest sense could be given to τύπος (238, l. 10: χρή δὲ κοινότερον τοῦ τύπου ἐπὶ τῆς φαντασίας ἄκουειν).

449b34. νοεῖν ὅν ἐστιν κ.τ.λ. Cf. De An. iii. ch. 7, 431a16: δὲ ὀπισθοτέρα νοεῖ ἀνευ φαντασμάτως ἡ ψυχὴ and 431b2: τά μὲν οὖν εἶδο τὸ νοητικὸν ἐν τοῖς φαντάσμασι νοεῖ, also ch. 8, 432a8: ὅταν τε θεωρή, ἀνάγκη ἤμα φαντάσματι θεωρεῖν.

The reasons which Aristotle adduces for this contention seem to be twofold, (1) firstly that brought forward in chapter 8 of De Anima iii., that nothing self-dependent or ‘isolated’ (κεχωρισμένον 432a4) exists beyond the extended things given by sense perception; knowledge can occupy itself only with the εἴδη, forms of or concepts realised in sense objects. Hence, when the actual object is not present, thought is possible only if the φάντασμα originated by perception is present to the mind. Secondly (2) there is the reason obscurely implied in ch. 7, which culminates in the statement in 431b10 that truth and falsehood, the distinctions applicable to theoretical consciousness (cf. 431a14: τῇ διανοητικῇ ψυχῇ) are generically the same as good and evil, the objects of pursuit and avoidance in the practical life (cf. also Eth. Nic. vi. ch. 2, 1139a26); cf. Rodier, ii. p. 515; affirmation and negation are at bottom the same as pursuit and avoidance (the germ of Pragmatism). Now, it is by means of sense that animals are able to distinguish between the pleasant and the unpleasant (cf. 431a10). Hence the pursuit of truth, which is distinguished from the quest of the good merely by
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450 a 9. ἄνευ τοῦ συνεχοῦς. Quantity, τὸ ποσόν, which is either discrete (as in number) or continuous (as in space or time) is here alluded to in the latter form, in which indeed it has been illustrated just above. It is the continuity which forms the perceptual element in the concepts of mathematical objects. We read in De An. iii. ch. 8, 432 a 5 that concepts, including those belonging to mathe-
matics, exist in the perceptual forms of things (ἐν τοῖς ἔδεσιν) which, therefore, when we think, form the total object of consciousness from which the mind disengages the higher concept or νόημα. τοῦ is ἔδος ἔδον, whereas perception (as actualised) is the ἔδος αἰσθητῶν. The perceptual setting, as opposed to the higher concept, will form the ὑλὴ νοητῇ of which Aristotle tells in Metaph. vii. ch. 11, 1037 a 4 and ch. 10, 1036 a 9 sqq.: ὑλὴ δ' ἡ μὲν αἰσθητή ἐστιν ἡ δὲ νοητή, αἰσθητὴ μὲν οἷον χαλκός καὶ ἔγλαυ καὶ ὅσι καλή ὑλή, νοητῇ δὲ ἡ ἐν τοῖς αἰσθητοῖς ὑπάρχουσα μὴ ἡ αἰσθητά, οἷον τὰ μαθηματικά. (Cf. the discussion of De An. iii. ch. 4, 429 b 10-22 in Rodier, ii. p. 442 sqq. The ὑλὴ αἰσθητῆ is the actual a(s) matter of the physical substance apprehended. It is not this which gets into the soul when we perceive, but the ἔδος of the thing; cf. De An. iii. ch. 8, 431 b 29: οὐ γάρ ὁ λίθος ἐν τῇ ψυχῇ ἀλλὰ τὸ ἔδος.) But this perceptual form itself supplies a matter for the higher concept, e.g. in mathematics. The pure mathematical concept is not τὸ εὐθὺ or τὸ κοῖλον, the straight line or the curved, but τὸ εὐθεῖα εἶναι and κωλότης—straightness or curvature (cf. loc. cit. 429 b 18 and ch. 7, 431 b 12, also Metaph. vi. ch. 1, 1025 b 30 sqq., x. ch. 8, 1058 a 23, etc.). But these concepts cannot exist apart, though they are for mathematical purposes assumed to exist apart (τὰ ἐκ ἀφαρμέσεως—τὰ μαθηματικὰ οὐ κεχωρισμένα ὡς κεχωρισμένα νοεῖ. The general expression for this matter, 'matière logique,' without which these concepts cannot exist, is τὸ συνεχῆς (cf. 429 b 19: μετὰ συνεχῶς γάρ, and Philop. De An. 531, 15, ὑλὴ γὰρ ἐστὶν, ὡς φύσιν, τῶν σχεμάτων τὸ συνεχῆς).

ἀνεφ χρόνου. Aristotle here mentions a different class of objects from the mathematical entities referred to in the last clause. He seems in particular to mean the heavenly bodies (cf. note to 449 b 34), which he continually refers to as ἀθανασία and ἀφθαρσία (cf. Phys. iv. ch. 12, 221 b 3), and as not being in time. They differ from other bodies in not having a ὑλὴ which admits of growth and decay, but one which admits of motion only. Cf. Metaph. viii. ch. 4, 1044 b 7.

One may say with Freudenthal (op. cit. p. 396) and Hammond that Aristotle here refers also to 'eternal laws'; they must be those of existence generally, and not merely the laws governing the motions of the heavenly bodies, as is implied by Hammond, for we hear in Phys. iv. ch. 12, 222 a 5: τὸ ἀσύμμετρον εἶναι τὴν διάμετρον ἔδει ἐστὶν. He does not, however, talk of laws or principles as existing apart
the passage in the text of objectivity as the objects.

Suppose him to do so would be to impute to him the theory of eidos χωριστά. The concepts involved in thinking of Themistocles’ things of sense are not οὐσίαι, e.g. neither the point (στιγμή, cf. Metaph. VIII. ch. 5) nor the infinite (τὸ ἀπειρον, cf. Phys. III. ch. 5, 204 a 23, and Metaph. XI. ch. 10, 1066 b 13 sqq.) are οὐσίαι. Again, τὸ ἀγαθόν and τὸ καλὸν are not eidos χωριστά. Though in the case of some concepts their essence and their existence is identical (De An. III. ch. 4, 429 b 12, and Rodier, ad loc. pp. 442 sqq.) this does not mean that these are to be regarded as substances (e.g. that their existence involves their existence, as according to Spinoza’s definition of substance), but that their existence is a purely conceptual one. The υἱόσα ἄνευ υλῆς mentioned in De An. III. ch. 6, 430 b 30, which are the ultimate simple constituents of intellect or objects of νοῦς (ἀδιάφορα μέρη, τὰ ἄνευ συμπλοκῆς, πρῶτα νοήματα, De An. III. ch. 8, 432 a 12) reudand which are to be identified in part with the categories (cf. Rodier, ling II. p. 474, and Metaph. VIII. ch. 6, 1045 a 33 sqq.) partly with vague theconceptions like the Good, Being, and the One, or again with τὸ τοῦ ἀπειρον, στιγμή, μονάς, etc., are not to be regarded as existing apart from sensible things. If Aristotle says that they have neither υλικά eidos εἶναι not υλη αἰσθητὴν (Metaph., loc. cit.), that simply means that they are ultimate and simple and are not formed by a complex of constituents, even mental constituents. These concepts must in fact be envisaged out of which the complex ones are formed. In that ch, though they themselves must be ἄνευ υλῆς but they are not χωριστά. The connection with the thought here and the main contention—43). B’thought cannot function apart from φαντασία—is not quite 450 a 16. Why should the impossibility of a thing being thought apart from φαντασία require the presence of a φαντασμα when it is apprehended? Doubtless it is because of the continuous nature of time 450 a 20. It owes to it owing to its connection with change. Cf. Phys. Joachimsth. 1, 219 a 12: διὰ γὰρ τὸ τοῦ μέγεθος εἶναι συνεχές καὶ τῆς κίνησις st of the ἐκχύσ, διὰ δὲ τῆς κίνησιν ὁ χρόνος: οὐσι γὰρ ἡ κίνησις, τοσοῦτος er animalwos ἀνεὶ δοκεῖ γεγονέναι. Time is the ‘measure’ or ‘number’ to them; cf. ch. 12, 220 b 8 sqq. (though not number in the But Sī: sense, for that implies discreteness): and change is the great characteristic of the sensible world. No doubt it is because the heavenly bodies are μεγέθη and participate in κίνησις, though merely
κίνησις κατὰ τόπον, that they must be represented as characteristic of the sensible world, and that they too can be hended only by means of φαινασία (cf. note to 449 b 34).

450 a 11. By this, as we have seen, Aristotle differently to the faculty or the organ and there is no grouping Freudenthal's refusal to think that the organ is here referred to. μέγεθος is certainly here not the simple equivalent of τὸ ποσὸν above; it is, rather, a particular example of quantity. Aristotle in this clause merely particularises what he had said before more universally of ποσὸν in general, and at the same time the mention of κίνησις and χρόνος carries us beyond the particular example of spatial quantity which was indicated by the triangle. μέγεθος, κίνησις, and χρόνος, are all united (cf. previous note) as species of τὸ συνεχεῖς, and it is pointed out that, in consequence, it must be the same function (and hence faculty and organ) which apprehends them all. If we keep the following sentences in the order given in the text, the argument will then be, "Magnitude, motion and time are perceived by the same faculty. But they (being continua, cf. previous note) form the sensuous and hence imageable element in consciousness. Now imagery belongs to the sensus communis. Hence the apprehension of these determinations of quantity belongs to the organ of the common sense—the primary sensorium. But memory, even that which deals with concepts, implies imagery. Hence it is a function of the primary organ of sensation directly, though indirectly it concerns the faculty of thought."

The whole argument as it stands is not well arranged and he Freudenthal proposes to remodel it, but it is not much more common than many others in the Parva Naturalia and the want of order be explained. There are two conclusions to prove, (1) the premiss of the final conclusion—that thought must employ in enunciated first in 449 b 34 sq.; (2) that, since that is so, every memory which deals with the objects of thought must be a faculty of the organ to which imagery is due. Involved in all this is also the briefer argument that memory in general, employing must be attributed to the primary organ of sensation.

It is the involution of these three difficult discussion causes the apparent want of coherence. There is more premiss which is merely implicit and never formulated—that identifies the imageable element—τὸ φαιναστὼν—with τὸ συνεχεῖς. Aristotle simply assumes their identity as obvious, and any arrange-
vent of the passage would have to fall back upon this principle as a constituent in the proof. Freudenthal proposes (op. cit. p. 397) to pass from χρόνον, l. 11, to ὡστε, l. 12, and insert the clause καὶ τὸ φάντ. ...πάθος ἔστιν after φαντάσματός ἔστιν, l. 14. For this he has the support of Themistius. Accordingly he gives the following as the sketch of the argument—"Every memory is bound up with a perception of time, every concept accompanied by a φάντασμα. To perceive time is identical with the perception of magnitude and motion, and is provided for by the πρῶτον αἰσθητικόν. Memory also uses concepts, but not apart from imagery, and this belongs to the πρῶτον αἰσθητικόν. Hence, memory belongs to it also."

But this does not do justice to the real complexity of the argument or bring out the main point—that even conceptual memory is a function of the primary sensorium. To prove that memory which does not specially deal with νοητά is a sense function would not cost so much argument.

Freudenthal seems to have been led astray by his misunderstanding of the reference to χρόνος in ll. 9 and 11. He thinks that there Aristotle refers to memory as a sense of time, as in 440 b 31. But there is no particular reference to this here. Aristotle is forced to talk of χρόνος because he wishes to illustrate the objects of thought which cannot be apprehended without an image in the mind, not only by the concepts of mathematics, τὰ ἐξ ἀδιαφάνειως, e.g. τὸ τρίγωνον, the scientific interest in which does not affect the matter in which they are realised, but by the eternal substances, which, though appearing in time, are not conditioned by it.

450 a 15. The texts all have νοομένου, which must be a mistake instead either of νοητικοῦ or of διανοομένου (Bywater, J. of Philol., xxviii. p. 243). Biehl relying on the vet. tr. "intellectivi" has νοητικοῦ.

450 a 16. καὶ ἔτερος. Cf. De An. iii. ch. 3, 428 a 10, 11, where φαντασία is attributed to the ant and the bee but not to the worm. Themistius brings in the dove (περιφαντασία) also.

450 a 20. The reading of all mss. is θυντῶν, but Rassow, Prog. d. Joachinsth. Gym. 1858, suggests θηρίων, which Biehl accepts. Most of the commentators certainly take θυντῶν as referring to the lower animals. Themistius writes ἀλόγων. If Aristotle meant to refer to them, certainly θηρίων is the more suitable term.

But Simon (p. 287), who also leans to the view that by θυντῶν "bruta" are meant, suggests as an alternative an interpretation which gives its proper sense to θυντῶν.—If Memory belonged to the faculty
of pure thought it would not belong to many animals (for few possess reason), and perhaps to none that have a perishable body (which requires their thinking to be mediated by imagination). Relying on the famous passage at the end of *De Anima* iii. ch. 5, where the impassivity of the eternal νόησις is set forth, and it is declared that we have no memory of a previous state of existence, because our thought depends upon the perishable reason which alone can experience impressions, he contends that, in Aristotle's opinion, memory does not belong to the superior and divine reason but only to the human, being exercised by the latter only through the instrumentality of φαντασία.

Whatever be the exact interpretation of the passage in the *De Anima* referred to, it is clear that, according to the Aristotelian teaching, νόησις, in the sense of a faculty of pure thought, cannot exercise memory. Its function is the ἀδιαφρέτων νόησις (*De Anima* iii. ch. 6, 430 a 26) which must be something totally different from the apprehension of time in which there is no part which is indivisible. Again, in its characteristic sense, it is not a faculty of synthesis (*ibidem*) such as human thought and memory must be. (When we remember we must affirm that the image is like the real object, *i.e.* there must be synthesis: cf. below.)

Simon, however, takes the next clause (ἔπει οὐδὲ νῦν πάσι, κ.τ.λ.) to refer to the lower animals which have not even got φαντασία (cf. *De Anima* ii. ch. 3, 415 a 10: ἀλλὰ τοῖς μὲν οὐδὲ φαντασίᾳ); but, if that is so, it is difficult to see what it has to do with the previous statement. Even though we read θηρίων or interpret θηρίων as θηρίων, we should have to render—"If memory were an affair of the intellect not many, perhaps none, of the lower animals would possess it, and, as a fact, as things are (memory being not an affair of the intellect), not all the lower animals do possess it, seeing that they do not all have the sense of time." But ἔπει cannot hardly carry this meaning, and, even if it did, the latter clause adds nothing to the argument. That some animals, being without φαντασία, do not remember, does not in the least show why, if memory were a matter of pure thought, none would remember.

Yet it must be in some such way that Rassow and Biehl, reading θηρίων, take the sentence; and Simon, taking the last clause as he does, rather inclines to give up his first interpretation and follow the other commentators.

Hammond (p. 198) translating Biehl renders "perhaps in none
of the brutes, seeing that they do not, as a matter of fact possess it, because they all lack the sense of time." This is an impossible rendering of οὖδὲ νῦν πάσι καὶ διὰ τὸ μὴ πάντα...ἐχειν, and, besides, contradicts ll. 16–17 immediately above, where memory is said to be found in certain other animals—διὸ καὶ ἑτέρους τισίν ὑπάρχει τῶν ἁμών.

Rassow, defending his emendation, maintains that it could not be said that if memory depended on thought it would be absent in man, one of the θυντά. But that is not so: memory exists in man only because he possesses the faculty of φαντασία; if he were a being whose sole activity was pure thought he would not remember. It should be clear that, if memory depends solely upon the νοῦς παθητικὸς (which involves φαντασία and αἴσθησις), a being whose reason is not similarly to be described as passive will not remember.

Hence the solution of the difficulty is to take ἐπεὶ οὐδὲ νῦν πάσι, κ.τ.λ. as referring to that being or those things whose sole activity is the exercise of νοῦς—θεωρία, i.e. θεός—God, or perhaps to the heavenly bodies. Hence, after πάσι we are not to understand τοὺς θυνταῖς but τοὺς ξύφοις.

It is not at all unprecedented for ξύφον to refer to living beings generally, nor is it impossible for it in this wide acceptance to include θεός and the heavenly bodies. Cf. De An. ii. ch. 3, 414 b 15 sqq.: τῶν ξύφων...ἐνίοις δὲ...ὑπάρχει καὶ τὸ κατὰ τόπον κυνητικὸν, ἑτέρους δὲ καὶ τὸ διανοητικὸν τε καὶ νοῦς, οἷον ἄνθρωπος καὶ εἰ τοῦ·οῦτον ἑτέρων ἐστίν ἡ τιμωτέρων. By the latter Simplicius (De An. 106, 27) tells us the stars are meant; cf. also De Caelo, ii. 12, 292 a, 20 sqq. and ch. 8, 290 a 32. The stars are in the last passage called ξύφα. Cf. De An. i. ch. 1, 402 b 7, where it is implied that θεός is a species or particular example of ξύφον. Cf. also Metaph. xi. ch. 7, 1072 b 28: φαμέν δὲ τὸν θεόν ἐίναι ξύφον ἄδιδον ἀριστον, also xiv. ch. 1, 1088 a 10. Since the activity of God is νόησις (1072 b 18), and since, being ἄδιδος and ἀφθαρτος, he is not in time, it would be a safe deduction that he has not the χρόνον αἴσθησιν which is indispensible to memory.

Hence, the sense of the passage is clear—"Memory is not a function of pure thought for, if it were, none of the living creatures that are mortal, i.e. have perishable bodies and think by means of the sensuous images which are bound up with bodily changes would have memory. (Cf. De An. i. ch. 1, 403 a 13 sqq. The psychical changes we experience are λόγοι ἐνυλοι 403 a 25.) In fact certain
living beings, which are freed from the conditions of human life, do not possess it.”

450 a 22-23. Rassow (op. cit.) proposes to read ἢ ἔμαθε πρότερον, αἰσθάνεται and make αἰσθάνεται govern ὅτι εἶδε k.t.l. The chief ground for the change is that προσαυσθάνεται seems to be a ἀπαξ λεγόμενον. But Biehl lets it stand, reading ἐνεργῇ τῇ μνήμῃ as equivalent to μυθομενεῖ and as governing ὅτι εἶδε.

450 a 27. δόσα μὴ ἄνευ φαντασίας. The question is whether there are any concepts which can be divorced from all imagery. Cf. previous notes.

450 a 32. Freudenthal (op. cit. p. 401) proposes either to omit τὸ πάθος or to read it after τοιοῦτον, l. 30. Certainly the words seem out of place and Rassow, who proposes either to delete τὸ after τοιοῦτον or to read τι, interprets the sentence following an order which places τὸ πάθος, ὅν...εἶναι after νοῦσαι l. 30.

450 a 34. Aristotle uses the metaphor of the seal-ring in another connection in the De Anima, iii. ch. 12, 435 a 2. The object as it were stamps an impression on the air which as it were transmits it onwards until it meets the sensory organ. Again in ii. ch. 12, 424 a 19 the impression on the organ produced by the sense object is compared to the impression left by a seal-ring on a surface. But cf. above note to 449 b 33.


450 b 2. δι’ ἡλικίαν. This, in consonance with the common use of ἡλικία (cf. Bonitz, Ind.), seems to refer both to the aged and the young. In both the mind seems to be too “fluid” to retain impressions, cf. ἰέωσι, l. 7 beneath.

450 b 4. τὸ ψήχεσθαι. This may be another simile for the minds of the aged, and Aristotle may have in view the crumbling condition of an old stone surface. But in the light of its conjunction with σκληρότητα l. 5, perhaps it refers to the inner walls of a building: that had originally a prepared surface in which a design was cut, but which gets worn off and leaves nothing but the hard layer beneath. This is suggested by a perusal of the famous passage in the Theaetetus (191 c sqq. especially 194 c sqq.) from which Aristotle seems to have drawn almost all the illustrations here employed. There the heart is compared to a waxen tablet (κύρινον ἔκμαγεῖον) on which impressions are stamped. The surface must be neither too soft nor too hard, for, in the former case, the mind, though easily receiving
an impression, soon loses it (ὡν μὲν ὄγρον, εὖμαθεῖς μὲν, ἑπιλόσμονες δὲ γύγνονται), while, with the hard surface, the opposite is the case. For a mind of good capacity, the waxen surface must be not only of the proper consistency but deep (βαθῶς τε καὶ πολὺς καὶ λεῖος καὶ μετρίως ώργασμένος). People with such an organ are both εὖμαθεῖς and μνημονεῖς.

Now an ἐκμαγεῖον or prepared surface need not be composed of wax; it may consist of gypsum (cf. L. and S.), and probably the decorated parts of Greek houses and buildings (where marble was not employed) may have had a layer of plaster imposed on the stone, with bas-reliefs cut thereon.

450 b 6–7. Cf. also ch. 2, 453 b 5.

450 b 18. Freudenthal proposes to read ητούτων αἰσθησις instead of τούτων αὐτῶν η αἰσθησις with Themistius (Sp. II. p. 239, l. 25). The change is not important.

450 b 27. Biehl brackets θεώρημα, while Freudenthal (op. cit. p. 401) deletes both it and φάντασμα, on the ground that if we read αὐτό τι καθ’ αὐτό εἶναι θεώρημα the next line η μὲν οὖν καθ’ ἐαυτο, θεώρημα η φάντασμα ἐστιν forms a tautology and, if we read ἄλλον φάντασμα, is contradictory.

Biehl has the support of L.S.U, Themistius and the ancient translation, in omitting θεώρημα. If we read θεώρημα it will be better to follow E Y and read καὶ αὐτὸ καθ’ ἐαυτό εἶναι θεώρημα καὶ ἄλλον φάντασμα—“is both an object of consciousness per se and the image of something else.” Then the next sentence goes on to explain and correct this statement. “Per se it is an object of consciousness or an image; so far as it is the appearance of something else it is a copy and souvenir.”

The contradiction, or rather the duality, in the use of φάντασμα here, which causes Freudenthal to expunge it from the former clause, is really one which goes right down into the heart of the concept of φαντασία and φαίνεσθαι as used by Aristotle. A φάντασμα is at once a sensuous image posited like a simple sensation or a fundamental concept before the mind, and at the same time it claims to represent something objective. In its first aspect, as a simple element in the content of consciousness, it has nothing to do with either truth or falsity; in its second capacity it falls within the domain of synthesis, in which truth and error reside. (Cf. note on φαντασία above 449 b 33.) Here Aristotle uses it first in the second of the two above senses, but immediately reminds us that properly and per se the
\( \phi \alpha \tau \alpha \sigma \mu \alpha \) has no reference to the object, that, so far as it has this, it is considered in a new light—as an \( \varepsilon \iota \kappa \iota \circ \nu \).

Hence, if Aristotle is in the second sentence really guarding his former statement, it would not be out of place to repeat that part of the former statement with which part of the second is identical. Hence, we may retain \( \theta \varepsilon \omega \rho \eta \mu \alpha \); it is no doubt used to signify the direct, immediate object of consciousness, something that is present as if to the senses (cf. Bonitz, \textit{Ind.} p. 328). It would include a present perception and so cover the case, never separately treated by Aristotle, of the recognition that an object in present perception has been seen before.

On the other hand \( \nu \omicron \omicron \mu \alpha \) is substituted in 451 a 2, which rather makes it appear as though \( \theta \varepsilon \omega \rho \eta \mu \alpha \) meant a concept specially. But probably this change is not significant.

450 b 29. Freudenthal proposes to omit \( \kappa \alpha \iota \) after \( \varepsilon \iota \kappa \iota \circ \nu \), tr. "a memorial after the fashion of a copy." \( \mu \nu \mu \omicron \omicron \omicron \omicron \mu \alpha \) is a \( \alpha \pi \alpha \varepsilon \lambda \varepsilon \gamma \omicron \omicron \omicron \nu \) in Aristotle.

450 b 33. \( \mu \acute{\eta} \varepsilon \omega \rho \acute{\alpha} \kappa \omega \acute{\iota} \). It is not hereby implied that we can remember without a prior sensuous experience. That would contradict what has been already said (cf. 449 b 24 sqq. above). \( \mu \acute{\eta} \varepsilon \omega \rho \acute{\alpha} \kappa \omega \acute{\iota} \) must mean—without having then had present to vision the veritable Coriscus.

450 b 34. \( \varepsilon \nu \tau \alpha \theta \alpha \kappa \tau \lambda \). All commentators from Michael Ephesius to Freudenthal notice that this paragraph is mere repetition. If more condensed and obscure it is not thereby less Aristotelian.

451 a 13–14. Cf. chapter 2, 451 b 15 and 32, \( \acute{\theta} \varepsilon \iota \).
CHAPTER II.

451 a 21. ἐν τοῖς ἐπιχειρηματικοῖς λόγοις. Themistius (Sp. ii. p. 241, l. 7) says ἐπιχειρηματικοῖς καὶ προβληματικοῖς, and, if we trust Diogenes Laertius, R.V. § 23–24, there was more than one work falling under the first title, viz. ὑπομνήματα ἐπιχειρηματικά γ' and ἐπιχειρημάτων α' β'. Hence it is probably to them that we are here referred. Michael Ephesius thinks rather that the Problems are indicated, but in the extant Problems no such discussion is found.

An ἐπιχείρημα is defined in Topics, vii. ch. ii, 158 a 16 as συλλογισμὸς διαλεκτικός, and ἐπιχειρεῖν very often means to discuss controversially (cf. Bonitz, Ind. p. 282 b 59). Now Aristotle frequently, even in the same book, prefaces his proper scientific treatment of a subject with a ‘dialectical’ account. This seems to be necessary in his view in order to attain a preliminary clearing up of notions, and hence we may conjecture that he wrote several popular tentative tractates (the literal sense of ἐπιχειρέω, = to attempt, seems to linger about ἐπιχείρημα) on various matters, and that these, owing to their tentative character, have been dropped out of the canon. Certainly we cannot here translate with Hammond ‘treatise On Argumentation.’ A reference to recollection could occur only as an illustration in a logical work, and λόγοι ἐπιχειρηματικοῖ could not be discussions on dialectical argumentation but discussions of a dialectical nature.

451 a 23 sqq. We may set aside Simon’s theory that by λῆψις is here meant not λῆψις μνήμης but the acquirement of fresh knowledge. There is no evidence that that is an Aristotelian usage, nor will the Greek bear the interpretation.

At the same time it is difficult to see what relation this statement bears to the following one. Having asserted that recollection is neither the reacquirement nor the first acquirement of memory, he goes on to point out that in μάθησις—the first acquirement of
knowledge, there is no such thing as recovery or acquisition of memory.

The doctrine that recollection is to be thus described is, as Freudenthal, Rheinisches Museum, p. 404, points out, not a Platonic one; but, of course, the teaching that μάθησις is ἀνάμνησις is the famous tenet set forth in the Meno and other dialogues; cf. esp. Meno, 85 D: τὸ δὲ ἀναλαμβάνειν αὐτὸν ἐν αὐτῷ ἐπιστήμην οὐκ ἀνάμνησις; Πάνω γε. Phaedo, 72 E sqq. Hence the tortuous argument here seems to be...‘When you recollect, you do not reacquire or acquire memory. If you take ἀνάμνησις with the Platonists as equivalent to μάθησις it is certainly not so (ὅταν γὰρ l. 23...ἐγγίνεται l. 27), nor when taken in the ordinary sense, as the remembering again of something forgotten, is it strictly defined either as the acquisition or reacquisition of a memory’ (ἐτι δ' ὁτε κ.τ.λ. l. 27 sqq.).

Freudenthal (loc. cit. p. 403) points out that Plato really anticipated the Aristotelian distinction between ἀνάμνησις and μνήμη (cf. Phaedo, 77 C sqq.). Recollection is a knowing again of what has been forgotten. It is to be reminded of something by oneself or by another; cf. Phaedo, 73 B, ἀναμνησθέναι = commonesieri: μέμνηται = meminit. Recollection implies ζήτησις Meno, 81 D. But the scientific discrimination of the two functions belongs to Aristotle.

(Plato also noticed the three ways in which ideas may be associated; cf. 451 b 22 sq. infra, contiguity, similarity, and contrast. Cf. Phaedo, 73 (1) A lyre or garment belonging to the beloved one puts the lover in mind of him and from seeing Simmias you may remember Cebes. (2) From seeing the picture of Simmias you may remember him. (3) Recollection may be derived from things unlike as well as from similar things.)

451 a 25. If we translate ἐκ ἀρχῆς as ‘at the beginning,’ then this argument becomes practically identical with the next, and Freudenthal will be right in saying that we have here the same thought as is repeated in ἐτι δ' κ.τ.λ. ll. 27 sqq.

But perhaps the sense is rather...‘when we learn, we neither have a memory reinstated in us, nor derive it (as a memory) from some origin, i.e. some other experience. Once the present experience is produced you may remember it; quà present experience it is not remembered. To start memory you need present experience, and hence you cannot derive the present experience from the memory.’

Aristotle is thus dealing here not with the temporal but the
logical priority of present experience. It is in the next paragraph that he goes on to show that memory requires, in addition to the originating experience, a period of time to have elapsed before it can be called memory. In addition, this is now brought in when he is dealing with ἀνάμνησις in the customary sense, not as identical with μάθησις, and hence the point of view is different.

But without adopting this hypothesis we may detect a note of individuality in the present passage. Perhaps in ἄταν δὲ κ.τ.λ. (ll. 25–27) the emphasis is on the necessity of there being a ἔσις—a disposition to remember—as well as an experience (πάθος) which is to be remembered, while in the next paragraph the lapse of time necessary becomes more prominent.

451 a 26. ἔσις. As I take it, this means the permanent disposition which itself is memory; it is not to be identified with τὴν ἔσιν in l. 30 beneath, which is a disposition produced by learning regarded as a source of memory. It is, however, somewhat misleading to think of that as being a source of memory in the same way as a πάθος is. Ἐνάλληλα nothing is an activity (ἐνέργεια) of consciousness and all memory must start from a present activity.

451 a 28. τὸ πρῶτον ἐγγέγονε, Biehl and Bekker; τὸ πρῶτον ἐγγέγονεi ἐν, L.S.U.

Freudenthal proposes to insert τι after ἐγγέγονε in order to provide it with a subject, τὸ πρῶτον being taken adverbially.

τὸ ἀτόμω καὶ ἐσχάτῳ. All commentators take this as referring to time, and that would be the most likely meaning of the Greek if we read ἐν τὸ ἀτόμῳ with L.S.U. But the dative which ἐγγέγονεσθαι governs should rather indicate the real ὑποκείμενον in which the πάθος originates, not the time. Hence perhaps we should interpret τὸ ἀτόμῳ κ.τ.λ. as referring to the αἰσθητήριον which is the primary seat of sensation and which, we learn in De Sensu, 7, is αὐτῷ καὶ ἐν ἀφθάρῳ and is also elsewhere called τὸ ἐσχατὸν αἰσθητήριον, De An. iii. ch. 2, 426b 16 and 7, 431 a 19. This is also Neuhauser's interpretation: cf. Introduction, sec. vi.

The argument then is, that the mere realisation of the impression in the primary organ of sensation—the heart or its συμφύτων πνεύμα—is not memory. There must be lapse of time before it can function as an εἰκόν of the absent object.

If we take ἀτόμῳ καὶ ἐσχάτῳ as referring to time, it is difficult to interpret ἐσχάτῳ. We should have to translate 'in the same individual and proximate moment of time.' But the proximate is
not the same moment, unless in the improper sense in which the same thing may be said to be proximate to itself.

Michael Ephesius thinks that the reference here is to the moment after complete perception and that this is here distinguished from the moment of perception mentioned in the last sentence. Freudenthal finds this too 'spitzfindig' and accordingly chooses to regard this passage as another version of the former one (cf. note to l. 25 above).

451 a 32. πρὶν χρονισθῆναι. Cf. ch. 1, 449 b 28.
451 b 2. Unless we accent ἐστὶ with Freudenthal the sentence will not construe.

The interpretation of ἐξ ἀρχῆς here confirms our rendering of the same phrase in 451 a 25. The ἀρχὴ is the starting point in time rather than the original experience from which the continued consciousness known as memory is derived.

451 b 3. ἀλλ' ἵπταν κ.τ.λ. Here at last is the distinction between ἀνάμνησις (in the proper and customary, as distinct from the Platonic sense) and μνήμη.

Recollection is the reproduction of a previous experience (apart, of course, from renewed sense perception or repetition of the experience, whatever its nature, afresh), which has passed out of the mind, and a revival—ἀνανέωσις (Themistius)—qua experience, not quâ memory. The memory, holding the present experience as the εἰκών of the past, can be produced either by the continued presence in consciousness of the previous experience or by its reinstatement through recollection. It is a consequence (συμβαίνει l. 6) that, when we reinstate an experience identical in character with the previous one, we should remember, i.e. that it is an εἰκών of the previous one. But it is the act of reinstatement which is accurately to be described as ἀνάμνησις, not the referring of the reinstated experience to the past.

451 b 6-7. Michael (132 a), Simon (p. 301) and Gesner, apparently (cf. Freud. Rh. Mus.), read τῷ δὲ μνημονεύειν συμβαίνει καὶ μνήμην ἀκολουθεῖν. This Freudenthal (p. 407) approves of, objecting to the absolute use of συμβαίνει in the other reading and trying to make out that we should, if we kept it, have to distinguish as different from each other, (1) ἀνάμνησις, (2) μνημονεύειν and (3) μνήμη. That is surely captious and, on the reading which he approves, we should have (with Gesner) to interpret μνημονεύειν as
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ἀναμνήσκεσθαι; but Freudenthal admits (p. 403) that, where Aristotle is distinguishing the two functions, he never employs a term, which refers to remembering merely, to designate the act of recollection, however much he may depart from this rule on other occasions.

Themistius says—ἐπεταὶ δὲ τῇ ἀναμνήσει ἐξ ἀνάγκης ἢ μνήμη, understanding by ἐπεταὶ apparently (and if there is any sense in his explanation) mere logical implication. He explains ‘recollection implies memory because, to recollect, you must remember something connected with the thing which you are trying to recollect...the starting point in the ζήτησις which is recollection’ (cf. infra 26 sqq.). Not only, however, is this a strange interpretation of συμβαίνειν and ἀκολουθεῖν, but, if recollection may start ἀπὸ τοῦ νῦν (l. 22 infra) it is not necessary for its starting point to be an object of memory.

451 b 7. ταῦτα refers vaguely and inclusively to ἀναμνήσκεσθαι and μνημονεύειν. The sense is...‘you do not get recollection and memory every time an experience which has lapsed from the mind is repeated. It may be repeated without your remembering you had it before. In such cases the repetition of the experience is not recollection.’ This is pretty nearly Simon’s interpretation. St Hilaire, evidently basing upon Themistius’s interpretation of the preceding sentence, thinks that here Aristotle is making explicit his distinction between the revived and the non-revived elements in consciousness in the act of recollection. (St Hilaire, p. 123): ‘Ce ne sont pas du reste des choses antérieures qui se reproduisent complètement de nouveau dans l’esprit; mais il y a alors une partie des choses qui se reproduit et une partie qui ne se reproduit pas; car la même personne pourrait très bien deux fois découvrir et apprendre la même chose.’ But this interpretation can only be come at by reading ἐγγίνεσθαι l. 8 (impossible Greek) or by supplying it after ἐγγίνεσθαι; further ταῦτα would have to refer to ἐπιστήμην etc., l. 4, which is rather too far back and would suggest the use of ἐκεῖνα; thirdly the thought is still more elliptical and loosely arranged than on the interpretation I give. ‘The previous experience is not wholly reinstated for, if it were, it would be a case of μάθησις not ἀνάμνησις.’ This renders ἀλλ’ ἐστιν...ἐστι δ’ equivalent to ‘partly...partly’ and makes us refer δις γὰρ μαθεῖν not to the clause immediately before it but to the previous one.

Hammond (p. 204) gives a totally new rendering, ‘Neither do the phenomena of recollection, if their occurrence is the repetition
of a previous recollection (sic), follow absolutely the same order, but sometimes they occur in one way, sometimes in another. It is possible for the same individual to learn and discover the same thing twice. Recollection then must differ from learning and discovery, and there is need of greater initial latitude (sic) here than is the case with learning.' He elucidates this in a note, 'In the case of learning and discovery there is a definite and exact process by which a given result may be twice arrived at.' (What Aristotelian doctrine is this?) '...In the case of recollection, on the other hand, there is not the same fixity of procedure. There are not only many forms of suggestion and association, but a given suggestion may not effect the same result in two instances.' This is to introduce a point mentioned in 452a 27 below but not relevant here. It is in no way apparent that Aristotle ever meant to compare the acquisition and the revival of knowledge with regard either to the relative fixedness of the processes or the fixity of the starting point.

St Hilaire quite fails to see that τούτων (l. 11) refers to μαθείν καὶ εὑρείν, and so he completely distorts the sense.

451b 11. καὶ ενούσης κ.τ.λ. On the whole this favours my interpretation of the previous passage rather than St Hilaire's. On his theory, relearning a thing implies complete reinstatement of everything in consciousness and it is difficult to see how there would be any ἀρχή at all in that case.

It is Aristotle's theory that in learning (either for the first or second time) as well as in recollection there is an ἀρχή from which we set out. We find no contradiction to this in 451a 25 above; there he simply says that in the process of learning memory does not begin concurrently with the initial step. Here he merely distinguishes learning and recollection according to the amount of the ἀρχή involved; but we can gather his doctrine from other passages. We learn either by deduction or induction (Anal. Post. 1. ch. 18, 81a 38 sqq.) and, in either case, we must have some previous knowledge which is the starting point of our deduction or our induction. (Cf. Anal. Post. 1. ch. 1, 71 sqq. and Metaph. 1. ch. 9, 992b 20 sqq.) In the one case we must know the premises of any particular conclusion and ultimately the constituents of the definitions of the terms (which enter into our premises); δεῖ γὰρ ἐξ ὅν ὄρισμα προειδέναι καὶ εἴναι γνώριμα (992b 32). In the latter, the knowledge of particular cases which are given in perception (τὰ καθ' ἑκάστα, τὰ ἐγγύτερον τῆς αἰσθήσεως Anal. Post. 1. ch. 2, 72a 2, 3) and which are
less intelligible naturally (τών ἴητον γνωρίμων φύσει Metaph. vii. ch. 4, 1029 b 4), is required before we can gather from them the universal law. But in learning by induction we do not have previous knowledge of the universal law, nor in deduction have we a prior acquaintance with the particular case. (It is only in so far as the particular is implicit in the universal that it is previously known. In its particularity and in the full sense of the word it is not known: ἀπλῶς δ’ οὖν ἐπίσταται 71 a 28.) If it had been explicitly thought of previously, then we should have a case of recollection not of μάθησις, which must be distinguished from ἀνάμνησις and is thus to be distinguished.

Another point of difference is that mentioned below in 452 a 5 sqq. Learning requires a teacher; the process of recollection is self-originated.

There is also a sense in which the act of learning is not a process. Cf. Phys. vii. ch. 3, 247 b 10 sqq. and also De An. i. ch. 3, 407 a 32. This however comes to no more than the familiar doctrine that per se the intellectual life is not a σωματικῶν πάθος like memory and recollection. But in this sense it cannot apply without qualification to the functioning of the νοῦς παθητικός which is realised in finite individuals.

451 b 14. ἔς ἀνάγκης. Hamilton (Reid, p. 894) points out that Locke too, in Essay II. ch. 33 § 5, distinguishes between those ideas which are naturally connected by a ‘union and correspondence which is founded in their peculiar beings’ and those that are associated ‘through chance or custom.’ By those necessarily connected Aristotle means notions which objectively imply one another, like centre and circumference. As Hamilton indicates, it was typical of members of the empirical English school (other than Locke) to ascribe all collolocations of ideas to custom.

451 b 16–17. Freudenthal’s reading (op. cit. p. 407)—συμβαίνει δ’ εἴναι μᾶλλον ἃ ἑτέρας πολλάκις κινούμενας—seems unnecessarily to anticipate the doctrine of 452 a 3 sqq. infra.

451 b 20. Freudenthal’s conjecture of τῶν instead of τωά makes the reading smoother, ‘we experience a number of previous changes conducting to the stimulation of that one’ etc.

451 b 22. τοῦ νῦν ἦ ἀλλου τῶν. By this Aristotle cannot mean merely ‘a time present or otherwise.’ It is difficult to see how one could start a process of reflection otherwise than from the present time. The idea is that the object, the thought of which starts the
train of recollection, can be given either in present perception or in memory.

ἀφ’ ὀμοίου κ.π.λ. This describes the character of the object or content of the notion which starts the process.

It is the first recorded formulation of the celebrated laws of association, though they are all to be found instanced in the *Phaedo*. Cf. above note to 451a 23.

451b 24. τῶν 8’ ἁμα. This evidently is capable of being illustrated by the ἐναντίαι κινήσεις which, being affections of a single sense organ, must be ἁμα; cf. *De Sens.* ch. 7, 447b 9 sq.: μᾶλλον γὰρ ἁμα ἡ κίνησις τῆς μυᾶς ταύτης (αισθήσεως) ἡ τῶν δύναν. Here of course the κίνησεις seem to be regarded as existing in the central not in the end organ, but evidently the characteristic of being ἁμα, which distinguishes ἐναντίαι κινήσεις in the end organ, is regarded as attaching to them when they are transferred to the heart.

If this interpretation be correct 'Association by Contrast' is to be assigned to 'Contiguity.'

451b 27. 8’ οὐτως. 8’ ὀμως Freudenthal, G. A. Bekker. The change is immaterial unless with Themistius, Leonicus, and Simon we take the οὐτως with ξητοῖντες and translate 'and we recollect, even though we do not search in this way.' But we see from 453a 18 sqq. below, that Aristotle does not limit ἀνάμνησις to the volitional process which reinstates an idea. Recollection is there said in some cases not to be ἐπ’ αὐτοῖς, i.e. subject to the will.

Cf. also Hamilton *op. cit.* p. 902, note.

451b 30. μεμνήμεθα here must be used inaccurately for ἀναμμηνησκόμεθα: cf. 452a 8, 11.

τὰ πόρρω. Hamilton, *op. cit.* p. 903, takes this as 'things remote and irrelevant to our inquiry' and (apparently) not as the object of μεμνήμεθα. This is surely very unnatural; the use of τὰ πόρρω and τὰ σύνεχες to denote something else than objects and processes which are connected in the train of recollection, just where the series has been described in terms of similar notions, would be a most flagrant instance of slipshod writing on the part of Aristotle. Hamilton translates, 'Nor is there any necessity to consider things remote [and irrelevant] how these arise in memory; but only the matters coadjacent (and pertinent to our inquiry). For it is manifest that the mode is still the same—that, to wit, of consecution,—[in which a thing recurs to us, when] neither pre-intentionally seeking it, nor voluntarily reminiscent. *For [here too], by custom, the several*
movements are concomitant of one another—this determinately following upon that.' Hamilton, reading τρόπος τῶς (λέγω δὲ τὸ ἐφεξῆς) οὖ κ.τ.λ., thinks that reference is still being made to the case of voluntary and involuntary reminiscence, and that it is the manner of occurrence of these two which is said to be identical. But προξητίσας and ἀναμνήσθείς cannot distinguish intentional as opposed to unintentional recollection. (What can 'pre-intentionally' mean?) It is the method of recalling τὰ πόρρω and τὰ σύνεγγυσ which is the same. As the remoteness of two distinctly connected ideas can be bridged over by inserting intermediate ones, it is the mode of connection of these latter we have to consider.

451 b 31–32. λέγω δὲ...ἀναμνήσθείς. A gloss according to Freudenthal. But, if we let it stand, it simply points out the fact that he refers to the order of a series of psychic changes determined, not by any previous act of recollection, but by the way in which they are accustomed (τῶ γὰρ ἐθει l. 32) to be experienced together.

451 b 35. ἀρχὴν κινήσεως. This is simply the term for efficient cause used in Phys. ii. ch. 7, 198 b 1, Metaph. i. ch. 3, 984 a 27, etc. Here we are dealing with that class of efficient causes or sources of change which are themselves motions or changes. The series of changes in conscious process is conceived by Aristotle quite in the same way as all other changes occurring in the world of generation and decay. The whole series is a κίνησις which is made up of parts which are themselves κινήσεις. Hence Themistius's illustration of the series of mental sequences by a chain in which, if one link be lifted, the next will also be moved (Sp. ii. p. 243, l. 12) is inadequate. The links in the series are themselves nothing static but processes also.

So far as we have gone, the κινήσεις which are stimulated in the act of recollection seem to be dormant in the soul or its organ the heart prior to stimulation, and this is apparently the view maintained through the De Memoria. In De An. i. ch. 4, 408 b 15 sqq., however, a rather different attitude is taken up. In recollection the κίνησις is said to pass from the soul to the affections (also κινήσεις) or their traces (μονάς) existing in the sense organs; this is opposed to what occurs in sense perception, where the κίνησις proceeds in the reverse way. In neither case is the process in the soul.

By this however Aristotle probably means no more than to emphasize the fact that in the higher faculties the mind is an originating cause. Of course, in all cases the soul is an ἀρχή (cf. De An. i. ch. i, 402 a 7) and to be regarded as an efficient as well as a final
cause (De Part. Animal. i. ch. 1, 641 a 27). But, just as none of its modifications, even a primitive one like perception, is mere passivity (cf. De An. ii. ch. 5) so we seem to find a progressively greater absence of passivity as we pass from lower to higher faculties; e.g. scientific knowledge—ἐπιστήμη—is not passive change of the type ἀλλοίωσις in the proper sense at all (417 b 6). A mechanical determination of psychic processes by each other may go on and be beyond the control of the individual in whom they occur (cf. 453 a 18 seq. infra). This is held to show the corporeal nature of such changes, or rather their dependence upon corporeal conditions. Hence it is suggested by implication that a function which was exclusively psychical would not be determined in this mechanical way but would be completely under control (ἐπ' αὐτοῖς: 453 a 22). Notwithstanding Aristotle’s determination to make out all human faculties to be conditioned by the bodily organism, and thus establish a thorough-going parallelism of psychical and corporeal changes, notwithstanding the fact that he declares the human νοῦς to be παθητικός, there seems to be this tendency to free itself from bodily conditions which is always manifested by that which is most characteristically psychical. It is significant that in this passage where Aristotle talks of the process in recollection proceeding outward from the soul, he immediately goes on (as if impelled by association of ideas) to talk of the νοῦς which is impassive and imperishable, and practically identifies ψυχή with it. The decline of the mental faculties is just like the dimness of sight in an old man, due to the bodily organ becoming impaired. It is not the ψυχή which suffers change but its organ (ὤστε τὸ γῆρας οὐ τῷ τῆν ψυχήν τι πεπονθέναι, ἀλλ' ἐν φίλε, 408 b 22). Hence the ultimate core of the ψυχή seems to consist of this imperishable νοῦς, which, no doubt, relatively to the body will be like the divine νοῦς in its relation to the world, the prime source of movement—τὸ πρῶτον κύρον.

Aristotle, however, does not state this explicitly, and though, indeed, he tells us that the νοῦς enters the living being from outside and its activity has nothing in common with that of the body (De Gener. Animal. ii. ch. 3, 736 b 28) yet the relation of this to the other mental faculties is most obscure in his philosophy, and really leads to difficulties much the same as those surrounding the relation of the Platonic ἱδέα to the things of time and sense.

452 a 2. τὰ πράγματα (the facts) may be either static elements, e.g. contiguous objects or different parts of a mathematical theorem, or events themselves. The series may be either temporal or not.
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452 a 8. *μέμνηται*. Referring a reinstated process to the past is a characteristic of remembering as distinct from learning a second time: cf. 451 b 6. Hence Aristotle is justified in using memory here as the generic term to include recollection.

452 a 10. *κινούντι πολλά*. This surely refers to many different starts not to many different items in a single series.

452 a 11–12. *τὸ γὰρ μεμνησθαί κ.τ.λ.*. The *act* of memory cannot be the merely potential existence of a process in the mind.

δυνάμει. δύναμιν L.S.U, Themistius, vet. tr. But we do not elsewhere hear of a special δύναμις κινούσα in the mind. It is an actual process which functions in recollection.

452 a 14. *ἀπὸ τόπων*. This, surely, as the illustration below bears out, refers to the τόποι—commonplaces of thought in general which Aristotle defines in their most universal sense in *Rhet.* 1. ch. 2, 1358 a 12 : (οἱ τόποι) εἰσὶν οἱ κοινῷ περὶ δικαίων καὶ φυσικῶν καὶ περὶ πολιτικῶν καὶ περὶ πολλῶν διαφερόμενων εἰδει, οἶον ὁ τοῦ μάλλον καὶ ἕττον τόπος: cf. also l. 32. The τόπος is a rule or general statement that will readily recur to one and hence it may be used as the ἀρχή of a train of ideas in recollection. *E.g.* it is a τόπος of the Aristotelian philosophy that air is damp, and apparently from *Meteor.* iii. ch. 4, 374 a 2 that it is λευκός; that milk is white and the autumn damp are given by ordinary perception.

Unfortunately Aristotle in illustrating the use of τόποι in recollection by those drawn from his own philosophy gives a series of ideas which would hardly with plausibility be used in the purposive recall of an idea. Hence Hamilton (followed by St Hilaire) proposes to read ἀπ’ ἀτόπων. But if the series is an absurd one still less likely is it to be employed in voluntary recollection, which is now being discussed. Themistius (*Sp.* ii. p. 247, ll. 8 sqq.) gives a variety of alternative explanations to τόπων. τόπους δὲ ἢ ἂς ἀρχὰς ἐνείμας δεῖν τῇ ἴσχὺ λέγομεν, ἢ τοὺς κατὰ τὰ σύστοιχα καὶ ὁμοιὰ καὶ ἀντικείμενα ὡς ἐν τῇ διαλεκτικῇ ἐφρησκεί, ἢ τοὺς σωματικοὺς καὶ τὰς ἐν τῷ ἐνεργοῖς μέρες θέσεις. Thomas interprets it as meaning the last merely. In that case, the reference would be to the art of memorising objects by attaching each to a special point in a spatial series—an art said to have been discovered by Simonides of Ceos and referred to by Cicero in *De Oratore*, ii. ch. 86.
So Hammond and Freudenthal, loc. cit. p. 409 (who indeed in consequence wishes to read τάχιστα instead of ενίοτε in l. 15). But it is strange that Aristotle after mentioning this method of memorising should give an example which has no reference to it.

452 a 18. τὸ καθόλου is read by L S U Y, Themistius and Michael. Both those commentators, however, render it by ὡς ἐπὶ τὸ πολὺ, a meaning which, according to Freudenthal (Archiv für Gesch. d. Philos. ii. 1887, p. 11) καθόλου can certainly have. They thus interpret τὸ καθόλου as though the τὸ were inessential. Siebeck however in Philol. 1881, pp. 350–2, and his Untersuchungen zur Philosophie der Griechen, p. 155, wishes to retain τὸ and to make it essential. He thinks that here Aristotle identifies the middle of a series of terms employed in reminiscence with the μέσον of logical inference which is a universal and furthest from sense. The connecting bond in recollection is a universal concept which binds together various particulars by means of their implication in it.

This comes to pretty much the same as Mr Bradley’s doctrine that ‘Association marries only Universals,’ or more simply, that there is a bond of identity between the thing remembered and the thing that brings it to mind. This however has been already made clear enough in 451 b 21–26 above, and it is strange that Aristotle should confuse that implication of a predicate in the middle term of a syllogism, which accounts for the truth of the conclusion, with that relation between psychical states which causes the presentation of the one to entail the presentation of the other. In the latter case you are accounting for a process, in the former for a connection which is independent of process. Moreover the ‘universal’ which connects different ideas in reminiscence is hardly the universal of logic—that which is ‘furthest from sense’; it is often of the most sensuous character. Once more, it would be unfair to represent it as a separate member in the train of connected ideas; it is rather the identical element pervading any two.

In the details of the subsequent passage Siebeck’s interpretation is beset with at least no fewer difficulties than Freudenthal’s.

Cf. also next note sub fin.

452 a 21. ἐφ᾽ ὧν ΑΒΓΔΕΖΗΘ ΚΤΛ.

Biehl’s text, which I print, follows Freudenthal’s reconstruction of the passage. I have translated it as it stands. But it can hardly be said that all difficulties have been removed even by this radical alteration of Bekker’s text. The general drift seems to be that the
middle term of a series of connected ideas is of unique importance because from it you can go in either direction to the other members. If you have a series of ideas A B C D E F G H and want to remember F or G and are not able to do so when you think of H, by thinking of E you may be able to recall them. Then from E you can get either to D or F, or from C you can pass to B, the term before it.

But this is not at all persuasive. Why should the final possibility of recall be the starting from A, which is an extreme in the series, if it is the employment of the middle term which Aristotle is illustrating? Besides, as Freudenthal himself points out, there is no single middle term in a series of eight.

Again, Freudenthal does not seem to give sufficient weight to the objection that this makes Aristotle talk of recollection as proceeding in a reverse order with equal facility.

Bekker’s text is as follows (l. 21): εἰ γὰρ μὴ ἐπὶ τοῦ Ε ἡμέρηται, ἐπὶ τοῦ ΕΘ ἐμνήσθη· ἐντεῦθεν γὰρ ἐπ’ ἄμφω κινηθῆναι ἐνδεχέται, καὶ ἐπὶ τὸ Δ καὶ ἐπὶ τὸ Ε. εἰ δὲ μὴ τοὺτον τι ἐπιξητεῖ ἐπὶ τὸ Γ ἐλθὼν μνησθῆσεται, εἰ τῷ Η ἢ τῷ Ζ ἐπιξητέει. εἰ δὲ μὴ, ἐπὶ τὸ Α (l. 19–23, Bek.).

Now, perhaps Aristotle only means that, after all, it is the connecting link, the intermediate term, which accounts for and must universally account for the recollection. If one does not remember by thinking of another term in the series one does so by coming to it. It is the proximate and universal (καθόλου, l. 18) cause of the recall of the idea in question. Hence I propose to read and translate as follows, 452 a 21 sqq.:

\[
\begin{align*}
\text{A B Τ Δ E Z H Θ} \\
\text{A B C D E F G H}
\end{align*}
\]

eἰ γὰρ μὴ ἐπὶ τοῦ Ε ἐμνησθη ἐπὶ τοῦ Η τὸ (τοῦ?) Θ ἡμέρηται: ἐντεῦθεν γὰρ ἐπ’ ἄμφω κινηθῆναι ἐνδεχέται, καὶ ἐπὶ τὸ Η καὶ ἐπὶ τὸ Ζ. εἰ δὲ μὴ τοὺτον τι ἐξήτει, ἐπὶ τὸ Γ ἐλθὼν μνησθῆσεται, εἰ τὸ Δ ἢ τὸ Ε ἐπιξητεῖ: εἰ δὲ μὴ, ἐπὶ τὸ Α· καὶ οὕτως ἄει.

‘If one has not remembered at E, at G one does remember H. The reason why one does not remember at E is that from that point one can pass to both G and F. If one does not want to remember these he will remember by going to C if he is seeking for D or E; if he is not seeking for these he goes to A. This is universally the process.’

MS. Y reads τοῦ ΗΘ (l. 20, Bek.). The omission of the τοῦ before Θ would easily occur. For the other changes of letter no MS. authority is available, except that the vet. tr. reads Z in l. 23 (l. 22, Bek.),
a change approved by both Siebeck and Freudenthal. The other alterations are mild in comparison with those made by Freudenthal.

The point is that it is the term just before the one to be recalled that you must get. There is no intention of dealing with a fixed middle term of the whole series. When Aristotle says the middle term may be considered as the \( \alpha \rho \chi \gamma \), he means that in a way it is really \( \pi \rho \omega \tau \omicron \nu \) in the sense of being the proximate cause. Now it is anything \( \pi \rho \omega \tau \omicron \nu \) in this way that is universally (\( \kappa \alpha \theta \omicron \omicron \alpha \omicron \) a cause.

Hence \( \kappa \alpha \theta \omicron \omicron \alpha \omicron \) may be read in l. 18 and its normal meaning ‘universally’ given to it, if my conjecture as to the meaning of the subsequent passage is adopted. It is the intermediate link between any two terms which is universally the cause of the transference from one to the other, just as it is the proximate cause which universally produces an effect, or as it is \( \eta \gamma \omicron \vartheta \) triangle, the middle term, that we can universally predicate equality of the angles of any figure to two right angles. Cf. Anal. Post. i. ch. 4, 73 b 25 sqq.

But another interpretation has been suggested to me (by Mr W. D. Ross, of Oriel College). It is proposed to adopt the following text instead of that of Bekker:

452 a 21 sqq. \( \epsilon i \gamma \alpha \rho \mu \iota \) \( \epsilon \pi \tau \omega \Lambda \mu \epsilon \mu \nu \nu \tau \tau \epsilon i \tau \omega \nu \) \( \epsilon \pi \tau \omega \nu \) \( \epsilon \tau \alpha \nu \) \( \alpha \mu \mu \omega \) \( \kappa \iota \nu \theta \nu \tau \kappa \) \( \epsilon \nu \delta \epsilon \nu \gamma \iota \) \( \nu \) \( \epsilon \pi \tau \omega \nu \) \( \tau \theta \) \( \epsilon \pi \iota \xi \iota \epsilon \iota \). \( \epsilon i \delta \varepsilon \mu \eta \) \( \epsilon \pi \tau \omega \nu \) \( \tau \Delta \).

The only changes here for which there is no ms. authority are \( \Lambda \) instead of \( \Sigma \) in l. 22 (l. 20, Bek.) and \( \Gamma \) instead of \( \Gamma \) in l. 24 (l. 22, Bek.), while the other variations from Bekker and Biehl follow the best ms.

The translation will then be as follows:

‘If one does not remember at \( \Lambda \) he remembers at \( \Sigma \), from that point he can pass in both directions—both to \( \Delta \) and to \( \Gamma \). But if he is not searching for one of these (\( \Delta \) or \( \Gamma \)), by going to \( \Gamma \) he will remember, if he is looking for \( \Gamma \) or \( \Delta \); while if he is not (looking for \( \Gamma \) or \( \Delta \), but those in the other direction—\( \Gamma \) and \( \Delta \)) he goes to \( \Delta \).’

In explanation of this interpretation it is maintained that \( \Lambda \) is not included in the series of terms of which \( \tau \omega \mu \epsilon \sigma \sigma \nu \) \( \pi \alpha \nu \tau \omega \nu \) is said to be the \( \alpha \rho \chi \gamma \) (hence they form an odd number and \( \Sigma \) becomes a real middle term). \( \Lambda \) is rather a term immediately outside the group in which the idea to be recalled is contained.

Aristotle is held to be illustrating the well-known process of recall
in which, when we wish to revive an idea, we pass first of all to the
group of former presentations within which we must already know it
to lie. E, then, will symbolize the central idea or nucleus of this
group from which it is possible to pass, in more than one direction,
to the idea lying in the outskirts of the group.

This interpretation is ingenious and gets rid of minor difficulties,
e.g. it does not require that Aristotle should be held to commit him-
self to the statement that we can recall ideas by proceeding back-
wards among terms experienced in a linear series like the letters
of the alphabet. Though Aristotle symbolizes his terms by the
letters of the alphabet he is thinking not of a series following the
direction of the time process but of a set of notions formed
by those notions being frequently thought of together and grouped
round one striking topic.

452 a 28. Freudenthal, in conformity with his interpretation of
the above passage, proposes to read E instead of Γ (C). The
associative process may go in either direction. But the meaning
is quite satisfactory and does not involve the special difficulties of this
contention if we keep the ms. version. Aristotle has just before
said that the intermediate term is universally the ground of
recollection. But it is objected that from a given term sometimes
you pass to a certain other one and sometimes not. That will be
true, he says, of the remoter terms in the series, for sometimes from
C we pass all the way along to F, sometimes to the next member D
only. Again, the particular series CDEF may become obliterated
and the association branch off in some other direction that has
become more familiar. Hence, though starting from C, we may
not arrive at F.

452 a 28-29. ἐὰν οὖν δι' ἀ πάλαι οὐ κινηθῇ. All editors except
Biehl, following L S U, read ἐὰν οὖν μὴ διὰ παλαιοῦ κινηται and
Freudenthal wishes to follow the same text with the omission
of μὴ. All difficulties, however, vanish when we take πάλαι as
'lately,' a sense which it often bears in Aristotle (cf. Bonitz, Ind.
p. 559 a 19: 'τὰ πάλαι λεχθέντα, οἱ πάλαι λόγοι refertur ad ea
quia ante in eodem libro exposita sunt') and in other writers.

One may not have lately experienced the succession CDEF,
and hence when C occurs one goes off on some more familiar route.

452 a 30. πολλάκις ἀ': L S U and all editors before Biehl read
ἀ πολλάκις, especially since the explanation is based upon the
frequency of the repetition; cf. 452 b 1 below: τὸ δὲ πολλάκις φύσων
R.
ποιεῖ. But the idea of frequency or continued action is contained in the imperfect tense ἐννοοῦμεν.

452 b 1. ἐνεργεῖα. Mr Cook Wilson (Journal of Philol. xi. p. 120) conjectures συνηθεῖα; but this makes the sentence simply a repetition of ll. 29–30 above. Though Themistius reads οὖτω καὶ έθει, that is no guide. It is just the practice of that commentator to reduce significant statements to idle repetitions.

Every one of those who read ἐνεργεῖα will have it that the reference is to the activity of mind and, as it is the function of intellect which is most appropriately styled an ἐνεργεία, the term may perhaps be used absolutely as referring to that without further qualification. But the meaning will not be, as some think, that the order of connection of things in nature must be reproduced in the mental process of recollecting. That would only be the case if the order of recall was always identical with the order of notions in science, which is admittedly a reproduction of the objective order. (Cf. De Interp. ch. 9, 19a 33: δύονως οἳ λόγοι ἀληθεῖς ὅσπερ τὰ πράγματα and Metaph. ix. ch. 10, 1051 b 3.) It is only the order of experience, though at times that might coincide with the scientific order, which is reproduced in association, and it is doubtful if it could be said that that takes place φύσει. The meaning would then rather be that, just as in the order of nature things succeed in a definite sequence, so it is in the functioning of thought. It is the occurrence of a particular order which is common to both.

Perhaps, however, the meaning is much wider than this. One of the mss. (M) inserts ἥ δυνάμει after φύσει and this, which seems to be a gloss, may, however, give us a clue to an interpretation—'Things when actually produced in a definite order do so by virtue of a natural disposition (or δύναμις) to do so. Now frequency of repetition produces this φύσις, and hence you explain the way in which we actually associate such and such ideas, since the ἐθος produced by frequent repetition is a kind of φύσις.' This φύσις might well have been called a ἔξις, as the tendency to virtuous action produced by practice is called in the Ethics. This ἔξις is, it must be noticed, a δύναμις, though determinate, and from φύσις you can never dissociate the idea of potentiality. Thus it can quite well be opposed to ἐνεργεία. In fact φύσις as the world of Nature is, apart from actual sensation, merely the potentiality of a sensible object, a ὑποκείμενον. Cf. Metaph. iii. ch. 5, 1050 b 31 sqq.: τὸ μὲν οὖν μὴτε τὰ αἰσθητὰ εἶναι μὴτε τὰ αἰσθήματα ἴσως ἀληθές..., τὸ δὲ
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tà ἀποκείμενα μὴ εἶναι, ἀ ποιεῖ τὴν αἰσθήσεων, καὶ άνευ αἰσθήσεως ἀδύνατον. Something must exist to cause sensation, but it is a ἀποκείμενον. Cf. also De An. ii. ch. 5, 417 a 12 and iii. ch. 2, 426 a 15 sqq.

The one sense of φύσις is not totally dissevered from any of the others. It is not a homonymous term. Here in this line φύσις is used in a way which would suggest ‘natural tendency’ or ‘constitution’ as a translation and it is used in the same connection as ἐν τοῖς φύσει and παρὰ φύσιν (452 b 2) which imply a reference to the world of Nature. Cf. Introduction, sec. iv.

452 b 2. παρὰ φύσιν. Cf. Phys. ii. ch. 8, 198 b 35 sqq. and iii. 215 a 2, etc. τὸ αὐτόματον or τύχη is the source of what we should call exceptions to the laws of Nature. Those deviations from the normal which we should ascribe to the operation of special subsidiary and counteracting laws Aristotle did not regard quite in the same light. As the action of Nature is not merely according to law, but purposive, Aristotle seems to consider these deviations from the general rule as being opposed to this purpose which aims for the best and as thwarting it. Hence the expression παρὰ φύσιν. Cf. Zeller, Arist. i. pp. 465 sqq. (τὸ αὐτόματον and τύχη may be distinguished, the former being specially the tendency to produce the unexpected found in natural phenomena). Cf. Bonitz, ad Metaph. xi. ch. 8, 1065 a 30.

452 b 5. ἀφέληται which Christ suggests, would make the reading smoother. But Aristotle continually works with an exceedingly indefinite subject, especially when discussing mental phenomena (cf. Rodier, ad De An. iii. ch. 5, 430 a 25); it is, indeed, possible for the subject to be changed between κινηθῆναι and ἀφέληκη.

452 b 6. δη ονόμα : επίη Christ: E Y have επείη μόνον.
452 b 8. γνωρίζειν δεὶ τῶν χρόνον. This is not a special characteristic of recollection, but is common to it and memory: ch. 1, 449 b 32 et passim. From here up to 453 a 5 Aristotle deals with the perception of time, a common function of both activities, and there after he goes on once more to contrast the two.

452 b 9. τι. This is evidently the common sense or its organ, the ἐν τι τῆς ψυχῆς mentioned in De Sensu, 449 a 10. To perceive time is a function of the common sense: cf. above, ch. 1, 450 a 11 and notes.

452 b 10. τὰ μεγέθη. Compare the way in which the perception of time is illustrated by the perception of a spatial magnitude in De Sensu, ch. 7, 448 b 3 sqq.
452 b 11. ἀποτελεῖσθαι κτ.λ. This would be a device for effecting thought by contact. Plato suggests in the *Timaeus* that thought is effected by contact (cf. *De An.* i. ch. 3, 406 b 26 sqq. and Rodier, *ad loc.*). But thought would thus be itself a μέγεθος. Cf. *Timaeus*, 34 c sqq. and especially 37 a. Aristotle, however, does not disdain to speak of the activity of intellect as a contact with its object—which is itself. Cf. *Metaph.* XII. ch. 7, 1072 b 21: θυγγαίων καὶ νοῶν (ὁ νοῦς).

Plato, though making thought to be effected by contact, does not suggest that it issues from the body and reaches out to the things thought of, but as we see in *De Sensu*, ch. 2, he, along with Empedocles, holds this to be true of sight.

452 b 14–16. Bekker reads τίνι ὅν ἄνθεον, ὅταν τὰ μειζόν νοη; ἢ ὅτι ἐκεῖνα νοεῖ, ἢ τὰ ἐλάττω; πάντα γὰρ τὰ ἐντός ἐλάττω, ὡσπερ ἀνάλογον καὶ τὰ ἐκτός. This is pretty nearly the traditional version of the commentators and it seems to have given rise to the interpretation descending from Themistius, which is to the effect that Aristotle is comparing the relation of external magnitudes and objective time to subjective processes by some relation between a whole and its parts. The inner processes in the subject are ἐλάττω, but so are the parts contained in a whole. Themistius takes the ἐντός as referring to the parts which are contained *in* the whole, not, apparently, as referring to ἐν αὐτῇ (sc. τῇ διανοώ), l. 13. Nevertheless, τὰ ἐντός—the parts contained in the whole—do correspond to the subjective processes but, when they are described as ἐλάττω, that primarily characterises their relation to the whole (τὰ μειζόν) and only secondarily the relation of inner process to the external reality.

The argument then is (Themistius, *Sp.* ii. p. 250) that, if you know the whole, the knowledge of the part is annexed to it, but that knowledge first attaches to the parts (τὰ ἐντός) and then, because they are analogous to each other, and to the whole, proceeds to the whole. The relation between whole and parts is like that in the *Timaeus* between the demiurge, or rather the animal of perfect figure which is to contain all others (*Timaeus*, 33 a), and the created gods which are within it and yet like to it.

It looks as though Themistius, having consulted the *Timaeus* in connection with the passage above, has been led on by some similarities of expression in the two works (τὰ ἐντός, ὀμοιότης and the notion of figures containing one another) to introduce as a parallel
something perfectly irrelevant. As Freudenthal points out, though a whole contains its parts, the parts do not contain the whole and it is impossible merely from the relation of part and whole to understand how a part can represent a whole. Among the commentators Simon and Thomas dismiss all this construction and take τὰ ἐντὸς as referring simply to the inner psychic affections which correspond to the external objects and periods of objective time.

It might seem at the first glance that τὰ ὀμοία σχῆματα which reside within the soul or its organ are what corresponds to the external spatial magnitudes, the κυνήγεις what answers to the periods of real time; but this distinction can hardly be maintained. All internal affections must be κυνήγεις and those by which time is apprehended must themselves be spatial, i.e. capable of being represented by figures (cf. De Insom. ch. 3, 461 a 8–11). The relation of inner to outer is represented by similar triangles (cf. 18–19 below). Though Themistius employs such triangles (the one including the other) in his elucidation of the passage, the one does not, according to him, represent the psychic states, the other the external realities, but one is held to symbolize time, and its smaller parts the subjective processes apprehending time, the other the objective thing, with its parts representing the concepts by which we know the objective, and what is asserted is not merely a proportion between the inner elements of each triangle and the whole, but between the two triangles as a whole and consequently between the inner elements of each triangle. Cf. Themistius, Ῥ. 11. p. 250, l. 23: ὡς τὸ ἐλάττων πρᾶγμα πρὸς τὸ μείζον ἔχει, καὶ ὁ ἐλάττων χρόνος πρὸς τὸν μείζονα ὀμοίος ἔχει, καὶ ἐναλλάξῃ, ὥς τὸ πρᾶγμα <πρὸς> ᾧπαντα τὸν χρόνον ἔχει καὶ τὰ μέρη πρὸς τὰ μέρη. (Spengel conjectures πρὸς before ᾧπαντα.) But Themistius has completely missed the point, which is—how can the internal represent the external? He is continually using νόημα and πρᾶγμα as interchangeable (cf. l. 21, loc. cit.); but the question is—how is it possible to use the νόημα (in the sense of psychic process) instead of being in actual contact with the πρᾶγμα? How are they related to one another?

Freudenthal, in Rheinisches Museum, xxiv. p. 415, conjectures practically the identical reading which Biehl reproduces and which makes quite plain to what τὰ ἐντὸς and τὰ ἐκτὸς refer. We must, however, depart from Biehl to some extent and delete before ἀνάλογον in l. 16 the ὅσπερ which obscures the sense and may have easily crept in from the subsequent line. We read καὶ with Freudenthal.
452 b 17. St Hilaire and Hammond take εἴδεσιν to mean figures (mathematical); 'just as a figure may contain a proportionate one within it, so with distances.' But εἴδος is never used as identical with σχῆμα—figure, though σχῆμα may be regarded as an instance of εἴδος in the most general sense; and besides, since the sides of geometrical figures are ἀποστήματα, in comparing the relations of ἀποστήματα to those which exist between proportionate figures, Aristotle would only be comparing a thing with itself.

Bender translates εἴδεσιν by 'Bildern,' and this may be founded on an illustration which Simon gives when he compares the psychic states to statuettes of equal size reproducing on the small scale the lineaments and features of two different men. Simon, however, seems to agree with Thomas that ἐν αὐτῷ (II. 17–18) refers not to the εἴδος as Bender seems to take it (—'in der Sache'—but that would rather be ἐν αὐτῷ or ἐν αὐτοῖς) but to the perceiving subject—'in ipso cognoscente,' and he thinks that Aristotle is comparing the function of the internal quantum in representing external quantity to the function of the internal εἴδος in representing that which exists in the objective universe. In both cases the internal is analogous to the external. This account of the εἴδος in the soul is rather different from the usual one. Aristotle generally says that the εἴδος of the object gets into the soul. For example, sense is a faculty for receiving the εἴδος—the form without the matter; cf. De An. ii. ch. 12, 424 a 18, and so of νοῦς in iii. ch. 4, 429 a 15, but again in 429 a 27 the soul is said to be the τόπος εἰδον. Now, if the εἴδος of the sensible object only exists actually (ἐνεργεία) when it is perceived or thought of, the εἴδος in the soul will be identical both numerically and specifically with that in the object so far as the latter exists ἐνεργεία, and this seems to be from one point of view the Aristotelian theory: cf. De An. iii. ch. 2, 426 a 15 sqq., and Metaph. iii. ch. 5, 1010 b 30; but here we seem to have the more common-sense position that the εἴδος exists realised in the external object independently of the percipient mind and that what exists in the mind is at least numerically different from the objectively existing one. Here indeed Aristotle would seem to go so far as to suggest that the εἴδος in the mind is only analogous to that existing in the external world.

In this passage, then, Aristotle's purpose is to illustrate the representation of an external ἀποστήματα by an internal σχῆμα, by the function which the εἴδος of an external object communicated to the sense organs has in giving us knowledge of that object. He refers
to the latter operation as to something already agreed upon. Cf. De Interp. ch. 1, 16 a 6: παθήματα τής ψυχής, καὶ ὄν ταῦτα ὁμοιώματα, πράγματα κ.τ.λ.

452 b 18. In the following lines, while I adhere to one of the emendations which Biehl adopts from Freudenthal (ΓΔ for ΑΔ in l. 19), I disagree with the latter in his interpretation of the passage. My interpretation enables us to read ΑΓ with Bekker and all other editors and mss. instead of ΑΖ in l. 21, and I instead of Μ in l. 22, a lection supported by mss. E M Y.

The figure I give in illustration of the text (for which, along with this interpretation, I am indebted to Mr W. D. Ross of Oriel College) differs from that suggested by Freudenthal as much as from the one found in Themistius; it will be found to be simpler than either and open to fewer objections. My contention is that Aristotle's sole point is to show how external ἀποστήματα and κινήσεις may be reproduced in parvo in the psychical organs. His explanation is that the internal σχήματα and κινήσεις are analogous to the external ones, just as the sides of a small triangle are in the same proportions as those of one any number of times larger, obtained by producing the sides to any distance and drawing the base parallel to the base of the small one.

He accordingly draws the triangle ΑΓΔ with BE near the apex and parallel to ΓΔ. (That this is the first figure to be drawn is evident from the fact that the letters round it succeed each other in the order of the alphabet.)

```
(Ż)F
(Γ)C
(B)B
(Α)A

G(H)
D(Δ)
H——(Θ)
I——(Ι)
K——(Κ)
L——(Λ)
```

The internal σχήμα or κίνησις then represents the external just as the sides AB, BE represent ΑΓ, ΓΔ by being proportional to them.

But the question arises, why should the internal σχήμα or κίνησις symbolized by AB, BE represent the external ΑΓ, ΓΔ rather than ΑΖ, ΖΗ (obtained by producing ΑΓ and ΑΔ and drawing ΖΗ parallel to ΓΔ), which are equally proportional to AB, BE?
Will not an internal σχήμα which represents a length of six feet at a certain distance represent one of twelve feet at double the distance? Aristotle replies that this is so, but that in the two cases we are conscious of a different proportion between the external and the internal. We have some standard by which we measure real size. We are conscious of the real distance from the eye outwards of the various objects, and hence (to state the case in modern terms) we know that an affection of the retina, which may mean a size of two inches in a near object, may mean two miles in a distant one. This is what Aristotle means when he says that ΑΓ is to AB in the proportion of Θ to I, but AZ is to AB in the ratio of K to Λ.

This interpretation requires us to regard Θ, I, K and Λ as the names of single lines, not as referring to points at the ends of lines as Freudenthal and Themistius would have it. This usage is common in Euclid. On the other hand it is impossible that τῶν ΘΙ or τῶν ΚΛ could refer each to single lines as Freudenthal maintains; nor is there anything in the passages he quotes (Phys. viii. ch. 16, Meteorol. iii. ch. 5, 6, 7, 8, 9, 11) to show that Aristotle could, by Θ or Μ (I) in l. 22, be referring to a single line by means of a point at one end of it, if the point at the other end is denoted by another letter. The difficulty is increased by the fact that his interpretation requires the full designation of the former line to be [Μ]Θ, of the latter [Κ]Μ. There is nothing to show that Μ was in Aristotle’s original scheme; it seems to have crept into some of the MSS. from the figure of Themistius where it is found along with several other superfluous letters. For further criticisms of the figure of Themistius, cf. Freudenthal in Rheinisches Museum, loc. cit.

Freudenthal’s text is as follows: 452 b 18 sqq. — ὁσπερ οὖν εἰ τὴν ΑΒ ΒΕ κυνζται, ποιεῖ τὴν ΓΔ· ἀνά· λογον γὰρ ἦ ΑΓ καὶ ἦ ΓΔ. τί οὖν μᾶλλον τὴν ΓΔ ἢ τὴν ΖΗ ποιεῖ; ἦ ὁσ ἦ ΔΖ πρὸς τὴν ΑΒ ἔχει, οὕτως ἦ Θ πρὸς τὴν Μ ἔχει. (The rest is identical with the version followed here.) He constructs two diagrams.

1. αζη and µβι are two similar triangles one inscribed in the other and both are intersected by a
line $\kappa \beta \epsilon \lambda$ drawn parallel to $\theta \iota$ or $\zeta \eta$ so that $\mu \kappa : \kappa \theta = \alpha \beta : \beta \zeta$. $\gamma \delta$ is also drawn parallel to $\zeta \eta$.

Then the following result will hold:

\[
\frac{a \gamma}{\gamma \delta} = \frac{a \beta}{\beta \epsilon} = \frac{a \zeta}{\zeta \eta}.
\]

Also

\[
\frac{a \zeta}{a \beta} = \frac{\theta}{\mu} \quad \text{i.e.} \quad \frac{\theta \mu}{\kappa \mu}.
\]

Finally

\[
\frac{\zeta \eta}{\beta \epsilon} = \frac{\theta \iota}{\kappa \lambda} = \frac{\zeta \alpha}{\beta \lambda}.
\]

According to Freudenthal, $a \beta$, $\beta \epsilon$ represent inner affections; $a \gamma$, $\gamma \delta$ concepts; $a \zeta$, $\zeta \eta$ objective magnitudes, while $\mu \kappa$, $\kappa \lambda$ represent our idea of time, $\mu \theta$, $\theta \iota$ actual objective time.

This scheme is not wholly unlike that of Themistius whose outer triangle represents time and its subjective apprehension, while the inner one symbolizes objects and the ideas by which they are thought.

But, as the whole point of the argument is, that the internal $\sigma\chi\mu\mu\tau\alpha$ and $\kappa\iota\nu\rho\sigma\epsilon\iota\varsigma$, though much smaller, are still analogous to the external magnitudes and periods of time, it is strange to find the internal $\kappa\iota\nu\rho\sigma\iota\varsigma$, which is the means of apprehending time, symbolized by lines in the external triangle. If there is any point at all in drawing inserted triangles to represent the relation in question, the inner one should certainly represent the subjective and 'smaller' process. A series of similar triangles, the one enclosing the other, would be a much better means of bringing out Aristotle's contention. It would thus be shown that differences in magnitude are non-essential; the proportions in the sides of the smallest interior triangle are still analogous to those of the largest exterior one. There is no need for Aristotle to represent objective time by different lines and symbols from those which represent external spaces (cf. De Sensu, ch. 7, quoted above), nor need the internal $\kappa\iota\nu\rho\sigma\iota\varsigma$ be distinguished by different letters from the internal $\sigma\chi\mu\mu\alpha$. In fact, the internal state corresponding to both spatial and temporal magnitudes must be a $\kappa\iota\nu\rho\sigma\iota\varsigma$ (and perhaps it is this that Aristotle means when he says in De An. iii. ch. 1, 425 a 17–18, that we know both figure and magnitude by means of $\kappa\iota\nu\rho\sigma\iota\varsigma$). But this $\kappa\iota\nu\rho\sigma\iota\varsigma$ can be represented by a figure, i.e. it is spatially determined, it is a kind of $\phi\rho\rho\alpha$, and it
is as such that it can represent the objective magnitudes whether of time or space. What the difference is between the \textit{kíνησις} which represents a magnitude which is itself a \textit{kíνησις} (as in time) and that which represents a space, Aristotle does not say; he seems merely to be bent on describing everything internal in terms of \textit{kíνησις}.

Again, it is difficult to believe that here Aristotle is distinguishing inner affections ('innern Affectionen,' Freudenthal in \textit{Rheinisches Museum}, p. 417) from concepts (Begriffe). In the previous sentence (ll. 16–18) he had (by implication) distinguished the apprehension of \textit{eἴθη} from that of \textit{ἀποστήματα}, holding that in both cases there is something analogous in the soul which corresponds to the objective \textit{εἴθος} or \textit{ἀπόστημα}. Now the distinction between \textit{εἴθος} and \textit{ἀπόστημα}—magnitude or spatial figure generally—is quite different from that between inner affection (\textit{φαντασμα}?) and concept. Further, \textit{εἴθος} is not a psychological term; it could not be used to mean concept as opposed to image. Though the \textit{εἴθος} of a thing means the concept or knowable character of a thing, it is used only in the epistemological reference not in the psychological. The appropriate term to designate the concept as a psychical entity is \textit{νόημα} not \textit{εἴθος}. Compare the usage all through this treatise as in \textit{De An.}, especially 432a12, 430a28. Further, even though one did take \textit{εἴθος} in the sense of \textit{νόημα} and held that the lines \textit{αγ}, \textit{γδ} represent \textit{νοήματα} or \textit{εἴθη}, yet, as they are not of the nature of spatial quantity, what is here said about their analogy to the objects they represent will be the merest metaphor. A concept represents the external reality by having the same \textit{λόγος}, or in fact being the \textit{λόγος} of the external thing (cf. \textit{De An.} II. ch. 12, 424a24); but that \textit{λόγος} is not a spatial proportion, neither in the external object (for that would be the Democritean theory) nor, consequently, in the soul. On the other hand the \textit{φαντάσμα} is spatial in character; as we saw in ch. 1, 450a9, not to be able to think without \textit{φαντάσματα} is just the same as not being able to think \textit{ἄνευ τοῦ συνεχοῦς}. (\textit{This συνέχεια, as we saw, forms the ὅλη νοητή of the concept.) Hence the analogy between the \textit{φαντάσμα} (or \textit{αἴσθημα} which is equally a spatial \textit{kíνησις}) and the objective magnitude whether temporal or not, can be adequately symbolized by spatial figures, \textit{e.g.} by the identical ratios which may be found in similar triangles of diverse magnitudes, whereas the analogy between the \textit{νόημα} proper and its external object must be something very different.
Hence, even though we were to keep Freudenthal’s figure, we need not appropriate special lines to the symbolization of particular classes of psychical states. The point seems to be merely that within a triangle of the same apex the shorter lines may be proportional to those obtained by producing the sides.

2. Freudenthal gives another illustration with three triangles, the smaller progressively inscribed in the larger, but the alteration is not material.

The only reason for following Themistius’s explanation of the passage—the alleged correspondence of the ‘triangulum rei’ and ‘triangulum temporis’—would be the difficulty of accounting for ὧν at the beginning of the next paragraph (l. 26) by any other. ‘Hence, (since the process corresponding to the time and that corresponding to the thing may themselves correspond), we may explain memory. When they occur together we remember, etc.’ But the alleged correspondence of time-apprehending and object-apprehending processes does not account for the fact of remembering. It is their coincidence that does so. It is also difficult to see what sense there is in making out a correspondence between an object and the time in which it is apprehended or between the subjective processes produced by each. Both may be illustrated by the same lines and figures as above, but that need not imply an analogy other than generic between the two classes of processes. The ὧν does not imply that the act of memory is explained by the previous passage; all that has been accounted for is the possibility of an internal process representing external reality, whether that be spatial magnitude or temporal process. Memory, as such, is accounted for by the coincidence merely of the two subjective processes.

(In l. 22 γὰρ instead of ὧν would give a smoother sense, but the change is not necessary.)

453 a 1–2. Bekker reads ὧν ὅτι τρίτην ἡμέραν ὁδήγοτε ἐποίησεν, ὅτε δὲ καὶ μέτρῳ. This gives no material difference. But Freudenthal, (op. cit.: p. 419) pointing out that τρίτην ἡμέραν makes one think of an exact interval of time, and hence can hardly be employed as an instance of indeterminate time, wishes to read ὧν ὅτι τρίτην ἡμέραν, ὅτι μέντοι ποτὲ ἐποίησεν. ὅτι δὲ καὶ μέτρῳ. ὅτι μέντοι is read by LS Michael and vet. tr.

The change is surely not essential. I take ὅτι τρίτην ἡμέραν ὁδήγοτε ἐποίησεν to be an example of remembering μέτρῳ. Aristotle says
that sometimes one does not remember the exact interval, as e.g. that it was an interval of three days, but at other times one does.

Freudenthal's objection against δὴποτε is not convincing. The indefiniteness of the subject acting need not entail any indefiniteness in the act performed.

453 a 7-8. Evidently to have recollection proper one must remember μέτρψ.

453 a 10. γνωριζομένων. The reading of L S U γνωρίμων is perhaps a little smoother.

453 a 12. οἶνον συλλογισμός τις. This would point either to Siebeck's theory or to the one I have given as to the meaning of 452 a 18 sqq. Beginning with your present thought, as it were with a minor premiss, you develop it further by a series of middle terms which finally lead to the idea you are in search of, just as your middle terms in a deduction finally bring you the ultimate predicate which is to be attached to the subject.

Here Aristotle lays emphasis on the pursuasive character of ἀνά-
μνησις. He treats it as a ζήτησις depending on will. It is evidently as such only that it is the exclusive possession of man. But ἀνά-
μνησις is not in all cases pursuasive: cf. 451 b 26, and l. 28 below.

453 a 14. βουλευωσις is also a species of ζήτησις: cf. Eth. Nic. vi. ch. 10, 1142 a 32, and again we have in 1142 b 1: ὁ δὲ βουλευω-
μενος ζητεῖ καὶ λογιζεται. Cf. also iii. ch. 5, 1112 b 20 sqq. It is a search for means to an end and for means which are in our power. There is another kind of ζήτησις— theoretic, such as in mathematics is a kind of ἀνάλυσις. Aristotle calls it in Metaph. IX. ch. 9, 1051 a 22 sqq., διαίρεσις (at least he says διαιροῦτες γάρ εύρισκοντων. This is of course not the Platonic διαίρεσις). The process involved is thus explained by Mr Burnet in The Ethics of Aristotle, p. xxxv. 'Figures are resolved by making actual the divisions into other figures which are there potentially. If they were already actually divided the proof would be plain; as it is, we must make a construction which is always in the long run some form of division. For instance, why are the angles of a triangle equal to two right angles? It is because the angles about one point are equal to two right angles. If the line parallel to the side were already drawn, the truth would be plain at first sight.'

This process is obviously just ἀποδείξεις—demonstration, or συλλο-
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γιαμός—the finding of the middle term. Scientific analysis and demonstration are just the same thing, as is borne out by the name of the treatises on demonstration—τὰ ἀναλυτικά. Recollection is then like a syllogism in being an analysis, though a psychological one, corresponding to the logical analysis involved in scientific reasoning.

453 a 16–17. σωματικόν τὸ πάθος. σωματικόν τι πάθος is read by L.S.U, the commentators and all editors other than Biehl. 

ἐν τοιούτῳ. Cf. De An. i. ch. 4, 408 b 17 and above, note to 451 b 35, ἰφρήν κινήσεως.

453 a 19. ἐπέχοντες. For this Christ is responsible. If we read ἐπέχοντας with the mss. and Bekker we must place a comma after ἀναμνησθῆναι and, taking the ἐπέχοντας along with ἐπιεικροῦντας, translate it ‘and though they restrain their thoughts.’ The vet. tr. however, though taking it along with ἐπιεικροῦντας, has ‘adhibentes intellegentiam.’

453 a 20. After οὐδὲν ἤστον I understand with Simon παρεξολείν. It is this which it is the purpose of the proof to maintain. So Thomas also. Themistius explains that the search still goes on. This is not far wrong though it is difficult to see how what is against one’s will can be a ζήτησις (cf. Themistius, Σφ. 11. p. 253, 1. 29). Hammond and Bender wish to have it that people remember when they are not trying and in fact trying not to. This does not suit the Greek so well and is hardly the point. Aristotle does not attempt to show the bodily nature of recollection by its occurring involuntarily (though that it does so is also implied, cf. ll. 27 sq.). In fact he has lately understood by ἀνάμνησις the voluntary recall of an idea. He wishes rather to show its corporeal connection by pointing out that it may stimulate bodily disturbances beyond the control of the will. This is the meaning of τοῦ μὴ ἐπ’ αὐτοῦ εἶναι τὸ ἀναμνηστικὸν τοῦτο (ll. 22 sq.) and the subsequent illustration.

453 a 25. σωματικόν τι. The heart, according to everyone but Neuhäuser: cf. Introduction, sec. vi. In De An. i. ch. 4, 408 b 18 Aristotle talks of the κινήσεις stimulated in recollection as being in the sense organs (ἐν τοῖς αὐθητηρίοις), but that is probably only a vaguely worded statement.

We have seen above in ch. 1, that the organ of κοινή αὐθητηρία and φαντασία is the heart, or is situated in it. Cf. also De Juvent. ch. 3, 469 a 12. These κινήσεις or πάθη are φαντάσματα.
453 a 28. ἐπανέλθη L S U. Michael, Themistius, and almost all editors read ἐπέλθη, which does not give the sense of *returning* which is involved in ἐπανέλθη and seems to be required.

453 a 34. εἰσὶ δὲ κ.τ.λ. Another proof of the bodily nature of memory and recollection. Dwarfs are people with the upper parts of their bodies more developed than the lower extremities just like young children.

453 b 5–6. διὰ τὴν κίνησιν. Cf. ch. 1, 450 b 7 sqq.
THE ARISTOTELIAN THEORY OF LIGHT.

It is difficult to reconcile Aristotle’s doctrine that light is a ἀέσ (cf. pp. 211-14 above) with his other statements which imply that, if not a motion, it at least has direction in space.

We must, indeed, disregard those passages (e.g. Meteorol. i. ch. 8, 345 b 10 and ii. ch. 9, 369 b 13-14) where his use of language which has such an implication is due to the fact that some Empedoclean doctrine is under discussion; and again in Anal. Post. ii. ch. 11, 94 b 29 sqq., where he talks of the passage of light through the enclosing walls of a lantern, he expressly safeguards himself by saying εἰπερ φῶς γίνεται τῷ διέναι. Once more, statements in the Problems (e.g. 904 b 17: τὸ μὲν φῶς κατ’ εὐθείαν φέρεται) may be set aside as not being of necessity genuinely Aristotelian.

Nevertheless, in Meteorol. iii. ch. 4, 374 b 4, Aristotle speaks of rays proceeding from the sun, and the whole of his account of the phenomena of eclipse and illumination rests on the assumption that light has direction; in De An. ii. ch. 8, 419 b 29 sqq. he explains the diffusion of daylight by the reflection of the sun’s light from the spots directly illuminated.

It is noteworthy, however, that when he talks of the formation of images in mirrors and tries to show that rainbows, haloes, etc. are due to reflection (e.g. in Meteorol. iii. ch. 2, 371 b 17 sqq.) he always speaks of the reflection of sight, not of the reflection of light. Moreover it is evident that he was as far as his predecessors from understanding that the visibility of an object which is not self-luminous is a phenomenon of reflection.

It is precisely when he comes to explain the perception of such an object that his theory, like that of prior philosophers, breaks down. The perception of anything which is a source of light (τι πυρωδές) is relatively a simple matter. The luminous body, by
producing a ἴσ in the medium intervening between it and the eye, is enabled to act upon the organ of vision and so cause perception of itself. But the non-luminous object must also act upon the eye, if it is to be seen, and yet, not being of the nature of fire, it cannot produce a ἴσ in the medium. The fact that it is illuminated, i.e. endowed with the ἴσ produced in the transparent medium (which penetrates it to a greater or less extent) by the presence of a source of light, may be a prior cause of its visibility (τὸ γὰρ φῶς ποιεὶ τὸ ὀπῶν), but does not explain how it acts upon the eye. Light can be the proximate cause of vision only in the case of a self-luminous body. We may think it strange that Aristotle, whose general doctrine of perception involved the action of all visible objects upon the eye, and who in De Sensu, ch. 2, 438 b 5, is content to call this a κίνησις, did not leap to the conclusion that illumination is itself due to a κίνησις which is identical with this. As things stand, his theory of the perception of bodies which are not self-luminous is left incomplete and is not reconciled with the rest of his teaching. It can only be described as an advance upon the Empedoclean doctrine, which made the act of vision a phenomenon of illumination—the illumination of an object by the eye, and thus took as obvious the fact most in need of explanation, namely the perception of an illuminated object.
APPENDIX II.

THE ARISTOTELIAN THEORY OF TIME-PERCEPTION

A tentative rendering of the difficult passage 452 b 8–25 (Bek. 7–22) has been suggested to me by Mr J. A. Smith and Mr W. D. Ross. The same figure is retained in illustration of the text and the explanation is of the same general type as that which I have adopted in pp. 279 sqq. But the reading in ll. 14–16 (Bek. 13–15) is altered to—τινι οὖν διοίσει, οὕτα μεῖζον νοη, οικεία νοεί ἣ τὰ ἐλάττω; πάντα γὰρ τὰ ἐντός ἐλάττω, ὕσπερ ἀνάλογον καὶ τὰ ἐκτός. 'When one thinks of the greater (and more distant) objects, what is the difference between thinking of them and of the smaller (and nearer)? For all the internal (subjective) are smaller (than the external) as it were in proportion to the external (objective).'

The internal AB, BE is smaller than ΑΓ, ΓΔ, but preserves the same proportion as ΑΓ, ΓΔ, and also as AZ, ZH. What then is the difference between interpreting AB, BE as meaning ΑΓ, ΓΔ and interpreting it as meaning AZ, ZH? The difference lies in the power (assumed by Aristotle l. 9 above—ἐστώ δὲ τι ὑπ' ἑρεί τὸν πλεῖον καὶ ἐλάττω) of knowing the distance in space or time of the object for which our mental object stands, and knowing, therefore, by what to multiply AB and BE—whether by \( \frac{\Theta}{I} \) or \( \frac{K}{\Lambda} \). This tells us (to take the case of μεγέθη) whether the image in us stands for a cat at ten yards' distance or a tiger much farther away. Similarly it enables us to say whether the κίνησις in us represents an event which took ten minutes a week ago or twenty minutes a fortnight ago. When the image is multiplied by us in the same ratio as that in which its distance from us is multiplied, we think of (or recollect) the right object at the right distance of space or time. When different ratios are used we get a false thought or a false recollection.

According to this interpretation AB is the ἀπόστημα of the image from us, ΑΓ and AZ the ἀποστήματα (in space or time) of the objects
from us. BE represents our subjective image or \( \kappa \nu \gamma \sigma \iota \varepsilon \), \( \Gamma \Delta \) and ZH the objects (spatial or temporal) which we think of. If you wish to think of ZH rather than \( \Gamma \Delta \) you must think of the \( \Delta \pi \sigma \tau \mu \mu \alpha \tau \alpha \) as being different too, and multiply \( AB \) by \( \frac{K}{\Lambda} \) not by \( \Theta \).

The chief objection to this interpretation is that it implies that Aristotle thought of the image in the mind as existing at a distance from us, as though there were within us an inner spectator (the real self) whose relation to mental images merely reproduced on a small scale the relation between a percipient being and the spatial objects external to his organism. In fact we have the scholastic and Cartesian theory of the relation of the soul to the motions in the 'animal spirits.' But surely such a doctrine is definitely non-Aristotelian. Further if \( \Lambda \Gamma \) and \( AZ \) can be interpreted as being designed to represent distances in time of past events, \( AB \) will also (when compared with these) represent an \( \Delta \pi \sigma \tau \mu \mu \alpha \) in time. But how can a present image or \( \kappa \nu \gamma \sigma \iota \varepsilon \) (BE) be said to be distant from us in time? It will thus be seen that there are difficulties in working out the consequences of this tempting and ingenious theory. I myself cannot believe that Aristotle meant his symbols to be anything more than a general illustration of the relation which internal \( \kappa \nu \gamma \sigma \iota \varepsilon \) bear to external \( \kappa \nu \gamma \sigma \iota \varepsilon \) and \( \mu \varepsilon \gamma \varepsilon \theta \gamma \). The fact that motion always implies extension made it possible for the former class to symbolize both the latter.
APPENDIX III.

LIST OF PRINCIPAL AUTHORITIES REFERRED TO

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WORKS BEARING ON THE SUBJECT:
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