VII.

Qualitative Change in Pre-Socratic Philosophy.

By

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I.

Strange as it may seem, this important theme appears never to have been treated fully, though the literature of Greek philosophy, ancient and modern, abounds in definite references or vague allusions to it. The Greek terms applied to such change are the nouns ἀλλοίωσις or ἑτεροίωσις and their cognates. The latter, though occurring only once in Aristotle,¹⁾ is probably the older term. In general, ἀλλοίωσις is the word that stands for a definite conception; and hence in the following discussion it will be used alone, though the two nouns are essentially synonymous.

Broadly speaking, ἀλλοίωσις signifies change; more specifically, change of aspect or quality. In itself it predicates nothing of the mode or process by which a given object, of whatever description, ceases to have one character and takes on another. Oftentimes the writer who employs the term manifestly has no clear and distinct idea to express; and it is not impossible that certain of the earliest philosophers had given the subject no thought. But

¹⁾ *Phys.* 217^b 26. The word occurs as early as Melissus. The verb ἀλλοιοῦν stands in Heraclitus, fr. 67 (Diels), but I incline to think it due to a later redaction, such as appears not unfrequently in Heraclitus. Zeller would have us think that it stands in a verbatim citation of Anaxagoras by Aristotle *Gen. et Corr.* 314^a 15. But see n. 110, below. Heraclitus uses μεταβάλλειν and μεταπίπτειν. The latter verb occurs also in Melissus. The verb ἀλλοιοῦνται occurs in [Hippocr.] *de Victu* (see n. 79), but the date of this tractate is too uncertain to yield satisfactory evidence.

it is evident that in general ἀλλοίωσις is employed by the later Greek writers on philosophy in the sense which it bears in Aristotle's works.

Plato, whose free coinage of philosophical terminology is well known, was apparently the first to use the word in a signification definite enough to entitle one to speak of it as a technical term. At all events, the manner in which he introduces the distinction between φορά and ἀλλοίωσις suggests a conscious innovation.²⁾ But even he does not define the mode of effecting this kind of change, except in so far as the object is said to remain in the same place — which is indeed the point of distinction as against φορά — and elsewhere he employs the term with a certain indefiniteness, except when he refers to change of character by recomposition.³⁾

Aristotle, likewise, at times speaks rather vaguely of ἀλλοίωσις, as if it could denote any qualitative change whatsoever; generally, however, the word bears a well-defined meaning. He says that *it is found whenever, — the sensible substrate remaining the same, — the substance changes in respect of its qualities, which are either*

²⁾ *Theaet.* 181 B foll., speaking of the flowing philosophers, he suggests that their dictum πάνταρεῖ embraces not only motion of translation (φορά) but also ἀλλοίωσις — ὅταν ἡ μὲν ἐν τῷ αὐτῷ, γηράσκη δέ, ἡ μέλαν ἐκ λευκοῦ ἡ σκληρὸν ἐκ μαλακοῦ γίγνηται, ἡ τινα ἄλλην ἀλλοίωσιν ἀλλοιῶται. Cp. *Parm.* 138 B foll. ὅτι κινούμενόν γε ἡ φέροιτο ἡ ἀλλοιοῖτο ἄν· αὐτὰ γὰρ μόναι κινήσεις. The passage relates ἀλλοίωσις to ποιεῖν and πάσχειν, and the tone is more dogmatic. *Theaet.* 157 B and *Parm.* 162 B — 164 B ἀλλοίωσις is used (in quasi-Heraclitic terms) as equivalent to θάνατος; ep. also *Legg.* 894 E. How Plato would have us think of ἀλλοίωσις in Heraclitus is clearly indicated *Theaet.* 152 D foll. See below, n. 15.

³⁾ *Repub.* 380 E — 381 D Plato uses the term of changes of form as well as of character. There is latent, however, the same reference to the Eleatic protest against multiplicity, implied in all change, as in *Parm.* 138 B foll. *Repub.* 454 C ἀλλοίωσις is indefinite, merely opposed to ὁμοίωσις. *Tim.* 45 D, after appropriating Empedocles's theory of vision, as based on the interaction of like and like, Plato explains the failure of sight by night as due to ἀλλοίωσις of the fire emitted by the eye, caused by the unlikeness to it of the air devoid of fire. *Tim.* 82 B ἀλλοιότητες are changes in character due to recomposition of the four (Empedoclean) elements. *Crat.* 418 A refers to change of meaning in a word. *Phaedo* 78 D ἀλλοίωσις is opposed to that which has only one character (μονοειδές). Cp. *Legg.* 648 E, where deterioration is implied, as in *Repub.* 380 E foll.

*contrary or neutral.*⁴⁾ He thus distinguishes ἀλλοίωσις from such changes as are effected by transformation, by addition, by subtraction, or by composition.⁵⁾

This statement would seem to be sufficiently explicit. Nevertheless many difficulties arise when one inquires just what changes shall be regarded as involving ἀλλοίωσις. Thus one is not a little surprised to find that Aristotle so considered the process of rarefaction and condensation,⁶⁾ whereas we are accustomed to regard it as a purely quantitative change, the alteration being such as a given mass undergoes in occupying more or less space.⁷⁾

4) *Gen. et Corr.* 319^b 10 ἀλλοίωσις μὲν ἐστίν, ὅταν ὑπομένοντος τοῦ ὑποκειμένου, αἰσθητοῦ ὄντος, μεταβάλλῃ ἐν τοῖς αὐτοῦ πάθεσιν, ἢ ἐναντίοις οὖσιν ἢ μεταζύ.

5) *Phys.* 190^b 5 γίγνεται δὲ τὰ γιγνόμενα ἀπλῶς τὰ μὲν μετασχηματίζει, οἷον ἀνδριάς ἐκ χαλκοῦ, τὰ δὲ προσθέσει, οἷον τὰ αὐξανόμενα, τὰ δ' ἀφαιρέσει, οἷον ἐκ τοῦ λίθου ὁ Ἑρμῆς, τὰ δὲ συνθέσει, οἷον οἰκία, τὰ δ' ἀλλοιώσει, οἷον τὰ τρεπόμενα κατὰ τὴν ὕλην. Thus ἀλλοίωσις is allotropy, to use a modern chemical term.

6) This is evident from many passages. One will suffice: *Phys.* 246^a 6 ἀλλὰ γίνεσθαι μὲν ἴσως ἕκαστον ἀναγκαῖον ἀλλοιουμένου τινός, οἷον τῆς ὕλης πυκνουμένης ἢ μανουμένης ἢ θερμαινόμενης ἢ ψυχομένης. The kinds of change are significant; for with Anaximenes, and the early Greek thinkers generally, rarefying and warming, condensing and cooling, are synonymous. That the process was called 'rarefaction and condensation' rather than 'warming and cooling' shows what aspects of the phenomena most impressed these philosophers. With Aristotle the emphasis was clearly reversed.

7) This point of view was indeed quite familiar to Aristotle himself, as *Categ.* 10^a 16 καὶ κατὰ τὴν μορφήν δὲ ἕκαστον ποιόν τι λέγεται. τὸ δὲ μανὸν καὶ τὸ πυκνὸν καὶ τὸ τραχὺ καὶ τὸ λεῖον δόξειε μὲν ἂν ποιόν τι σημαίνειν, ἔοικε δὲ ἀλλότρια τὰ τοιαῦτα εἶναι τῆς περὶ τὸ ποιὸν διαιρέσεως· θέσιν γὰρ μᾶλλον τινα φαίνεται τῶν μορίων ἑκάτερον δῆλόν. πυκνὸν μὲν γὰρ τῷ τὰ μόρια σύνεγγος εἶναι ἀλλήλοις, μανὸν δὲ τῷ διεστάναι ἀπ' ἀλλήλων. *De Caelo.* 299^b 7 ἔτι εἰ τὸ μὲν βαρὺ πυκνόν τι, τὸ δὲ κούφον μανόν, ἔστι δὲ πυκνὸν μανοῦ διαφέρον τῷ ἐν ἴσῳ ὄγκῳ πλεῖον ἐνυπάρχειν. The opposition of δόξειε and ἔοικε in the first passage may be significant, if the former verb, as is frequently the case, alludes to traditional views, while the latter expresses Aristotle's own opinion. It would then appear that Aristotle believed he was reflecting the opinions of predecessors (see n. 6), in making the distinction between the rare and the dense qualitative, whereas he himself held it to be quantitative. I hope to make it probable that the φυσικοὶ shared Aristotle's own view, and that their doctrine was misunderstood.

In another passage⁸⁾ he speaks of this process as the source of all qualities that are subject to ἀλλοίωσις. Again, we are informed that increase⁹⁾ necessarily involves ἀλλοίωσις, and the same would seem to be true of freezing and of crystallization in general, which we should regard as changes in form or structure.¹⁰⁾ The

⁸⁾ *Phys.* 260^b 7 ἔτι δὲ πάντων τῶν παθημάτων (= παθῶν, cp. *Met.* 1022^b 15 foll.) ἀρχὴ πύκνωσις καὶ μάνωσις· καὶ γὰρ βαρὺ καὶ κοῦφον καὶ μαλακὸν καὶ σκληρὸν καὶ θερμὸν καὶ ψυχρὸν πυκνότερες δοκοῦσιν καὶ ἀραιότερες εἶναι τινες. πύκνωσις δὲ καὶ μάνωσις σύγκρισις καὶ διάκρισις, καθ' ὅς γενέσις καὶ φθορὰ λέγεται τῶν οὐσιῶν. Here once more δοκοῦσιν and λέγεται indicate that Aristotle believes he is reflecting the philosophical tradition. The passage is interesting also for other reasons. It appears to state discursively what the early physiologists perceived naïvely, viewing the process as the natural sequel of the κίνησις ἀίδιος; for Aristotle is trying to prove that motion of translation is the original form of change, and that the original form of φορά is the circular, because (as returning upon itself) it is continuous. The ideas are ancient; cp. Alcmaeon's explanation of man's mortality *Arist. Probl.* 916^a 33, and Heraclitus, fr. 103 with Diels's note on Parmenides 3, 1 in *Parmenides Lehrgedicht*, p. 66 foll. In our passage Aristotle had in mind the notion of a δίνη almost universally held by the early philosophers.

⁹⁾ *Phys.* 260^a 29 ἀδύνατον γὰρ αὐξήσιν εἶναι ἀλλοιώσεως μὴ προϋπαρχούσης· τὸ γὰρ αὐξανόμενον ἔστι μὲν ὡς ὁμοίῳ αὐξάνεται, ἔστι δ' ὡς ἀνομοίῳ. τροφή γὰρ λέγεται τῷ ἐναντίῳ τὸ ἐναντίον. προσγίνεται δὲ πᾶν γινόμενον ὅμοιον ὁμοίῳ ἀνάγκη οὖν ἀλλοίωσιν εἶναι τὴν εἰς τάναντία μεταβολήν. I do not know whose opinion (cp. λέγεται) Aristotle here thinks to reproduce: but it is his familiar doctrine of nutrition by 'assimilation'. We here meet for the first time Aristotle's deep-rooted preconception, expressed in the last clause, that wherever there is a change from one state to its contrary, there is ἀλλοίωσις. We shall find hereafter how this assumption vitiated the account of sense — perception in their predecessors as given by Aristotle and Theophrastus. The play of contraries in ἀλλοίωσις is recognized in the definition, above, n. 4.

¹⁰⁾ Prantl, *Aristoteles Acht Bücher Physik*, Leipzig, 1854, p. 519, speaking of *Phys.* 246^a 1 foll. says: „Es ist merkwürdig, wie hier und in dem Folgenden wieder bloß sprachlich-grammatisch argumentirt ist, so daß der ganze Erfolg des Beweises eigentlich nur eine Rectificirung des Sprachgebrauches ist, abgesehen davon, daß hier selbst inhaltlich das Bedenken bleibt, daß die Formirung und Gestaltung nur vom menschlich-künstlerischen Bilden gilt, denn die nach Arist. doch gewiß qualitative Aenderung des Gefrierens und Krystallisirens in den Naturgebilden bringt eine von ihr untrennbare Modifikation der Gestaltung mit sich; wo hört dann die ἀλλοίωσις auf?“ Prantl's perplexed and somewhat impatient question will, I am sure, be echoed by every student of the problem. The difficulty, as regards Aristotle, is enhanced by the fact that he often speaks from what he assumes to be the point of

fact that ἀλλοίωσις, as conceived by Aristotle, thus manifestly involves notions which are not coincident with modern conceptions of qualitative change, makes it imperative to examine the records of the pre-Socratics, to determine just what they may have had in mind in speaking of such alterations as we call qualitative. For we surely have no right to assume that they approached the problem with the same presuppositions as we of modern times.

In the ancient accounts there appear two modes of conceiving what takes place when an object alters its character. One of these is technically known as ἀλλοίωσις; the other is called μίξις or χρᾶσις.¹¹⁾ Of the first of these modes we have already spoken; but we need to consider it more narrowly, in order to discover whether its implications are such as to fit into pre-Socratic thought.

The term ἀλλοίωσις, in the Aristotelian sense, implies a hard and fast definition of identity and difference, with the identity residing in an unchanging essence, while the differentiae relate to the nonessential or accidental. Of these two pairs of ideas, the first — viz. identity and difference — received a distinct formulation only in consequence of the Eleatic dialectic; the second pair — viz. essence and accident, or substance and attribute — is a product of logic, as it was developed by Plato and Aristotle on the foundations laid by Socrates in his quest for general and universally valid definitions.¹²⁾ That a conception of such complexity cannot be reasonably sought among the pre-Socratics need hardly be proven by further arguments.

view of his predecessors, whereas he is in many cases unconsciously importing his own conceptions into spheres quite alien to them. Some of these cases can be proven beyond a peradventure, namely in regard to the so-called minute philosophers; in other cases the proof is necessarily somewhat less exact.

¹¹⁾ The pre-Socratics do not appear to have distinguished between these terms as did Aristotle and the Stoics in later times.

¹²⁾ See Arist. *Met.* 1078^b 17 foll. The definitions of Democritus and the Pythagoreans were not based on this procedure. Indeed, all the definitions of concrete things known to us from the pre-Socratics have regard, like those of Empedocles, to the composition of the substance: in other words, their definitions are chemical formulas.

But it may be objected that this conclusion proves nothing, as Aristotle in this instance, as in so many others, is only defining with undue precision a conception which in the minds of his predecessors was rather indefinite. The objection deserves consideration: but the real question is whether the mode of change, however vaguely conceived by the early philosophers, was actually in essential points like that which Aristotle called ἀλλοίωσις. The difficulty — I had almost said the impossibility — of conceiving such a process, except on the basis of the presuppositions above detailed, is such that I believe no one who squarely faces the question will answer it in the affirmative. This alternative once rejected, we must look to the mode known as μίξις, unless, indeed, we are to suppose that the early Greeks may have had in mind nothing more definite than the mysterious 'sea-changes', to which their marine divinities were in the mythology thought to be subject, or those equally miraculous transformations of the prodigies, such as the conversion of a cock into a hen. Only an utter want of evidence tending to establish a more rational view could justify one, it would seem, in having recourse to so unphilosophical and, for the Greek philosophers, so unlikely a conclusion.

Turning now to the rival conception — that of μίξις —, we may say that the term denotes all forms of composition, decomposition, and recomposition. There is, to be sure, a sense in which μίξις implies the existence of elements unitary, homogeneous and eternal, as the possible ingredients of composition. If this was the only sense in which the term could be fitly employed, they might be in the right who hold that this mode of change is not to be found before Empedocles and Anaxagoras;¹³) for, in that case, the notion would involve the same definite view of unity (identity) and difference which we have seen to be necessarily involved in the conception of ἀλλοίωσις. And this definition was the outcome of the Eleatic dialectic concerning the One. It would be as unreasonable to seek such a view among the Ionians as it would be to expect

¹³) Parmenides (fr. 8, 54 foll. and fr. 9) represents his elements (Light and Night) in the same terms as Empedocles his Love and Strife (fr. 17, 20) and his four elements (fr. 17, 27).

to find there Aristotle's own *μίξις*, regarded as chemical combination involving *ἀλλοίωσις*.¹⁴⁾

But, fortunately, these are not the only presuppositions on which *μίξις* is possible. Indeed, the passages in which change of quality is attributed to *μίξις* are almost as numerous as those in which it is explained by *ἀλλοίωσις*. The practice of altering the character of a thing by admixture of something else is so simple and so primitive that there is no difficulty about assuming it for any period of human history above that of the veriest brute savagery. No assumption as to ultimate elemental characters need be made: any pronounced character, even though it be itself the product of a previous mixture, will serve the ends of such composition.

It is in this sense that Plato represents Socrates as maintaining that all the philosophers, excepting Parmenides,¹⁵⁾ agree in deriving things from motion and composition.¹⁶⁾ As this position, which I regard as essentially true, differs widely from that held quite generally by historians of Greek thought, it may be in order to pause long enough to indicate in the most summary way the grounds for this belief.

The real issue here concerns two principal points. First, what were the historical antecedents of the molecular theory of matter? Second, just what was implied in the monism of the Ionians? Everything depends on the answers given to these questions.

First, then, as to the molecular constitution of things. To my mind, this theory is the outgrowth of the observation of those

¹⁴⁾ See Joachim, *Aristotle's Conception of Chemical Combination*, in *The Journal of Philology*, vol. XXIX. no. 57, p. 72, foll.

¹⁵⁾ This refers, of course, to his denial of multiplicity and change in 'Truth'; but is it not significant that, in his 'Opinions of Men' he made a large use of composition?

¹⁶⁾ *Theaet.* 152 D ἐκ δὲ δὴ φορᾶς τε καὶ κινήσεως καὶ κράσεως πρὸς ἀλλήλα γίνεται πάντα ἃ δὴ φαμεν εἶναι οὐκ ὀρθῶς προσαγορεύοντες· ἔστι μὲν γὰρ οὐδέποτε οὐδέν, αἰεὶ δὲ γίνεται. καὶ περὶ τούτου πάντες ἐξῆς οἱ σοφοὶ πλὴν Παρμενίδου συμφερέσθων, Πρωταγόρας τε καὶ Ἡράκλειτος καὶ Ἐμπεδοκλῆς, κτλ. It will not do to except all of his predecessors with Parmenides. The 'Opinions of Men' and Heraclitus sufficiently indicate the point of view. There is *μίξις* here, both of the vaguer sort, and of the more definite kind (represented by Empedocles), with fully defined elemental substances.

meteorological phenomena commonly called evaporation (*ἀναθυμίασις*) and precipitation. It is clear that the appearance of the sun 'drawing water' early impressed the Greek thinkers. Theophrastus refers to this phenomenon to explain Thales's assumption that all is water.¹⁷) From Anaximander onward every philosopher of importance made a large and growing use of this conception for the explanation of things. Now this familiar process of evaporation and precipitation contained in embryo the large operations of nature as they were gradually formulated in the course of time. First, it afforded an example of the diminution of one body and the enlargement of another by increments individually beyond human ken. It thus became the type of 'effluences' of all sorts, and the upward course of the vapors and the downward return of the precipitates exemplified the way up and down. Here also we are to find the meaning of rarefaction and condensation, with their synonyms heating and cooling. By evaporation air and fire encroach upon water and earth, and by precipitation water and earth encroach upon air and fire. Thus one typical form of existence (element, if you please) 'changes' into the other. These 'elements' may mix either in this sublimated form or else in a more palpable form as when the sea drenches the sand on the shore, only to retire presently and leave it dry. It is a far cry from this simple conception to the elaborate theories of Empedocles or Democritus; but it is a case of 'old instincts hardening to new beliefs', as Lowell says.

Our second question concerns the implications of monism as held by the Ionians. Historians ancient and modern seem unable to conceive of the change of one element into another except as necessarily involving *ἀλλοίωσις*. Aristotle of course took this view; but this need not daunt us as he was manifestly drawing a logical inference rather than stating a certain fact supported by documen-

¹⁷) Aët. I. 3. 1. It is clear that Theophrastus was merely amplifying Arist. *Met.* 983^b 18 foll., and referring the words αὐτὸ τὸ θερμὸν ἐκ τοῦτου γιγνόμενον καὶ τοῦτω ζῶν to the cosmic process of evaporation and the production and replenishment of fire from water by means of it.

tary evidence.¹⁸⁾ It is not enough to show that such a conclusion must follow, unless one can likewise prove that both the premises were known and acknowledged by these early thinkers. Such proof has never been offered and it is hardly too much to say that it never will be offered. Besides, Aristotle's testimony here will appear even more discredited when it is seen that he tried, by the most inexcusable reinterpretation, to father upon Anaxagoras this same doctrine, in spite of the clearest evidence that the philosopher did not and could not entertain it.¹⁹⁾ Aristotle clearly discloses the grounds for his inference, viz. the assumption that the Ionians had strictly defined the unity and self-identity of the elemental substance, the express condition of his doctrine of ἀλλοίωσις.²⁰⁾ The attentive student of Greek thought can hardly

¹⁸⁾ *Gen. et Corr.* 314^a 8 ὅσοι μὲν γὰρ ἔν τι τὸ πᾶν λέγουσιν εἶναι καὶ πάντα ἐξ ἑνὸς γεννῶσιν, τούτοις μὲν ἀνάγκη τὴν γένεσιν ἀλλοίωσιν φάναι καὶ τὸ κυρίως γιγνόμενον ἀλλοιοῦσθαι· ὅσοι δὲ πλείω τὴν ὕλην ἑνὸς τιθέασιν, οἷον Ἐμπεδοκλῆς καὶ Ἀναξαγόρας καὶ Λεύκιππος, τούτοις δὲ ἕτερον. καίτοι Ἀναξαγόρας γε τὴν οἰκείαν φωνὴν ἠγνόησεν· λέγει γοῦν ὡς τὸ γίγνεσθαι καὶ ἀπόλλυσθαι ταῦτόν καθέστηκεν τῷ ἀλλοιοῦσθαι. *Ibid.* 314^b 1 τοῖς μὲν οὖν ἐξ ἑνὸς πάντα κατασκευάζουσιν ἀναγκαῖον λέγειν τὴν γένεσιν καὶ τὴν φθορὰν ἀλλοίωσιν· αἰεὶ γὰρ μένειν τὸ ὑποκείμενον ταῦτό καὶ ἔν· τὸ δὲ τοιοῦτον ἀλλοιοῦσθαι φάμεν· τοῖς δὲ τὰ γένη πλείω ποιοῦσι διαφέρειν τὴν ἀλλοίωσιν τῆς γενέσεως· συνιόντων γὰρ καὶ διαλυομένων ἡ γένεσις συμβαίνει καὶ ἡ φθορά· διὸ λέγει τοῦτον τὸν τρόπον καὶ Ἐμπεδοκλῆς, ὅτι φύσις οὐδενός ἐστιν, ἀλλὰ μόνον μίξις τε διάλλαξις τε μιγέντων. ὅτι μὲν οὖν οἰκείως ὁ λόγος αὐτῶν τῇ ὑποθέσει οὕτω φάναι, ὁῦλον, καὶ ὅτι λέγουσι τὸν τρόπον τοῦτον· ἀναγκαῖον δὲ καὶ τούτοις τὴν ἀλλοίωσιν εἶναι μὲν τι φάναι παρὰ τὴν γένεσιν, ἀδύνατον μέντοι κατὰ τὰ ὑπ' ἐκείνων λεγόμενα.

¹⁹⁾ More will be said below concerning this effort of Aristotle's to make a place for his favorite conception of ἀλλοίωσις in the systems of Anaxagoras, Empedocles and Leucippus. Here it is enough to note that he is compelled to do violence to their definitely expressed opinions to do so.

²⁰⁾ See n. 17 and the definition of ἀλλοίωσις, n. 4. Cp. *Met.* 983^b 6 τῶν δὴ πρῶτων φιλοσοφούντων οἱ πλείστοι τὰς ἐν ὕλης εἶδει μόνας ψήθησαν ἀρχὰς εἶναι πάντων· ἐξ οὗ γὰρ ἔστιν ἅπαντα τὰ ὄντα, καὶ ἐξ οὗ γίγνεται πρῶτον καὶ εἰς ὃ φθείρεται τελευταῖον, τῆς μὲν οὐσίας ὑπομενούσης, τοῖς δὲ πάθεσι μεταβαλλοῦσης, τοῦτο στοιχεῖον καὶ ταύτην ἀρχὴν φασιν εἶναι τῶν ὄντων (Who will suppose that Aristotle had any such definition of an element from the Ionians?), καὶ διὰ τοῦτο οὕτε γίγνεσθαι οὐδὲν οἶονται οὐτ' ἀπόλλυσθαι, ὡς τῆς τοιαύτης φύσεως αἰεὶ σφριζομένης . . . τὸ μέντοι πλῆθος καὶ τὸ εἶδος τῆς τοιαύτης ἀρχῆς οὐ τὸ αὐτὸ πάντες λέγουσιν, ἀλλὰ θαλῆς μὲν ὁ τῆς τοιαύτης ἀρχηγὸς φιλοσοφίας ὕμνωρ εἶναι φησιν. The most casual reader will observe

fail to see that Aristotle is pressing too much the conception of unity as held by the Ionians. The thought that unity or identity excludes difference is the contribution of the Eleatics. Had Thales and Anaximenes had this notion, they would have denied change outright, as did Parmenides. The distinction between essence and attribute was not yet current.

Furthermore we are not to assume, as historians ancient and modern are prone to do, that the Ionians emphasized the same characteristics of the 'elements' as first occur to our minds. For example: When Heraclitus and Democritus spoke of the soul as fire, did they think first of the heat of fire, or of some other property? Did Lucretius do justice to Heraclitus, when he urged the objection that, on his theory, the only differences effected in the elemental fire by its condensation or rarefaction would be expressible in degrees of temperature?²¹) To ask such a question is to answer it. When Anaximenes and Heraclitus, to mention only two names, chose these terms to denominate the process of differentiation, they gave unmistakable tokens of their deliberate intention: which clearly was to regard all other differences in things as subordinate and incidental to variations in density. So much once granted, there would seem to be left no basis for the assumption of such *ἀλλοίωσις* as Aristotle thought to discover in these early systems.

Early as we find this conception emerging, I incline to think that the notion of difference consisting in the relative degree of density is not original, but that it is one of the first generalizations from the phenomena of evaporation and precipitation. It may be doubted whether this notion ever stood alone as the means of accounting for the varieties of concrete things, unless this holds true of the system of Diogenes of Apollonia. It is not necessary to descant on the historical significance of this conception, as leading directly to the ultimate assumption that the essential properties of things are the properties of mass. But, taken by itself, it does

that Aristotle supposes Thales's 'element' defined as precisely as Empedocles's. It need hardly be said that this supposition affords a weak foundation for a theory of changes.

²¹) Lucretius. I. 650 foll.

not account for the distinctive features of such systems, say, as those of Empedocles, Anaxagoras, and Leucippus, who attributed differentiation to composition and relegated rarefaction and condensation to a markedly inferior position.

What are we to say of this thought that things change their characters by recomposition? Some would have us think that it was a theory contrived to meet the fatal objections of Parmenides to the doctrine of ἀλλοίωσις. My discussion of the question thus far must have shown that I cannot accept this view. It is common to say that the difficulties raised by the Eleatics in regard to the One and the Many in predication were in large measure due to the substantive character attributed to the copula. There is, no doubt, much truth in this contention; but it does not touch the heart of the matter. The difficulty, as I conceive it, is with the predicate even more than with the copula. In other words, the predicate, whether noun or adjective, was regarded as substantive. What is implied in this assumption?

The question at issue is, in the last analysis, whether primitive man conceived of qualities as abstract, or as material constituents or ingredients of things. The only phrase in Parmenides which relates to change of quality is διὰ τὴν χροῶν φανὸν ἀμείβειν (fr. 8, 41). One has only to consider the meaning of χρώς, χροῖα and χρωμα (signifying the surface as much as the color) and the verbs that go with these nouns to express change — διαμείβειν, ἀμείβειν, ἀλλάσσειν — all of which suggest *exchange*, to see that color is no abstraction; as indeed it would be surprising if so remote a conception should be found to be original. When Shakespeare said "Youth's a stuff will not endure", he used an expression that is true to primitive notions, as we meet them in such statements as that in *Proverbs* 27, 22 "Though thou shouldest bray a fool in a mortar among wheat with a pestle, yet will not his foolishness depart from him". Here folly is evidently thought of as an admixture, like the soul according to Epicurus, a σῶμα λεπτομερές παρ' ὅλον τὸ ἄθροισμα παρασπαρμένον. When, therefore, we find Empedocles, Anaxagoras and the Atomists taking this view of qualities, it is certainly more reasonable to suppose that they

are merely adapting an old notion to the needs of philosophy than to believe this a newly contrived hypothesis to meet the objections of Parmenides. The dialectic of the Eleatic did compel a revision of previous views; but this revision was in the nature of a clearer definition of the process and of a sharper formulation of the elemental characters, in accordance with the assumed nature of the truly 'existent', as unchangeable and homogeneous, which terms are practically synonymous.

II.

We have now tarried among these general considerations quite long enough, and must turn to the several pre-Socratic philosophies to weigh the claims of ἀλλοίωσις made in regard to them by Aristotle and the doxographers.

It is clear that Aristotle attributed ἀλλοίωσις, in his sense, to Thales and all the monists.²²⁾ The doxographers followed him, and added a conception of composition, likewise involving ἀλλοίωσις, that is strictly Aristotelian.²³⁾ It would be futile to discuss the matter in respect to Thales, of whose opinions in detail we know next to nothing.

Anaximander presents an interesting problem, because Aristotle and Theophrastus, our most important witnesses, are not agreed on the chief point. We cannot here discuss the matter exhaustively, but there are three subjects that require consideration: (1) the conception of the ἄπειρον; (2) the meaning of ἔκκρισις or ἀπόκρισις; (3) the nature and function of the κίνησις αἰδώς.

(1) As regards the ἄπειρον, Aristotle²⁴⁾ would have us think that it was either a mixture or something very like it: in other

²²⁾ See nn. 17 and 19.

²³⁾ Aët. I. 17 (περὶ μίξεως καὶ κράσεως) Plutarch says οἱ μὲν ἀρχαῖοι [Stobaeus θαλῆς καὶ οἱ ἀπ' αὐτοῦ κράσεις εἶναι] τὰς τῶν στοιχείων μίξεις κατ' ἀλλοίωσιν. For Aristotle see *Gen. et Corr.* 328^b 22 ἡ δὲ μίξις τῶν μικτῶν ἀλλοιωθέντων ἔνωσις, and p. n. 13.

²⁴⁾ *Phys.* 187^a 20 οἱ δ' ἐκ τοῦ ἑνὸς ἐνούσας τὰς ἐναντιότητας ἐκκρίνεσθαι, ὥσπερ Ἀναξίμανδρος φησι καὶ ὅσοι δ' ἐν καὶ πολλὰ φασιν εἶναι, ὥσπερ Ἐμπεδοκλῆς καὶ Ἀναξαγόρας· ἐκ τοῦ μίγματος γὰρ καὶ οὗτοι ἐκκρίνουσι τὰλλα. We may grant (with Zeller, I. 203, 2) that the similarity in doctrine between Anaximander on the one hand and Empedocles and Anaxagoras on the other is

words, it was not wholly homogeneous. Theophrastus, on the other hand, regarded it as an unitary, indeterminate substance.²⁵⁾ Zeller judiciously concludes that Anaximander merely failed to define the qualitative character of the "Ἀπειρον,"²⁶⁾ being chiefly concerned about its spatial infinitude. How much truth there is in this view will presently appear.

(2) The important fact in regard to Anaximander is that he had a definite view of the process of differentiation: there is no doubt that he spoke of it as ἔκκρισις or ἀπόκρισις. And Aristotle clearly acknowledges the affinity of this process with the winnowing and sifting of like to like out of the πάντα ὁμοῦ of Anaxagoras and Empedocles.²⁷⁾ Take what view of the matter we will, it is impossible to think of these processes, historically related as antecedent and consequent, otherwise than as essentially alike. If there is a difference, as not improbably there is, it would seem most reasonable to seek this difference in a greater degree of definiteness as to method and presuppositions in the later systems.

Now, if we inquire just what Anaximander had in mind, the most plausible answer appears to be this: He held the naïve opinion that a substance — say the "Ἀπειρον" — may possess various 'qualities', and that these qualities are really in that object in the form of ingredients, possibly so confused and blended that none assumes

remote, and (with Döring, *Gesch. der gr. Philos.*, I. 32) "daß er die Bezeichnung 'Gemisch' nur für die Fassung des Urzustandes des Stoffes bei Empedokles und Anaxagoras gebraucht"; but it is indisputable that Aristotle represents their conceptions as essentially similar or parallel, and that the point of comparison is in the word μῖγμα. We may well believe that Aristotle did not attribute to Anaximander "ein Gemenge verschiedener, ihre qualitativen Unterschiede in der Mischung festhaltender Stoffe" (Zeller), in the sense of true elements, without concluding that he thought of the "Ἀπειρον" as qualitatively indeterminate.

²⁵⁾ Diels, *Dox.* 479, 12 μίαν φύσιν ἀόριστον καὶ κατ' εἶδος καὶ κατὰ μέγεθος. We should note here in passing; what will be more clearly shown below, that these words occur in a passage which is strongly under the influence of Aristotle's violent reinterpretation of Anaxagoras and does justice neither to him nor to Anaximander.

²⁶⁾ Zeller, I. 216.

²⁷⁾ See n. 23.

a considerable prominence. The theogonic conception of a Chaos would suggest so much. This view is amply confirmed by Aristotle's phrase ἐκ τοῦ ἐνός ἐνούσας²⁸⁾ τὰς ἐναντιότητας ἐκκρίνεσθαι, if we take the words in the sense they must have borne for Anaximander, rather than with the suggestions they had for Aristotle,²⁹⁾ who is notoriously prone to read his own thoughts into the words of his predecessors.

(3) We have seen that Aristotle distinctly associated ἔκκρισις with the winnowing of like unto like assumed as the initial cosmic process by Empedocles, Anaxagoras, and the Atomists. Yet

²⁸⁾ It may not be out of place at this point to suggest that the notion of qualities 'inhering' in substances is probably a 'survival' of the conception of a quality, viewed as a physical constituent, present in an ἄθροισμα. This is the meaning of μετέχειν and παρῆναι in the pre-Socratics; whereas in Plato μέθεξις and παρουσία represent the doctrine of logical realism for which things *participate* in Ideas. The primitive notion of a thing is that it 'contains' certain qualities, the point of view being purely physical. The logical, or psychological view is that a quality is one of the 'meanings' of a 'thing', both 'thing' and 'meanings' being constructs growing out of certain interests directed to the realization of ends. On this view 'inherence' is meaningless and constitutes no problem. But in the transition from the physical to the psychological conception of qualities and things, a blending of the two points of view took place. The general stock of like 'stuff' of which a thing partakes in virtue of containing that quality, is converted into an Idea, half abstract and half concrete; and at once there arises the problem of relating the thing, as concrete, with the Idea, as abstract, and of relating the Ideas among themselves. This problem was to be solved only by a complete abandonment of the physical point of view with its implications. Aristotle was as much under the spell of the old conception as was Plato: his importation of the distinction between potentiality and actuality raised a false issue and retarded the solution.

²⁹⁾ There are two that we may mention: (1) The word ἐναντιότητες involved for Aristotle a hint of the elements (worked out by Simpl. *Phys.* 150, 24) and also of ἀλλοιώσις, every change from one thing to its opposite or from a neutral μεταξύ to contraries having for Aristotle that implication (see n. 4). (2) Aristotle, no doubt, thought of the inherence of the contraries in the Ἄπειρον as 'potential'; but this conception cannot apply to Anaximander. That the latter did speak of inherence, however, is clear from the fact that he spoke of ἔκκρισις. The reference to unity (ἐκ τοῦ ἐνός), which may be Aristotle's contribution, would not prove the contrary even if it belonged to Anaximander; for even Empedocles fr. 17 used unity in this lax sense. The attempt to father the Eleatic One upon Anaximander, Empedocles, and Democritus (see below, nn. 105, 107, 123) created the illusion of ἀλλοιώσις.

quite without such a hint from Aristotle, the conclusion would inevitably follow from any intelligent reading of pre-Socratic thought for ἔκκρισις, ἀπόκρισις and διάκρισις always bear more or less definitely this acknowledged sense. But Aristotle doubtless supposed this change to involve ἀλλοίωσις,³⁰⁾ whereas Simplicius, whether of his own accord or, as I prefer to think, on the authority of Theophrastus, asserts the contrary, explaining the process of ἀπόκρισις by the operation of the everlasting motion.³¹⁾ In this matter we must take our stand with Simplicius.

It is difficult to say just what was the nature of this everlasting motion. Some prefer to think of it as mysterious and vital, as opposed to mechanical, because it is associated with the hylozoic or hylopsychic principle;³²⁾ but there is no reason to think that there was any such distinction recognized. Aristotle also regarded the world as a ζῶον; yet the operations within his cosmos are all mechanically conditioned. Why should we think otherwise of Anaximander? We do not know whether he distinguished between a primordial motion, obtaining in the universe at large, and a secondary motion operating in the cosmos; yet this would seem improbable in so early a thinker. However, the notion of a circular motion of the world included within the stellar sphere is so imme-

³⁰⁾ See n. 28. (1). Many moderns take this view, as *e. g.* Döring, I. 32 folk., who speaks of ἐκκρίνεσθαι in *Phys.* 187^a 20 as "die qualitative Weitergestaltung aus dem Unbestimmten ins Bestimmte", and again he says "es hat sich [das Kalte] durch qualitative Veränderung in sie [Erde, Luft, Wasser] verwandelt".

³¹⁾ Diels, *Dox.*, 476, 8 οὗτος δὲ οὐκ ἀλλοιούμενου τοῦ στοιχείου τὴν γένεσιν ποιεῖ, ἀλλ' ἀποκρινομένων τῶν ἐναντίων διὰ τῆς αἰδίου κινήσεως. διὸ καὶ τοῖς περὶ Ἀναξαγόραν τοῦτον ὁ Ἀριστοτέλης σὺνέταξεν. While Simplic. here refers only to Arist. *Phys.* 187^a 20 foll., the dependence of his statement on Theophrastus is not unlikely. Aristotle says nothing of the αἰδίου κίνησις, whereas Simplicius's further statements, in this connection, touching Anaximenes and Diogenes, are, as I think rightly, ascribed by Diels to Theophrastus. In regard to Anaximenes the reference to κίνησις αἰδίου is explicitly made, and it seems to me to be made implicitly also of Diogenes. Aristotle's belief that all before Anaxagoras had failed to postulate an ἀρχὴ τῆς κινήσεως (as distinct from the material principle) kept him from seeing the true relation of things; whereas Theophrastus seems to have emphasized this factor.

³²⁾ See *e. g.* Döring, I. 33.

diately suggested by the naïve view of nature³³), and is withal so entirely in harmony with the cosmology of Anaximander,³⁴) that the unbiased student must be led to believe that our philosopher had this in mind when he spoke of the everlasting motion. Such, at any rate, is the agency recognized by later thinkers who adopted the notion of a cosmic 'winnowing' by which the world of particular things arises.

The philosophy of Anaximenes, though perhaps less captivating to the modern imagination, differs from that of Anaximander chiefly in the direction of a more precise definition, undertaken in the interest of true science. The vague ἄπειρον comes to be viewed as Air infinite in extent: as Air, its character is determined; but this does not imply absolute homogeneity. Indeed, it might be guessed that the predecessor of Parmenides, while tending toward greater precision, did not effect the synthesis of the εἶν and the ὅμοιον, which constituted the central thought of the Eleatics; but the nature of the process of differentiation proves beyond question the essential inequalities in distribution of the elemental Air.³⁵) For Anaximenes called this process rarefaction and condensation, resulting, like Anaximander's ἐκκρίσις, from the everlasting motion.³⁶)

³³) See Arist. *de Caelo* 295^a 10 foll. I do not adduce this as proof of the views of Anaximander, though I consider the argument of Zeller (I. 219, 2) against such an application of the passage as one of the most extraordinary feats of misapplied special pleading that I have ever met. See above, n. 8.

³⁴) The importance which he attached to evaporation in the separation of the *maxima mundi membra* and their respective positions in the world can hardly be otherwise explained. See my article, The δίνη in Anaximenes and Anaximander, in *Classical Philology*, Vol. I, No. 2.

³⁵) Hippolytus, Diels, *Dox.* 560, 16 τὸ δὲ εἶδος τοῦ ἀέρος τοιοῦτον· ὅταν μὲν ὁμαλώτατος (i. e. most evenly distributed, with least πίλησις) ᾗ, ὅψει ἄδηλον (as in atmospheric air), δηλοῦσθαι δὲ τῷ ψυχρῷ καὶ τῷ θερμῷ καὶ τῷ νοτερῷ καὶ τῷ κινουμένῳ. These changes are all incident and equivalent to changes in distribution consequent on motion. Cp. nn. 140 and 141.

³⁶) Simplic., Diels, *Dox.* 477, 4 κίνησιν δὲ καὶ οὗτος (as well as Anaximander, see n. 30) ἀίδιον ποιεῖ, δι' ἣν καὶ τὴν μεταβολὴν γίνεσθαι. *Ibid.* 1 διαφέρειν δὲ μανότητι καὶ πυκνότητι κατὰ τὰς οὐσίας, καὶ ἀραιούμενον μὲν πῦρ γίνεσθαι, πυκνούμενον δὲ ἄνεμον, εἴτα νέφος, ἔτι δὲ μᾶλλον ὕδωρ, εἴτα γῆν, εἴτα λίθους, τὰ δὲ ἄλλα ἐκ τούτων.

The evidence here that this motion, within the cosmos, is the familiar vortex is entirely satisfactory.³⁷⁾

We have already observed that Aristotle regarded this process of rarefaction and condensation as involving ἀλλοίωσις;³⁸⁾ it remains for us to inquire whether he was justified in his thought of Anaximenes. To support his view it would be necessary to show, not only that such a conclusion would follow from the assumptions of Anaximenes, but also that the philosopher was aware of the implications of his doctrine. This, however, it seems impossible to prove.³⁹⁾ On the contrary, it was clearly the purpose of Anaximenes to represent the method of differentiation as mechanical, and there is no hint of a chemical doctrine of allotropism conditioned by purely physical states. The assumption of inequalities in the elemental Air shows that it was not conceived either as qualitatively neutral or as qualitatively homogeneous to a degree making it necessary to account for the emergence of properties otherwise than as incident to extension or compression. Indeed, the whole development of Greek thought tends to show that what we call 'secondary' qualities (as a result of that very course of thought) were esteemed *negligible* in the account of nature's operations. Hence we may safely conclude that Anaximenes, who was most distinctly the forerunner of this theory, had no such conception as that of ἀλλοίωσις. Simplicius distinctly connected the process of rarefaction and condensation with the sifting and winnowing of like to like,⁴⁰⁾ which we have met in a rudimentary form in

³⁷⁾ The evidences may be found in Zeller I, 245, 2, 246, 3, who accepts them with seeming reluctance. Zeller (I. 242, 4) is quite right in rejecting the circular motion of the infinite Air assumed by Teichmüller, but this does not militate against a cosmic δίνη. Teichmüller, on the other hand, might well contend that Anaximenes had not strictly defined the limits of the vortex motion. See my article, *The δίνη in Anaximenes and Anaximander*, in *Classical Philology*, Vol. I., No. 2.

³⁸⁾ See above, nn. 17 and 19.

³⁹⁾ Plut., *de Princ. Frig.* 947 F speaks of qualities as πάθη κοινὰ τῆς ὕλης ἐπιγινώμενα ταῖς μεταβολαῖς. This phrase seems likewise to imply ἀλλοίωσις, but does not prove it.

⁴⁰⁾ *Phys.* 203, 3. Those who reject his testimony seem to forget Arist., *Phys.* 260^b 7, quoted above, n. 8. Of course, with the recognition of distinctly

Anaximander; and doubtless he was correct in principle. It is not quite clear whether or not we are to think of individual concrete things as combinations of the primary products of rarefaction and condensation; but this supposition is not altogether improbable.⁴¹⁾

Heraclitus presents many difficulties to the student who would interpret him. Most of these vanish, however, when one sees in him, what in his point of view he undoubtedly was, one of the series of Ionic philosophers of nature,⁴²⁾ laying the foundations of the corpuscular theory, as it was developed by his successors with certain modifications due to the criticism of the Eleatics. As a monist Heraclitus was of course included by Aristotle in the list of those who must have held the doctrine of ἀλλοίωσις. Furthermore, Aristotle and Theophrastus attribute to him the principle of differentiation of the elemental fire by rarefaction and condensation;⁴³⁾ and we already know that to Aristotle this fact also implied ἀλλοίωσις. Indeed, Heraclitus expressed himself in terms which, to one with Aristotle's preconceptions, necessarily involved change of that sort;⁴⁴⁾ and it is therefore quite natural that modern historians accept this view as beyond question.⁴⁵⁾

The scope of this paper does not admit of a polemic nor of a detailed account of the philosophy of Heraclitus. A brief sketch

defined 'elements' σύγκρισις and διάκρισις necessarily come to be more precisely interpreted.

⁴¹⁾ See n. 35 τὰ δὲ ἄλλα ἐκ τούτων. Hippol., *Dox.* 560, 15 says τὰ δὲ λοιπὰ ἐκ τῶν τούτου (sc. ἀέρος) ἀπογόνων. These phrases regularly imply composition, as a little observation will show.

⁴²⁾ See Diels, *Herakleitos von Ephesos* p. VI., foll.

⁴³⁾ It will suffice here to refer to Diels, *Dox.* p. 164, foll. If, as appears not improbable Parmenides's fr. 2 alludes to Heraclitus, this view, already certain, is doubly attested.

⁴⁴⁾ In fr. 126, for example, τὰ ψυχρὰ θέρεται, θερμὸν ψύχεται, ὕγρὸν αὐαίνεται, καρφαλέον νοτίζεται.

⁴⁵⁾ See Mabillean, *Histoire de la Philosophie Atomistique* p. 126. Zeller, I. 636. n., says that Plato, *Theaet.* 181B foll., gives it as the meaning of Heraclitus's dictum πάντα ῥεῖ that it implies both περιφορά and ἀλλοίωσις "aber so, daß man deutlich sieht, wie erst Plato diese beiden Arten der Bewegung unterscheidet"; but when he proceeds to interpret Heraclitus (pp. 652—4) he appears to attribute ἀλλοίωσις to him without actually employing the term.

of it will however be necessary, and the interpretation here proposed must be left to commend itself without the citation of such authorities as may be in agreement at one point or another.

As Anaximenes, impressed with the phenomena of evaporation and precipitation, sublimated the Water of Thales to Air (or vapor), so Heraclitus, going one step farther, made Fire his principle. He adopted also the Ionian doctrine of an everlasting motion and made of it the central thought of his philosophy — πάντα ῥεῖ. Fire, the ever-living (ἀείζων, fr. 30), is all and all in all, because it embodies this process. Apparently Heraclitus did not say just what he meant by fire, or rather, just what fire was to his mind; one may safely assume, however, that he was not conscious of speaking symbolically. If he had been pressed for a definite answer, it is more than probable that he could not have given one. Certain it is that we are not in position to do so.

We may infer however, that he had in mind certain obvious characteristics of fire. Among them we may enumerate: the change effected by combustion in the constitution of that which is subjected to it; the freeing from the mass consumed of particles that 'blend' with the fire (for, be it remembered that fire was regarded as a substance until very recent times) and thus change character; the stream of particles given off by the fire in the form of sparks or smoke; and the difference in the time required for the consumption (or conversion into fire) of various substances under given conditions. Undoubtedly he thought of fire as hot; but it is improbable that heat was regarded by him as its chief characteristic. Indeed, it is evident that he supposed this 'property' to vanish when fire was most condensed in the form of earth. He seems to have spoken of the limits of the process of rarefaction and condensation as 'kindling' and 'extinguishing'.⁴⁵)

To begin with the cosmic process, the libration between the One, when all is fire to 'satiety', and the Many, when all is at war,⁴⁷) is periodic in the series of cosmic years; the transition is

⁴⁵) Fr. 30.

⁴⁶) The terms *κόρος* (fr. 65, 67), *εἰρήνη* (fr. 67) are the analoga of Empedocles's *Φιλία*, while *ἔρις* (fr. 8, 80) *πόλεμος* (fr. 53, 67, 80), *χρημοσύνη* (fr. 65)

made by the condensation of the rarefied fire in successive stages to water and earth, the phenomena of evaporation and precipitation suggesting the means.⁴⁸) This process is so like the traditional σύγκρισις and διάκρισις, that we cannot escape the conclusion that Heraclitus accepted the view.⁴⁹) And, as with his predecessor Anaximenes and his successor Empedocles, the cause of this differentiation is motion, and doubtless a rotary motion or δίνη.⁵⁰) The way up and down thus defines itself with reference to center and circumference, as with the physical philosophers generally.⁵¹) Heraclitus appears likewise to have accepted the view of a periodic encroachment of one element on the other within certain limits,

λιμός (fr. 67) reappear in Empedocles as Νείκος. Only in the latter state can a world exist: hence πόλεμος πάντων μὲν πατήρ . . . καὶ τοὺς μὲν θεοὺς ἔδειξε τοὺς δὲ ἀνθρώπους κτλ. (fr. 53); cp. fr. 67, 80; Emped. fr. 21, 12; 23, 8, and Lucret. II. 574, V. 381, 392. On fr. 80 many attempts have been made to emend χρεώμενα in the phrase κατ' ἔριν καὶ χρεώμενα. I do not know what Heraclitus wrote, but his meaning seems clear; whatever be the right word, it must = χρησμοσύνην. There is much in favor of χρεών: first, it is a cognate of χρησμοσύνη and may quite as well have borne that sense; secondly, it would best explain the (apparently erroneous) references to εἰμαρμένη (= χρεών = ἀνάγκη) in Laert. Diog. and other authorities dependent on Theophrastus. If this be correct one might inquire whether the phrase κατὰ τὸ χρεών in Anaximander (*Dox.* 476, 9) bears the same signification. Cp. *Dox.* 475, 18 foll., and see n. 51 below. Diels rightly considers fr. 137 spurious.

⁴⁷) So important was the function of evaporation that Arist. *de Anima* 405^a 25 foll. speaks of it as producing everything, and this is doubtless what is meant when Laert. Diog. IX. 9 says πάλιν τε αὐτὴν γῆν χειρῶσαι, ἐξ ἧς τὸ ὕδωρ γίνεσθαι, ἐκ δὲ τούτου τὰ λοιπά, σχεδὸν πάντα ἐπὶ τὴν ἀναθυμίασιν ἀνάγων τὴν ἀπὸ τῆς θαλάττης. Whether Heraclitus expressly called this Ἀήρ or not, and gave it a substantive character as one of the stages, or merely regarded it as the transition-form *par excellence* (cp. δι' ἀέρος, fr. 31) matters little: for πάντα ῥεῖ. But see Teichmüller, *Neue Studien* I. 62 and Pascal, *Studii Critici sul Poema di Lucrezio* p. 78 foll.

⁴⁸) [Hippocr.] *de Victu* (Diels, *Vorsokr.* p. 85, 23 foll., 29 foll.) suggests the segregation of like to like. Who can say that this does not derive from Heraclitus?

⁵⁰) This conclusion rests on Laert. Diog. IX. 9, where the cosmic changes seem to require a δίνη. This is denied by many, but it seems to be confirmed by the figure of the potter's wheel, [Hippocr.] *de Victu* (*Vorsokr.* p. 88, 10 foll.).

⁵¹) The mere absence of express mention of so obvious a notion, after it had once been employed, as it was by Anaximenes, can of course prove nothing.

a view widely held by early thinkers.⁵²) This phenomenon was readily misconceived as implying the conversion of one element into another, and therefore as affording a notable example of ἀλλοίωσις. But the case of Empedocles should suffice to dispel such illusions. As the same arguments hold for Heraclitus as for Anaximenes, as regards the supposed implication of ἀλλοίωσις in the assumption of differentiation by rarefaction and condensation, there is no need of here recurring to that theme.

The next subject calling for discussion is whether Heraclitus regarded all particular things as occupying each its determinate place in a graduated scale of tenuity or density ranging from pure fire to earth, or whether he explained the individuality of things in some other way. The former alternative is exceedingly unlikely; for, on that view, the assumption of a triad of quasi-elemental substances would be more than useless, every degree in the scale being equally elemental and equally derivative. We must therefore look elsewhere for a principle of individuation; and this inquiry leads finally to a consideration of three doctrines which are fundamental to the thought of Heraclitus: namely, the flux of all things, the coëxistence of contraries, and the relativity of qualities.

We have said that Heraclitus adopted the everlasting motion of his predecessors, which in the cosmic process was doubtless conceived as rotary. But its activity does not exhaust itself in the vortex that created the cosmos. It results in a movement upward and downward typified by evaporation and precipitation. Everything but the 'elements', we are told, is produced by this process. This statement may readily be pressed overmuch; for it is scarcely credible that Heraclitus would have said without quali-

⁵²) See fr. 94 ἡλιος γὰρ οὐχ ὑπερβήσεται (τὰ) μέτρα and Diels's note in *Heraclit. con Eph.* p. 9. Cp. Lucret. V. 380 foll. and [Philo] περὶ ἀφθαρσίας κόσμου, ch. 27. All this is a part of the cosmic πόλεμος. See Arist. *Meteor.* 345^a 13 foll., [Arist.] *de Mundo* 400^a 25 foll., Emped. fr. 17, 29; 26, 1 foll. How this encroachment comes about is indicated by Laert. Diog. IX. 9 αὔξεσθαι δὲ τὸ μὲν πῦρ ὑπὸ τῶν λαμπρῶν (sc. ἀναθυμιάσεων), τὸ δὲ ὕγρὸν ὑπὸ τῶν ἐτέρων. Are the τίσις and δέκη of Anaximander (*Dox.* 476, 10) likewise to be so understood? Cp. Heraclitus fr. 80 καὶ δέτην ἔριν, and see above, n. 46 and below, n. 88.

fication that goodness and beauty (fr. 102) are forms of exhalation. What did he mean?

In speaking above of the characteristics of fire, mention was made of the streams of particles entering and leaving the flame. Now it appears to be just this phenomenon, so well represented by evaporation, that Heraclitus had chiefly in mind.⁵³⁾ He speaks of the river, in which drop succeeds drop,⁵⁴⁾ as the type of the universal change; but the figure does not prove adequate to the case, for the water in a river flows in *one* direction. Heraclitus, believing that things do not exist, but only come into existence and pass away unceasingly, thought of them as the points at which opposite streams of particles meet. It is the unstable equilibrium of such effluences that he called the *παλίντροπος ἁρμονίη*.⁵⁵⁾ These

⁵³⁾ These are the *ψήγματα* mentioned by Aët. I. 13, 2 (*Dox.* 312^b 7). The meaning is made clear by comparison with Empedocles (*Dox.* 312^a 2); for *ψήγματα*, like *θραύσματα*, refers to the *ἀπορροαί*, which cannot be denied to Heraclitus, cp. Lucret. I. 660 foll. There is no reason to suspect, with Zeller (I. 652, 2), that Heraclides is meant: he is mentioned Aët. I. 13, 4. Cp. the *λεπτομερῇ σώματα*, below, n. 109.

⁵⁴⁾ Fr. 12, 91. Plato, *Theaet.* 160 D, speaks of *ρέυματα*: this term was inseparably associated with the *ἀπορροαί*; cp. *Dox.* 405^a 8, 408^a 9, 423^a 23, and see especially *ibid.* 308^b 1.

⁵⁵⁾ Fr. 51. Laert. Diog. IX. 7. says *διὰ τῆς ἐναντιοδρομίας* (Parm. fr. 6, 9 has *παλίντροπος κέλευθος*) *ἡρμόσθαι τὰ ὄντα* and *ibid.* 8 *γίνεσθαι τε πάντα κατ' ἐναντιότητα καὶ ρεῖν τὰ ὅλα ποταμοῦ δίκην*. Cp. Aët. I. 7, 22, and Plato, *Crat.* 413 E *μάχην δ' εἶναι ἐν τῷ ὄντι, εἴπερ ρεῖ, οὐκ ἄλλο τι ἢ τὴν ἐναντίαν ῥοήν*. The ingredients of a thing thus are ceaselessly combined and dissipated, which Heraclitus picturesquely expresses by saying (fr. 91) *σχιδνῆσι καὶ πάλιν συνάγει καὶ πρόσσει καὶ ἄπεισι*. Cp. [Hippocr.] *de Victu* (*Vorsokr.* 85, 9) *φοιτώντων τε ἐκείνων ὥδε τῶνδ' τε κείσε συμμισγομένων πρὸς ἄλληλα*. So in the terms *συμφέρον* and *διαφέρον* (fr. 8, 10) the notion of meeting and parting is uppermost. There is nothing occult about *ἁρμονίη*. It is the combination (*μίξις*, *κρᾶσις* or *σύνθεσις*) of opposites. See Aristotle, *de Anima* 407^b 30 *καὶ γὰρ τὴν ἁρμονίαν κρᾶσιν καὶ σύνθεσιν τῶν ἐναντίων εἶναι . . . καίτοι γε ἡ μὲν ἁρμονία λόγος τίς ἐστι τῶν μιχθέντων ἢ σύνθεσις*, which distinctly relates the Pythagorean *ἁρμονία* with Empedocles's mixture. [Arist.] *de Mundo* 396^b 16 speaks of *mixing* high and low notes in a chord, just as one speaks of mixing colors, etc. The whole passage (quoted under fr. 10) is interesting because it shows that the notion of *μίξις* is uppermost in the change. See what is said below, n. 64. The reading *παλίντροπος ἁρμονίη* (fr. 51) suggests the Stoic doctrine of *τόνος*, which may well give a hint of the Heraclitic doctrine of effluences and mixture.

opposite streams of particles create and destroy the character of things; hence Heraclitus speaks of the life of one thing as being the death of the other.⁵⁶⁾ Change thus becomes *exchange or interchange of ingredients*⁵⁷⁾ mediated by the effluences; and composition,⁵⁸⁾ resulting from ceaseless motion,⁵⁸⁾ explains the particularization of things.

This interpretation seems to agree best with the record. If now, we recall what was said above touching the primitive conception of substance and attribute, according to which the qualities are physical or material ingredients of the object to which they belong, we shall not find it difficult to understand what Heraclitus meant. There is moreover a fragment (67) which states this view explic-

⁵⁶⁾ See fr. 26, 36, 62, 76, 77, 88. The cases fall into two divisions: first, when one 'element' shifts (τρέπεται, hence τροπή) to the next in order by change of density, whereupon one 'lives the death' of the other; second, when the effluvia, passing from one body to another, mark the death of the first, the birth of the second. Possibly the phenomena of respiration suggested these terms. Compare the doctrine of the breathing of the cosmos found in Anaximenes and the Pythagoreans, and cp. Lucret. I. 1105 foll. See also Lucret. I. 263 foll., Arist. *de Resp.* 472^b 2 foll., Diog. of Apollonia fr. 4, and n. 96 below, on Melissus. The *finis* of Lucret. are the μέτρα of Heraclitus (e. g. fr. 94) and the μοῖρα of [Hippocr.] *de Victu* I. 5. Cp. also Hdt. I. 47, and Diog. of Apollonia fr. 3, *Dox.* 323^b 5. Whittier speaks of the "metes and bounds of Providence".

⁵⁷⁾ See fr. 88 and n. 54, above. This is clearly the meaning of the generally misunderstood phrase *in commutatum veniunt*, Lucret., I. 795, with which cp. M. Aurelius X. 7 εἰς ἀλλοτρίωσιν ἰόντων, where Stich conj. ἀλλοίωσιν.

⁵⁸⁾ See Plato, *Theaet.* 152 D, cited above, n. 15. Cp. [Hippocr.] *de Victu* I. 18 μάγειροι κτλ.

⁵⁹⁾ See fr. 125 καὶ ὁ κυκλῶν διστάται (μὴ) κινούμενος. The importance of this utterance is shown by the fact that Epicurus (cp. Laert. Diog. X. 8), doubtless because of it, called Heraclitus κυκλήτης. The same notion reappears in fr. 52 αἰὼν παῖς ἐστὶ παλίων, πεττεύων, amplified or more correctly reported by Lucian *Vit. Auct.* 14 τί γὰρ ὁ αἰὼν ἐστίν; — παῖς παλίων, πεσσεύων, (συμπερόμενος) διαφερόμενος. Cp. also n. 54, above. The world is a game of chance; as the proverb has it, quite possibly after Heraclitus, τύχη ἄνω καὶ κάτω τὰ ἀνθρώπεια πεττεύει. The shaking of the dice, with the infinity of possible throws, where the dice are so many, admirably illustrates a molecular world kept in motion and passing from combination to combination in kaleidoscopic changes. See Lucret. V. 187 foll., 422 foll. for the Atomists and Epicurus, and Plato, *Legg.* 889 B foll., for Empedocles.

itly. 'God', says Heraclitus,⁶⁰⁾ *is day and night,⁶¹⁾ winter and summer,⁶²⁾ peace and war, satiety and hunger.⁶³⁾ But he changes⁶⁴⁾ as does fire when it mixes⁶⁵⁾ with spices, receiving a name in accordance with the fragrance of each.⁶⁶⁾*

We are now able to understand what Heraclitus meant in those enigmatic utterances of his which have been so persistently interpreted as implying the truth or at least the coëxistence of contradictories. The interchange of effluences, by which, in its transition from one character to another, a thing is, for example, both hot and cold, sufficiently explains all the cases known. The same applies to the relativity of qualities. The mixture of diverse ingredients constituting an object doubtless served also to account for the varying effects it had on different things or persons.⁶⁷⁾

⁶⁰⁾ ὁ θεὸς ἡμέρη εὐφρόνη, χειμῶν θέρος, πόλεμος εἰρήνη, κόρος λιμός· ἄλλοι-οὔται δὲ ὥκωσπερ <πῦρ>, ὁπότεν συμμιγῇ θυώμασιν, ὀνομάζεται καθ' ἡδονὴν ἐκάστου.

⁶¹⁾ Day and night depend on the gathering and dispersion of the dry, shining vapors that form the sun.

⁶²⁾ The seasons depend likewise on the character and quantity of these exhalations. Cp. Laert. Diog. IX, 10. See n. 103.

⁶³⁾ See above, n. 46.

⁶⁴⁾ Note that ἀλλοιοῦται is used. This does not, of course, imply ἀλλοίωσις in the Aristotelian sense. If reference be made to Plato, *Theaet.* 181 B. foll., it will be seen that, while ἀλλοίωσις occurs, the word implies nothing but that the object remains *in loco*, which it may well do though the ingredients which give it character be coming and going. If ἀλλοιοῦται was actually used by Heraclitus, he meant it as it is employed by [Hippocr.] *de Victu*, 4 συμμι-γόμενα δὲ καὶ διακρινόμενα ἀλλοιοῦται. Aristotle would naturally take the word in his own sense.

⁶⁵⁾ Diels remarks that μείγνυσθαι ποῖ Pind. fr. 129, may be 'sakraler Ausdruck'. For our purposes this matters not: the important fact is that the conception of μίξις is emphasized. Heraclitus used various figures to express this thought, in all of which the verb μείγνυσθαι could stand. Thus 'mixing' in love (the sexes) and strife (πόλεμος), 'blending' notes in a harmonious chord, and 'mixing' colors. See above, n. 54 and cp. fr. 10; also n. 84 and *Eudem. Ethic.* 1235^a 25 foll. Does Arist., *Gen. et Corr.* 327^b 10 foll. allude to fr. 67?

⁶⁶⁾ I cannot here accept either the rendering or the interpretation of Diels.

⁶⁷⁾ Fr. 61 θάλασσα ὕδωρ καθαρῶτατον καὶ μιανῶτατον, ἰχθύσι μὲν πότιμον καὶ σωτήριον, ἀνθρώποις δὲ ἄποτον καὶ ὀλέθριον. Why? Doubtless because there is fresh water mixed with the salt. See Aelian, *Hist. An.* IX. 64 for Empedocles and Democritus, and Theophr. *de Sensu* 67 for Democritus in

This explanation, common to most of the Greek thinkers, may be accepted as fairly well assured.

Theophrastus,⁶⁸⁾ following Aristotle, discovered ἀλλοίωσις in Heraclitus's doctrine of sense-perception, assuming that the principle of contrast in certain sensations involved the denial of interaction between similars and the affirmation that only dissimilars can react. Aristotle, indeed, goes so far as to say that most philosophers agree in the opinion that only unlike or opposite substances can act and react on each other, their interaction being such as properly to be called ἀλλοίωσις,⁶⁹⁾ and that perception is one form of interaction. Here we see a striking illustration of the effect of Aristotle's prepossessions on his reading of history, and, in consequence, through Theophrastus, on the doxographic tradition. As we have said before, any change from one state to another contrasted state or any change in any way involving contrariety seems to Aristotle to involve ἀλλοίωσις. Furthermore, the statement that most philosophers believed in interaction between the unlike is demonstrably false, so far as it relates to the pre-Socratics. Not only Democritus⁷⁰⁾ but Diogenes of Apollonia⁷¹⁾ expressly stated the

general. Cp. [Hippocr.] *de Victu* I. 18 θαλάσσης δύναμιν, ζώων συμφόρων τροφόν, ἀσυμφόρων δὲ φθόρον. Of course it may be said that we have no right to conclude from Empedocles to Heraclitus; but the objector must show that there was current a different explanation of such phenomena. And this, I fancy, will be difficult.

⁶⁸⁾ *De Sensu* 1 οἱ δὲ περὶ Ἀναξαγόραν καὶ Ἡράκλειτον τῷ ἐναντίῳ (sc. τὴν αἴσθησιν ποιῶσιν) . . . 2 οἱ δὲ (sc. Heraclitus and Anaxagoras) τὴν αἴσθησιν ὑπολαμβάνοντες ἐν ἀλλοιώσει γίνεσθαι καὶ τὸ μὲν ὁμοιον ἀπαθὲς ὑπὸ τοῦ ὁμοίου, τὸ δ' ἐναντίον παθητικόν, τούτῳ προσέθεσαν τὴν γνώμην· ἐπιμαρτυρεῖν δὲ οἶονται καὶ τὸ περὶ τὴν ἀφὴν συμβαῖνον· τὸ γὰρ ὁμοίως τῇ σαρκὶ θερμὸν ἢ ψυχρὸν οὐ ποιεῖν αἴσθησιν. Theophrastus might with equal propriety have included the Pythagoreans in his list; cp. Arist. *de Caelo* 290^b 24 ἐπεὶ δ' ἄλογον ἐδόκει τὸ μὴ συνακοῦειν ἡμᾶς τῆς φωνῆς ταύτης (the 'music of the spheres') αἴτιον τούτου φασὶν εἶναι τὸ γιγνομένοις εὐθὺς ὑπάρχειν τὸν ψόφον, ὥστε μὴ διαδόηλον εἶναι πρὸς τὴν ἐναντίαν σιγὴν· πρὸς ἀλλήλα γὰρ φωνῆς καὶ σιγῆς εἶναι τὴν διαγνώσιν. See below on Anaxagoras, Democritus and Diogenes.

⁶⁹⁾ *Gen. et Corr.* 323^b 3 foll.; cp. *de Anima* 410^a 23 foll., 416^a 29 foll.

⁷⁰⁾ Whom Aristotle alone excepts, *Gen. et Corr.* 323^b 10 foll.

⁷¹⁾ Fr. 2, and see Arist. *Gen. et Corr.* 322^b 12 foll. and Theophr. *de Sensu* 39.

contrary view with much emphasis; and Empedocles and Anaxagoras based their posulate of a general mixture,⁷²⁾ in which everything should contain some portion of each element, on the principle that only like can act on like. Aristotle himself implies that this doctrine was held by Heraclitus.⁷³⁾ It can hardly be regarded as without significance that in his prologue, which immediately⁷⁴⁾ preceded the emphatic enunciation of the principle *ἕμοιον ὁμοίῳ*, Diogenes of Apollonia said that the principle laid down at the beginning of every discourse ought to be indisputable.⁷⁵⁾

What then shall we say of Aristotle's dictum? The only justification for it — and that merely apparent — is to be found in the field of psychology. Not only Heraclitus,⁷⁶⁾ but other philosophers also, held that mental states of whatever character, whether pleasurepains or cognitive states required contrast, to set them off. Heraclitus, indeed, may have emphasized this fact in connection with his doctrine of universal change, asserting that instability and variation were a source of pleasure.⁷⁷⁾ These facts are, however, in any case of a wholly different order from those which appealed to the pre-Socratics as involving interaction; hence, while they affirmed without reserve the principle *ἕμοιον ὁμοίῳ*, they generally acknow-

⁷²⁾ The doctrine of general mixture is admitted for Anaxagoras, but often denied (e. g. by Zeller, I. 762 and n. 3) for Empedocles: but see Arist., *de Anima* 410^b 6 *ἐκ πάντων γὰρ ἕκαστον*. It would perhaps require more space than can here be allowed to verify the claim that the motive for this doctrine was as stated; but see my study, *The Logic of the Pre-Socratic Philosophy*, p. 218 foll. See also, below, my remarks on Anaxagoras.

⁷³⁾ *De Anima* 405^a 27 *τὸ δὲ κινούμενον κινουμένῳ γινώσκεισθαι*. [Hippocr.] *de Victu* I. 6 has much to say of the segregation of like to like and *ibid.* 7 growth and nourishment by accession of like to like are emphasized. The latter would, according to Aristotle and Diogenes fr. 2, be a case of interaction.

⁷⁴⁾ Simplicius says *εὐθὺς μετὰ τὸ προοίμιον*.

⁷⁵⁾ Fr. 1 *δοκεῖ μοιχεῶν εἶναι τὴν ἀρχὴν ἀναμφισβήτητον παρέχεσθαι*.

⁷⁶⁾ Fr. 23 *δίχης ὄνομα οὐκ ἂν ᾔδεναν, εἰ ταῦτα μὴ ᾔην*; fr. 84 *μεταβάλλον ἀναπαύεται καὶ κάματος ἐστὶ τοῖς αὐτοῖς μοχθεῖν καὶ ἀρχεσθαι*.

⁷⁷⁾ See last note and cp. fr. 111 *νοῦσος ὑγιεινὴ ἐποίησεν ἡδύ, κακὸν ἀγαθόν, λιμὸς κόρον, κάματος ἀνάπαυσιν*. Cp. [Hippocr.] *de Victu* I. 18 *εἰ δὲ ὅμοια πάντα ποιήσειέ τις, οὐκ ἔτι τέρψις. αἱ πλεῖστα μεταβολαὶ καὶ πολυειδέσταται μάλιστα τέρπουσιν*.

ledged, without any sense of incongruity, the psychological significance of contrast.⁷⁸⁾ To be more explicit, the principle *ὅμοιον ὁμοίῳ*, wherever applied, assumes that everything is composite in character, the several elements in one body responding to their kind in another. The principle of psychological contrast makes no such assumption. Hence, as has been said, the principles are of different orders and do not conflict.

The treatise *De Victu*, traditionally ascribed to Hippocrates, presents a singularly interesting problem, which we cannot here discuss. Its chronology is of the great est importance to the adjudication of many a dispute in the history of Greek philosophy. It is not my purpose here to express a definite opinion on this question; for indeed I must confess that I have hitherto been unable to form one. I may be permitted to say, however, that, as between Zeller and Teichmüller, the latter has in my opinion the better of the argument, though himself at many points in error.

The cardinal defect in the reasoning of Teichmüller, as indeed of all who have discussed this matter, is the assumption that there is no alternative but out and out *ἀλλοίωσις* or atomism of the most pronounced type. The case of Empedocles should have warned historians against this conclusion; but many have preferred to consider him a degenerate rather than a prophet. The corpuscular theory, if we may so call it, is much older than atomism. It rests upon the assumption of minute effluences, certainly made by Heraclitus and possibly by Anaximander. Schuster, Zeller, and Teichmüller one und all ignore this patent fact in discussing the treatise *περὶ διαίτης*.

Thus Schuster and Zeller find in the tractate the doctrine of 'unalterable elements', against which Teichmüller argues with mani-

⁷⁸⁾ The evidence will appear below. This fact, that philosophers who stated the physical principle *ὅμοιον ὁμοίῳ* with all emphasis held without compunction the psychological doctrine in question, can not be too strongly stated: for it is highly significant and does not appear to have been remarked. The fact that Aristotle and Theophrastus were profoundly interested in the psychological problem is likewise significant and may explain their patent misstatement of history.

fest success; but he at once concludes that the author definitely asserted the 'qualitative Uebergang der Dinge in einander', giving as evidence the fact that the words ἀλλοιούμενα, ἀλλοιούται etc. are constantly recurring. Teichmüller also refers⁷⁹⁾ to the periodic encroachment of fire upon water and *vice versa* as conclusive evidence of ἀλλοίωσις; but he is in error on both points.

The reference to the author's use of ἀλλοιούται shows beautifully how superficial much of the study of Greek philosophy has been; for the author himself says in the most unequivocal terms that the change of which he speaks is effected by composition and decomposition.⁸⁰⁾ And the alternate encroachment of fire upon water and *vice versa* is with equal certainty conceived in the meteorological terms of the Milesians, with whom ἀναθυμιάσις represented the process of corpuscular interchange in the cosmic δίνη.⁸¹⁾

⁷⁹⁾ Teichmüller, Neue Studien I. 254. „Der qualitative Uebergang der Dinge in einander wird von unserem Verfasser so wenig geleugnet, daß er vielmehr seine ganze Lehre darauf begründet. Darum ist der Ausdruck für die qualitative Veränderung (ἀλλοιούμενα, ἀλλοιούται κ.τ.λ.) fast immer das dritte Wort in dem ganzen Traktat. Wo wäre aber auch nur davon die Rede, daß untheilbare Körperchen, die sich bloß nach Ordnung, Form und Lage unterscheiden, durch den Wirbel umgetrieben, unsere Welt bildeten? Vielmehr beginnt der Verfasser gleich mit qualitativen Gegensätzen, Wasser und Feuer, die sich in einander qualitativ umsetzen, indem das Feuer sich aus dem Wasser ernährt, was nichts anders heißt, als daß das Wasser sich in Feuer verwandeln kann. Gerade wegen dieses qualitativen Uebergangs der beiden Elemente in einander hielt es der Verfasser notwendig, der gefährlichen, weltzerstörenden Consequenz entgegenzutreten, als wenn vielleicht einmal alles Feuer zu Wasser, oder alles Wasser zu Feuer werden könnte. Dazu erdenkt er das geistreiche Auskunftsmittel, daß bei mangelnder Nahrung das Feuer zurückweichen muß, und ebenso das in seiner Herrschaft fortschreitende Wasser bei mangelndem Feuer seine Bewegung verlieren und also stillstehen müßte, um wieder von dem daraufstürzenden Feuer verzehrt zu werden (De Victu I. 3).“

⁸⁰⁾ Kühn, I. 631 συμμισγόμενα δὲ καὶ διακρινόμενα ἀλλοιούται. I have no doubt that this represents the doctrine of Heraclitus, not being based on clearly conceived 'elements'. See above n. 63. See also n. 110.

⁸¹⁾ Kühn, I, p. 630 ξυνίσταται μὲν οὖν τὰ ζῷα τὰ τε ἄλλα καὶ ὁ ἄνθρωπος ἀπὸ δυοῖν . . . πυρὸς λέγω καὶ ὕδατος . . . τὸ μὲν γὰρ πῦρ δύναται πάντα διὰ παντὸς κινῆσαι (cp. Diels, *Dox.* 564, 21, for Parmenides and Arist., *Met.* 984^b 33 foll., *Dox.* 582, 11 for Empedocles), τὸ δὲ ὕδωρ πάντα διὰ παντὸς θρέψαι· ἐν μέρει δὲ ἐκάτερον κρατέει καὶ κρατέεται ἐς τὸ μῆξιτον καὶ τὸ ἐλάχιστον ὡς ἀνυστόν (cp. Empedocles fr. 17, 29; 26, 1). οὐδέτερον γὰρ κρατῆσαι παντελῶς δύναται

Hence, where others have thought to find the most convincing evidence of the doctrine of ἀλλοίωσις, we discover on the contrary a clear statement of change in character by recomposition without the assumption of indivisible, unalterable molecules or atoms. Whatever the chronology of the tractate, it falls logically in the interval between Heraclitus and his successors, Empedocles and Anaxagoras. The author displays no concern whatever about the logical difficulties raised by Parmenides.

Of the early Pythagoreans there is no occasion to speak in this connection, as the static nature of their principles did not compel attention to the problem of change. At all events, there is no satisfactory evidence that they considered it.⁸²⁾

The Eleatics next claim our attention. And here we begin with Parmenides, as the general terms and considerations to which Xenophanes confined himself yield no materials for our present inquiry. The philosophy of Parmenides, however, made the problem of change one of the main issues. As I have elsewhere pointed out,⁸³⁾ the distinctive contribution made by the Eleatics to philosophy was the strictly formulated postulate of the *unity* of the world interpreted as meaning *homogeneity*. The virtual identification of these two concepts—both old and generally accepted —

διὰ τὸδε· τὸ μὲν πῦρ ἐπεξιών ἐπὶ τὸ ἔσχατον τοῦ ὕδατος ἐπιλείπει τῇ τροφῇ. ἀποτρέπαται οὖν ὁκόθεν μέλλει τρέφεσθαι (cp. Aët. II. 17, 4 for Heraclitus; Arist., *Meteor.* 354^b 33 foll.; for Diogenes of Apollonia, see Diels, *Vorsokr.* 354, 22, *Dox.* 494, 8; see also Lucret. V. 524 foll. and Usener, *Epicur.* p. 383). τὸ δὲ ὕδωρ ἐπεξιών ἐπὶ τὸ ἔσχατον τοῦ πυρὸς ἐπιλείπει ἢ κίνησις. ἴσταται οὖν ἐν τούτῳ. [Here the implication is clear: the author refers to the ἀναθυμιάσεις and the diminution and replenishment of the several *maxima mundi membra* effected by them. Where is the warrant for the assertion that ἀλλοίωσις is intended?]. ὁκόταν δὲ στή, οὐκ ἔτι ἐγκρατές ἐστιν, ἀλλὰ δὴ τῷ ἐμπίπτοντι πυρὶ ἐς τὴν τροφήν καταναλίσκεται. οὐδέτερον δὲ διὰ ταῦτα δύναται κρατῆσαι παντελῶς· εἰ δὲ κοτε κρατηθεῖ καὶ ὁκότερον οὐδὲν ἂν εἴη τῶν νῦν ἑόντων ὥσπερ ἔχει νῦν. For water nourishing fire in this meteorological sense, see Aët. I. 3, 1 (*Dox.* 276^a 20 foll.), where Theophrastus imputes this thought to Thales, making somewhat more specific the conjecture of Arist., *Met.* 983^b 23 foll. Cp. also n. 103, below.

⁸²⁾ See nn. 55 and 68.

⁸³⁾ In a paper entitled *The Significance of the ὁμοιον in the Eleatic Philosophy*, read before the section on Greek Language of the International Congress of Arts and Science at St. Louis, 1904.

led to a view of the unity of the world that exerted a profound influence on all subsequent pre-Socratic thought. With the Eleatics the problem of the One and the Many, which had hitherto been handled in the practical spirit of daily life and empirical science,⁸⁴⁾ entered the sphere of logic and metaphysics. The homogeneity of substance, which was the chief outcome of this dialectical movement, was henceforth generally accepted: the differences between subsequent systems relate to the number of substances postulated and to the means of effecting interaction between them. Empedocles and Anaxagoras posited multiple elements; Diogenes and the Atomists clung to the conception of a single substance, but its unity and homogeneity were less strictly defined than by the Eleatics.⁸⁵⁾

In his negative dialectic Parmenides arrived at the position that the One excluded difference, thus admitting of no change; for change of any sort must involve two kinds of difference, to wit, difference in character and difference in time. The latter kind of difference doubtless concerned the Eleatics in the arguments against motion founded on the analysis of time into discrete moments. The former kind contravened their assumption of the unity and homogeneity of substance. For, holding, as we have said, that qualities are substantive ingredients, they could not admit that their One comprehended within itself differences of character. The only example of qualitative change of which we find mention in Parmenides relates to color or complexion. It is not of such sort that one could discern in it a hint of the Aristotelian ἀλλοίωσις.⁸⁶⁾

Passing to that part of Parmenides's treatise which dealt with

⁸⁴⁾ One has only to think of Heraclitus fr. 10 ἐκ πάντων ἐν (cp. Arist., *de Anima* 410^b 6 ἐκ πάντων γὰρ ἕκαστον, speaking of Empedocles), fr. 50 ἐν πάντα εἶναι, fr. 57 ἐστι γὰρ ἐν (to wit, day and night, cp. above, n. 60), fr. 89. See also [Hippocr.] *de Victu* I. 15 and Plato, *Tim.* 68 D.

⁸⁵⁾ The Atomists, by assuming specific kinds (i. e. shapes) of atoms as constituting specific kinds of matter, virtually abandoned their principle that all substance is identical, and Diogenes clearly assumed inequalities in the distribution of the elemental Air that were equivalent to qualitative differences. Parmenides expressly excluded differences in density.

⁸⁶⁾ See p. 15.

the Opinions of Men,⁸⁷⁾ we find certain suggestions as to the manner in which he thought of qualitative change. Here he spoke of two elemental substances, fire and earth. They appear pure and unmixed at the extremes of the evolving world, — fire at the periphery, earth at the center. All between is a mixture of these elements.⁸⁸⁾ The goddess of Love, as the deity presiding over union (*μίξις*)⁸⁹⁾ and generation, rules in the mixed sphere.⁹⁰⁾ The differentiation of thing from thing is due to the varying proportions in which the elements unite.⁹¹⁾ The soul is a compound of earth and fire, and as it perceives things in virtue of the action of like on like, the character of the perception (and hence of thought also) varies with the proportions of the elements to be found in individual souls.⁹²⁾ The doctrine that everything possesses some degree of perception⁹³⁾ manifestly rests in like manner upon a universal *μίξις* of the elements. Hence the inference is irresistible that Parmenides regarded change of quality in the traditional sense as a change of composition.

Of the later Eleatics there is little to say. Zeno may well be supposed to have shared the views of his master Parmenides in regard to this problem, but there is no direct evidence. One might perhaps infer from Plato's references to Zeno's doctrine touch-

⁸⁷⁾ The *representative* character of these opinions is emphasized by this recurring phrase. They are the traditional views of philosophers.

⁸⁸⁾ Arist., *Gen. et Corr.* 330^b 13 foll.

⁸⁹⁾ See above, n. 65, and fr. 13. See also fr. 12, 3 ἐν δὲ μέσῳ τούτων θαίμῳ ἢ πάντα κυβερνᾷ· | πάντα γὰρ (ἢ) συγεροῖο τόκου καὶ μίξις ἄρχει | πέμ-
πουσ' ἄρσεν. θῆλη μιγῇν τὸ τ' ἐναντίον αὐτίς ἄρσεν θηλυτέρῳ. Male and female are here, as with the Pythagoreans, merely typical of the συστοιχίαι of opposites. The goddess presides over γένεσις and φθορά as they are μίξις τε διά-
λαξις τε μιγέντων (Emped.). Cp. the function of Venus in the famous proem of Lucretius. See also Cic., *N. D.* I. 12, 28, Aët. II. 7, 1 and [Hippocr.] *de Nat. Hominis*, Kühn, I. 351 πρῶτον μὲν οὖν ἀνάγκη τὴν γένεσιν γίνεσθαι μὴ ἀφ' ἐνός· πῶς γὰρ ἐν ᾧ ἐόν τὸ γεννήσκειν, εἰ μὴ τιμι μιχθείη;

⁹⁰⁾ Elsewhere she is spoken of as Justice or Necessity (Aët. II. 25, 3). See nn. 46 and 51, above.

⁹¹⁾ See fr. 9 and Plut., *adv. Colot.* 1114 B.

⁹²⁾ Theophr. *de Sensu* 1 and 3, Macrob. *Sat.* I. 14, 20.

⁹³⁾ Theophr. *de Sensu* 3 καὶ ὅλως δὲ πᾶν τὸ ὄν ἔχειν τινὰ γνῶσιν.

ing the *ἁμοιον*⁹⁴⁾ that he had given the matter some thought, but they are too inconclusive to afford much insight into his point of view.

In the case of Melissus we have an unmistakable instance of the contamination of our sources by the importation of Aristotelian terminology. Later accounts here speak unequivocally of the Aristotelian conception of *ἀλλοίωσις*,⁹⁵⁾ attributing it not to Melissus alone but affirming that everybody so understood the process of qualitative change.⁹⁶⁾ For once we are in the fortunate position of being able to check the Peripatetic paraphrase with the original. Melissus uses various expressions for change, such as *μεταπίπτειν*, *ἐτεροιοῦσθαι*, *ἐτεροῖον γίνεσθαι*, *μετακοσμεῖσθαι*.⁹⁷⁾ All of these are quite general and are of course opposed to the postulate that the All be *ἓν* and *ἁμοιον*. Only one of them has a meaning clear enough to bear a definite interpretation, to wit, *μετακοσμεῖσθαι*, especially when, as here, it is reinforced by *κόσμος*.⁹⁸⁾ In this striking instance, there-

⁹⁴⁾ Plato, *Parm.* 127 E., *Phaedrus* 261 D.

⁹⁵⁾ Laert. *Diog.* IX. 24 ἐδόκει δὲ αὐτῷ τὸ πᾶν ἄπειρον εἶναι καὶ ἀναλλοίωτον καὶ ἀκίνητον καὶ ἐν ὁμοίῳ ἑαυτῷ καὶ πλήρες. The tractate *de M. X. G.* 974^a 18 says τοιοῦτον δὲ ὃν τὸ ἐν ἀνῶδυνόν τε καὶ ἀνάλητον ὑγιές τε καὶ ἄνοσον εἶναι, οὔτε μετακοσμούμενον θέσει οὔτε ἐτεροιοῦμενον εἶδει οὔτε μινύμενον ἄλλῳ. This is intended to restate Melissus fr. 7. There, however, there is nothing to correspond to the words θέσει, εἶδει, or μινύμενον ἄλλῳ. These additions are not contrary to the meaning of Melissus excepting that of εἶδει, which clearly presupposes the Aristotelian definition of *ἀλλοίωσις*, according to which a thing remains the same *γένει* but changes *εἶδει*. The word εἶδη occurs in Melissus fr. 8, but Diels correctly renders it 'Gestalten'.

⁹⁶⁾ *De M. X. G.* 976^b 29 τί καὶ τὴν ἐν τῷ αὐτῷ μένοντος τοῦ πράγματος τόπῳ (see Plato, above, n. 2, and Aristotle, above, nn. 4 and 19) τοῦ εἶδους μεταβολήν, ἣν ἀλλοίωσιν οἱ τε ἄλλοι κακεῖνος λέγει, and 977^a 2 ἀλλοιούμενου οὐδενός προσγιγνομένου οὐδ' ἀπογιγνομένου σώματος.

⁹⁷⁾ See Melissus fragments 7 and 8.

⁹⁸⁾ Fr. 7, 3 ἀλλ' οὐδὲ μετακοσμηθῆναι ἀνυστόν· ὁ γὰρ κόσμος ὁ πρόσθεν ἔων οὐκ ἀπόλλυται οὔτε ὁ μὴ ἔων γίνεται. Here κόσμος clearly means 'order', 'arrangement', 'fashion'. Now Melissus unmistakably regards *ἐτεροιοῦσθαι* as involving *μετακόσμησις*; see fr. 7, 3 ὅτε δὲ μήτε προσγίνεται μηδὲν μήτε ἀπόλλυται μήτε ἐτεροιοῦται, πῶς ἂν μετακοσμηθὲν τῶν ἐόντων εἴη; εἰ μὲν γὰρ τι ἐγίνετο ἐτεροῖον, ἤδη ἂν καὶ μετακοσμηθεῖη. Cp. fr. 7, 4 and 5, fr. 8, 2 and 3. This is the view of the Atomists, except that it takes no account of *μίξις*. See below, nn. 122 foll. It is noteworthy that change here reappears as *θάνατος* (fr. 7

fore, it may be seen that the Aristotelian notion of ἀλλοίωσις was fathered upon one of the pre-Socratics for no other reason, apparently, but that he employed the term ἑτεροιοῦσθαι which was regarded as a synonym for ἀλλοιοῦσθαι and interpreted accordingly from the point of view of the Peripatetics. We should not be surprised at this when we recall that modern historians have fallen into the same snare.

We may now turn to Empedocles. Accepting the dictum of the Eleatics that, assuming the fact of multiplicity, the Many must have the same characteristics which they postulated for the One,⁹⁹⁾ he asserted the existence of four true elements, eternal and unchangeable.¹⁰⁰⁾ Hence all change is secondary, an epiphenomenon of mixture or recombination effected by effluences from one thing entering into the pores of another.¹⁰¹⁾ This doctrine is so clearly held and so unambiguously stated that there would seem to be left no room for misapprehension. Yet misapprehension has arisen at two points, both of which are instructive. Empedocles twice speaks of the periodic encroachment of one element upon the other,¹⁰²⁾ and this notion is said by Simplicius to involve change of one into another,¹⁰³⁾ which to him of course means ἀλλοίωσις. There can be no doubt that Simplicius was in error,

and 8). The implication of the notion being so unmistakable here, we may safely conclude that Heraclitus, from whom the figure was borrowed, understood it in the same way. In θάνατος there is added the notion of μίξις which did not appear in fr. 7, 3. See n. 55 on Heraclitus.

⁹⁹⁾ The words are those of Melissus fr. 8, but the thought may have come from Parmenides.

¹⁰⁰⁾ The evidence appears below.

¹⁰¹⁾ See Zeller I. 767, 3 for the testimony of Aristotle. See above, n. 17 and Aët. I. 24, 2 quoted below, n. 109. Emped. fr. 21, 13 αὐτὰ γὰρ ἔστιν ταῦτα, ὃ' ἀλλήλων ἐνέθεοντα ἰγίνεται ἀλλοιωπά· τόσον διὰ κρήσις ἀμείβει. For the ἀπορροαί see Diels, *Vorsokr.* Emped., A 86, 87, 88, 89; B 84, 89, 91, 101; for the pores, *ibid.* A 86, 87; B 84. Interaction by effluvia and pores rests upon the action of like on like. The best brief statement of this matter with which I am acquainted is that of Karsten, *Empedokles* 396.

¹⁰²⁾ Fr. 17, 29; 26, 1 foll. (Zeller I. 778, 1 refers this to Love and Hate).

¹⁰³⁾ Quoting the latter passage Simplicius says ὅτι δὲ εἰς ἀλλήλα μεταβάλλει, ἐτηλοῖ λέγων ἐν δὲ μέρει . . . αἵτης.

though there may be some doubt as to Empedocles's real conception. He may have meant no more than that, in the formation and subsequent vicissitudes of the world, the *maxima mundi membra*, which in his scheme were synonymous with the elements, successively dominated each other. This notion, grown traditional,¹⁰⁴⁾ would naturally be stated as if it related to the elements as such, whereas in strict logic it could apply only to earth, water, air and fire regarded, like everything else in the world,¹⁰⁵⁾ as mixtures of all the elements.

The other case relates to the question of the One and the Many, with which Empedocles had in some way to deal. The One he found in the union of the elements in the Sphere; the Many, in their segregation.¹⁰⁶⁾ Here was an opportunity for the display of that want of historical insight which was not uncommon in the Aristotelian commentators. Aristotle himself, apparently unable to view the One except in the form, originated by Parmenides, of an absolute unity utterly homogeneous, charges Empedocles with inconsistency in maintaining, first, that the elements do not arise one from the other, and, secondly, that everything becomes one and in turn comes from one.¹⁰⁷⁾ The commentator states as historical

¹⁰⁴⁾ See above, n. 81.

¹⁰⁵⁾ See above, n. 72. The connection of this with the τροφή or replenishment of the *maxima mundi membra* in compensation for the losses they sustain, is suggested also by [Hippocr.] *de Nat. Hominis*, Kühn I. p. 359 ὥσπερ ὁ ἐναιυτός (with this cp. my note on summer and winter in Heraclitus, n. 61, above) μετέχει μὲν πᾶς πάντων τῶν ἐνεούτων ἐν τῷδε τῷ κόσμῳ, ἀλλ' εἰ ἐν τι ἐκλείποι, πάντ' ἂν ἀφανισθείη· ἀπὸ γὰρ τῆς αὐτῆς ἀνάγκης πάντα ξυνέστηκέ τε καὶ τρέφεται ὑπ' ἀλλήλων.

¹⁰⁶⁾ See *e.g.* fr. 17.

¹⁰⁷⁾ Arist., *de Gen. et Corr.* 315^a 3 Ἐ. μὲν οὖν ἔοικεν ἐναντία λέγειν καὶ πρὸς τὰ φαινόμενα καὶ πρὸς αὐτὸν αὐτός. ἅμα μὲν γὰρ οὗ φησιν ἕτερον ἐξ ἐτέρου γίνεσθαι τῶν στοιχείων οὐδέν (cp. also 314^b 20 foll.), ἀλλὰ τὰλλα πάντα ἐκ τούτων, ἅμα δ' ὅταν εἰς ἓν συναγάγῃ τὴν ἅπασαν φύσιν πλὴν τοῦ Νείκου, ἐκ τοῦ ἐνὸς γίνεσθαι πάλιν ἕκαστον. See also *ibid.* 329^b 1 foll., 333^a 16 foll., *Met.* 984^a 8 foll. Ἐ. δὲ τὰ τέτταρα, πρὸς τοῖς εἰρημένους γῆν προστιθεὶς τέταρτον· ταῦτα γὰρ αἰεὶ διαμένειν καὶ οὐ γίνεσθαι ἀλλ' ἢ πληθῆι καὶ ὀλιγότητι συγχρινόμενα καὶ διαχρινόμενα εἰς ἓν τε καὶ ἐξ ἐνός. The phrase ἀλλ' ἢ πληθῆι καὶ ὀλιγότητι does not seem to be understood. It means 'except in respect of number', πληθος καὶ ὀλιγότης, like so many pairs of abstract correlates, expressing together the

fact what Aristotle had in mind only as an unconscious prejudice,¹⁰⁸) thus imputing to Empedocles ἀλλοίωσις of the most approved type.

It requires but a moment's reflection to perceive that there is here a repetition of the Theophrastean fallacy touching Anaximander and of the Aristotelian fiction regarding Anaxagoras. Had Empedocles accepted the Eleatic One, he would never have postulated a multiplicity, to the units of which he attributed the same character. There is, therefore, no basis of fact whatever for the assumption of a qualitative change in his system other than that effected by the composition of elementary substances interacting through effluences and pores.

Anaxagoras excited the interest of Socrates and Plato by the introduction of teleological considerations. Aristotle also was uncommonly attracted by Anaxagoras and owed to him several conceptions of the first importance to his own philosophy, such as the more precise conception of Deity and of the relation of God to the world. This circumstance may in part explain Aristotle's repeated efforts to restate the thought of Anaxagoras in terms that appeared to him dictated by reason. The extent to which this attempted reinterpretation has falsified the accounts of the philosophy of Anaxagoras is little appreciated. Inasmuch as the chief points in question bear directly on the problem now under consideration, we may turn at once to discuss them.

The thought of Anaxagoras would seem to be sufficiently clear and intelligible. He endeavored to answer two main questions—namely, that which relates to the One and the Many, and that which relates to change and differentiation. The One he found in a universal state of mixture; the Many, in an infinity of elemental

notion "number", as Plato's μέγα καὶ σμικρόν meant 'magnitude', 'dimension' or 'extension'. For such pairs of abstracts see Plato's *Euthyphro* 7C foll.

¹⁰⁸) Philop. *de Gen. et Corr.* 19, 3 Vitelli πρὸς μὲν γὰρ τὰ φαινόμενα ἐναντία λέγει ἀναιρῶν τὴν ἀλλοίωσιν ἐναργῆ οὖσαν, πρὸς αὐτὸν δὲ διότι λέγει μὲν ἀμετάβλητα τὰ στοιχεῖα, καὶ αὐτὰ μὲν μὴ γίνεσθαι ἐξ ἀλλήλων τὰ δὲ ἄλλα ἐκ τούτων. πάλιν δὲ φησι τῆς Φιλίας κρατούσης τὰ πάντα ἐν γίνεσθαι καὶ τὸν Σφαῖρον ἀποτελεῖν ἅποιον ὑπάρχοντα, ὡς μηκέτι μήτε τὴν τοῦ πυρὸς μήτε τῶν ἄλλων τινὸς σφίξεσθαι ἐν αὐτῇ ιδιότητι, ἀποβάλλοντος ἐκάστου τῶν στοιχείων τὸ οἰκεῖον εἶδος.

substances absolutely homogeneous, unalterable, and infinitely divisible. In the primordial πάντα ὁμοῦ these ὁμοιομερῆ were as absolutely defined as they are in the world about us. Thus far we have a system like that of Empedocles, except that the latter postulated four elements, where the former posited an infinity. The first important difference between the systems is that, whereas Empedocles assumed a periodic oscillation between σύγκρισις and διάκρισις, Anaxagoras conceived of only one segregation of like to like, and that incomplete, resulting not in an absolute separation of the several kinds of ὁμοιομερῆ, but only in a condition in which the like elements gained the ascendancy in particular things. This predominance of one element, accompanied by an admixture of every other element, constitutes the individuality of a thing. Change, on the other hand, consists in a recomposition of such sort that another element, or group of elements, comes to predominate in a given compound.

Aristotle was not content to leave the matter thus. He suggested that Anaxagoras must have meant, or at any rate ought to have said, that the condition in the state of universal mixture was that of the absence of all quality.¹⁰⁹⁾ This interpretation was taken up and treated more seriously than it deserved by Theophrastus,¹¹⁰⁾ whose application of the same notion to Anaximander we have already noticed, although he well knew¹¹¹⁾ that Anaxagoras had not so expressed himself. Assuming the correctness of Aristotle's interpretation, we should of course have a clear case of

¹⁰⁹⁾ *Met.* 989^a 30 foll.

¹¹⁰⁾ See Diels, *Dox.* 479, 12 foll.

¹¹¹⁾ *Aët.* I. 24, 2 Ἐμπεδοκλῆς Ἀναξαγόρας Δημόκριτος Ἐπίκουρος καὶ πάντες ὅσοι συναθροισμὸν τῶν λεπτομερῶν σωμάτων κοσμοποιοῦσι συγκρίσεις μὲν καὶ διακρίσεις εἰσάγουσι, γενέσεις δὲ καὶ φθοράς οὐ κυρίως· οὐ γὰρ κατὰ τὸ ποιὸν ἐξ ἀλλοιώσεως, κατὰ δὲ τὸ ποσὸν ἐκ συναθροισμοῦ ταύτας γίνεσθαι. Cp. also Anaxagoras fr. 17 τὸ δὲ γίνεσθαι καὶ ἀπόλλυσθαι οὐκ ὀρθῶς νομίζουσιν οἱ Ἕλληνες· οὐδὲν γὰρ χρῆμα γίνεται οὐδὲ ἀπόλλυται, ἀλλ' ἀπὸ ἐόντων χρημάτων συμμίσγεται τε καὶ διακρίνεται. The doxographic account, which is correct in every detail, rests on the authority of Theophrastus, Epicurus having been subsequently added as the epigonus of Democritus. This case of manifest contradiction in Theophrastus has not received the attention that it deserves because it throws light on the relation of his reports to those of Aristotle.

ἀλλοίωσις in the differentiation of qualitatively defined elements from the qualitatively indifferent One. We have repeatedly observed the fascination exercised by this notion upon the imagination of Aristotle and his successors, and we have come to be justifiably suspicious of their findings in such a case as this. Nobody will gainsay our right to call in question Aristotle's statement when he asserts that this represents the view of Anaxagoras.¹¹²⁾

There is another point at which our authorities profess to find in Anaxagoras the doctrine of ἀλλοίωσις. It has to do with the psychology of perception by opposites. We have already touched upon this matter in speaking of Heraclitus, and may therefore treat it here more briefly than we should otherwise do. Theophrastus attributes to Anaxagoras the view that interaction occurs only between dissimilars.¹¹³⁾ This statement, I think, can readily

¹¹²⁾ *Phys.* 187^a 29 διὰ τοῦτο γὰρ οὕτω λέγουσιν, ἣν ὁμοῦ τὰ πάντα καὶ τὸ γίνεσθαι τοιόνδε καθέστηκεν ἀλλοιοῦσθαι. The last clause might be taken as a quotation, but Prantl rightly renders it "und das Entstehen eines qualitativ bestimmten Dinges ist dann nur eine qualitative Aenderung". *De Gen. et Corr.* 314^a 11 ὅσοι δὲ πλείω τὴν ὕλην ἐνὸς τιθέασιν οἷον Ἐμπεδοκλῆς καὶ Ἀναξαγόρας καὶ Δεύκιππος, τοῦτοι δὲ ἕτερον (*sc.* ἀλλοίωσιν καὶ γένεσιν ἀνάγκη εἰπεῖν). καίτοι Ἀναξαγόρας γε τὴν οἰκείαν φωνὴν ἡγνόησεν· λέγει γοῦν ὡς τὸ γίνεσθαι καὶ ἀπόλλυσθαι ταῦτόν καθέστηκε τῷ ἀλλοιοῦσθαι. Zeller I. 979, 3 regards the last clause as a direct quotation from Anaxagoras. Diels rightly decides otherwise. I incline to think Anaxagoras used the verb ἀλλοιοῦσθαι, though in the vague sense of change of character, the mode being defined as σύγκρισις and διάκρισις, as in [Hippocr.] *de Victu*, quoted above nn. 63 and 79. Aristotle was prone to take the words ἑτεριοῦσθαι and ἀλλοιοῦσθαι in his own sense. About the clause καίτοι . . . ἡγνόησεν there is much doubt. Prantl renders thus: "Und doch hat A. sein eigenes Wort mißkannt; er sagt ja wenigstens, daß das Entstehen und Vergehen das Nämliche sei, wie das qualitative Geändertwerden." Professor Shorey, in a private communication, suggests that "Aristotle means that, Anaxagoras failed to recognize what are (according to Aristotle) the necessary implications of his own doctrine. The expression is figurative and, I think, proverbial". The Berlin Aristotle renders "quamquam Anax. suam profecto vocem ignoravit". Bonitz, in the *Index*, says "Non recte intellexit propriam vocabuli ἀλλοιοῦσθαι vim". It seems as if Aristotle must be charging Anaxagoras with not understanding his own words for having involved himself in a contradiction. This is suggested by καίτοι . . . γοῦν. Cp. the contradiction Aristotle finds in Empedocles n. 105 above. See also n. 123, below, and n. 28, above.

¹¹³⁾ Theophr. *de Sensu*, quoted above, n. 67. *Ibid.* 27 ὁρᾶν μὲν γὰρ τῇ ἐμπράσει τῆς κόρης, οὐκ ἐμπαίνεσθαι δὲ εἰς τὸ ὁμόχρων, ἀλλ' εἰς τὸ διάφορον . . .

be shown to be false, and the occasion for the misapprehension is so obvious that one who is attentive cannot fail to discover it.

Theophrastus would clearly have us believe that Anaxagoras accepted the principle of interaction between dissimilars and rejected that of interaction between similars. This can be shown to be an error. In the first place there appears to be no satisfactory explanation for Anaxagoras's assumption of a universal mixture except on the theory that, as like only can act on like, each thing, in order to admit of interaction with others, must contain an element or elements common to them. This principle, in its most generalized form, was distinctly enuntiated by Diogenes and the Atomists, and was satisfied in their systems by making all substance in essence identical. Empedocles and Anaxagoras, postulating a multiplicity of heterogeneous elements, had recourse to the device of a universal mixture. The principle *ὁμοιον ὁμοίῳ* thus lies at the base of all these systems.

This can be shown for Anaxagoras as clearly as possible in at least one form of interaction, namely that of nutrition,¹¹⁴) a

τὴν δὲ χροάν τὴν κρατοῦσαν μᾶλλον εἰς τὴν ἐτέραν ἐμφαίνεσθαι. 28 τὸν αὐτὸν δὲ τρόπον καὶ τὴν ἀφὴν καὶ τὴν γεῦσιν κρίνειν· τὸ γὰρ ὁμοίως θερμὸν καὶ ψυχρὸν οὔτε θερμαίνειν οὔτε ψύχειν πλησιάζον οὐδὲ δὴ τὸ γλυκὺ καὶ τὸ ὀξύ· δι' αὐτῶν γνωρίζειν, ἀλλὰ τῷ μὲν θερμῷ τὸ ψυχρὸν, τῷ δ' ἀλμυρῷ τὸ πότιμον, τῷ δ' ὀξεῖ τὸ γλυκὺ κατὰ τὴν ἔλλειψιν τὴν ἐκάστου . . . 29 ἅπασαν δ' αἰσθησιν μετὰ λύπης, ὅπερ ἂν ὀξείην ἀκόλουθον εἶναι τῇ ὑποθέσει· πᾶν γὰρ τὸ ἀνόμοιον ἀπτόμενον πόνον παρέχει. Cp. Aët. IV. 9, 16 Ἀναξαγόρας πᾶσαν αἰσθησιν μετὰ πόνου. That these statements prove nothing is shown by a reference to *de Sensu* 9 for Empedocles and *ibid.* 42 for Diogenes.

¹¹⁴) Fr. 10 πῶς γὰρ ἂν, φησὶν, ἐκ μὴ τριχὸς γένοιτο θρῖξ καὶ σὰρξ ἐκ μὴ σαρκός; See Arist. *Phys.* 203^a 19 *fol.* and Simplic. *ad loc.* ὁρῶν οὖν πᾶν ἐκ παντὸς γινόμενον . . . καὶ τροφῆς δὲ τῆς αὐτῆς προσφερομένης οἶον ἄρτου πολλὰ καὶ ἀνόμοια γίνονται, σάρκες ὅσῃ φλέβες νεῦρα τρίχες. ὄνυχες καὶ πτερὰ δὲ εἰ οὕτω τύχοι καὶ κέρατα, (αὕξεται δὲ τὸ ὅμοιον τῷ ὁμοίῳ)· διὸ ταῦτα ἐν τῇ τροφῇ ὑπέλαβεν εἶναι καὶ ἐν τῷ ὕδατι, εἰ τούτῳ τρέφοιτο τὰ δένδρα, ξύλον καὶ φλοιὸν καὶ καρπὸν. διὸ πάντα ἐν πᾶσιν ἔλεγε μεμῖχθαι καὶ τὴν γένεσιν κατὰ ἐκχρίσιν γίνεσθαι. πρὸς τοῦτο δὲ ἐνήγγεν ἴσως καὶ τὸ μενόντων τινῶν γίνεσθαι ἀπ' αὐτῶν ἄλλα ὥσπερ ἐκ λίθου πῦρ καὶ ἐξ ὕδατος πομφολυγίζοντος ἀέρα. ὁρῶν οὖν ἄφ' ἐκάστου τῶν νῦν διακεκριμένων πάντα ἐκκρινόμενα οἶον ἀπὸ ἄρτου σάρκα καὶ ὀστοῦν καὶ τὰ ἄλλα, ὡς πάντων ἅμα ἐνυπαρχόντων αὐτῷ καὶ μεμιγμένων ὁμοῦ, ἐκ τούτων ὑπενόει καὶ πάντα ὁμοῦ τὰ ὄντα μεμῖχθαι πρότερον πρὶν διακριθῆναι.

form in which interaction was recognized from the dawn of Greek philosophy. But it is likewise involved and clearly implied in the doctrine of the Νοῦς. Why, in the system of Anaxagoras, is the Νοῦς unmixed and pure? In order to be free from interaction or influence on the part of the world,¹¹⁵⁾ which could not be avoided if it contained anything else in its own nature, since like act on like. The Νοῦς of Anaxagoras is the prototype of Aristotle's God, who is required by the theory to touch the world without being touched in return. Evidently the assumption is that if the Νοῦς had something in common with the world, it could not be purely active, but must be passive also. Of course Anaxagoras was inconsistent: but was Aristotle less so?

How then are we to explain this singular misrepresentation of the thought of Anaxagoras? The case is exactly the same as that of Heraclitus.¹¹⁶⁾ Theophrastus, with the inveterate Peripatetic prejudice, thinks to find ἀλλοίωσις wherever there are contrarieties involved in any fashion in the production of something new.¹¹⁷⁾

¹¹⁵⁾ Cp. Plato, *Crat.* 413C; Arist., *de Anima* 405^a 15 foll., 429^a 18 foll.; *Phys.* 256^b 24 foll.; *Gen. et Corr.* 328^a 18 foll., and *Met.* book XI. Fortunately we are here in position to present Anaxagoras's *ipsissima verba* fr. 12 τὰ μὲν ἄλλα παντὸς μοῖραν μετέχει, νοῦς δὲ ἐστὶν ἄπειρον καὶ αὐτοκρατὴς καὶ μέμεικται οὐδενὶ χρήματι, ἀλλὰ μόνος αὐτὸς ἐφ' ἑαυτοῦ ἐστίν. εἰ μὴ γὰρ ἐφ' ἑαυτοῦ ᾔην, ἀλλὰ τεφ ἐμέμεικτο ἄλλω, μετεῖχεν ἂν ἀπάντων χρημάτων, εἰ ἐμέμεικτό τεφ . . . καὶ ἂν ἐκώλυον αὐτὸν τὰ συμμειγμένα, ὥστε μηδενὸς χρήματος κρατεῖν ὁμοίως ὡς καὶ μόνον ἔόντα ἐφ' ἑαυτοῦ . . . καὶ τὰ συμμειγμένα τε καὶ ἀποκρινόμενα καὶ διακρινόμενα πάντα ἔγνω νοῦς. This last clause naturally makes difficulty. Just as one cannot understand how the Νοῦς (and Aristotle's God) can act on the world without being reacted on, no matter what the principle, whether that of ὁμοιον ὁμοίῳ or any other; so one naturally wonders how, on the principle ὁμοιον ὁμοίῳ, the Νοῦς, being unmixed, can know the mixed. We meet the same inconsistency in Empedocles, where the principle is beyond dispute. Aristotle (*de Anima* 410^b 5 foll.) ridicules him for making God the most unintelligent of beings, because he alone is ignorant of Strife, one of the 'elements.' The seems to be that Empedocles and Anaxagoras made certain concessions to the point of view of the popular religion.

¹¹⁶⁾ See above, nn. 76—78.

¹¹⁷⁾ This is well shown in regard to nutrition by Arist., *Phys.* 260^a 29, quoted above, n. 9. See also Theophr., *de Sensu* 31 τὸ μὲν οὖν τοῖς ἐναντίοις ποιεῖν τὴν αἰσθησιν ἔχει τινὰ λόγον, ὥσπερ ἐλέγθη· δοκεῖ γὰρ ἡ ἀλλοίωσις οὐχ ὑπὸ τῶν ὁμοίων ἀλλὰ ὑπὸ τῶν ἐναντίων εἶναι κτλ. According to Aristotle sense-

We may therefore dismiss Anaxagoras with the confident assertion that his doctrine of psychological contrast had no connection with such qualitative change.

The Atomists propounded a doctrine which, in its general outlines, is remarkably clear. It is unnecessary to restate the theory in detail. The concrete world consists of atoms and void. Interaction between atoms is by impact, and rests on the fundamental principle that only like can act on like:¹¹⁸⁾ hence all atoms are essentially homogeneous, differing only in size and shape and (in composition) in position. The differences in the world, we should therefore expect, would be essentially confined to composite things.

Here, however, we meet the important fact that the Atomists, after starting with a purely physical conception of the atom, fall back upon what we may properly call the chemical view, to explain the infinite variety in the universe.¹¹⁹⁾ Hence, while we should have expected them to rely wholly on position and arrangement of the atoms in the compounds, they made much of the presence or absence of atoms of specific characters. It matters little that these specific characters were regarded as ultimately differences of mass: the effect was the same as if the differences

perception is a πάθος, and hence of course the result of interaction between the unlike, and hence ἀλλοίωσις. See also below, n. 127 on Democritus.

¹¹⁸⁾ Arist., *de Gen. et Corr.* 323^b 11 φησὶ γὰρ τὸ αὐτὸ καὶ ὁμοιον εἶναι τὸ τε ποιοῦν καὶ τὸ πάσχον· οὐ γὰρ ἐγχωρεῖν τὰ ἕτερα καὶ διαφέροντα πάσχειν ὑπ' ἀλλήλων, ἀλλὰ καὶ ἕτερα ὄντα ποιῆ τι εἰς ἀλλήλα, οὐχ ἧ ἕτερα ἀλλ' ἧ ταῦτόν τι ὑπάρχει, ταύτη τοῦτο συμβαίνειν αὐτοῖς. This one passage will suffice: on this point all authorities agree.

¹¹⁹⁾ Arist., *de Gen. et Corr.* 314^a 21 ἐκ σωμάτων ἀδιαιρέτων τὰλλα συγκεῖσθαι φασι, ταῦτα δ' ἄπειρα καὶ τὸ πλῆθος εἶναι καὶ τὰς μορφάς, αὐτὰ (the compounds) δὲ πρὸς αὐτὰ διαφέρειν τούτοις ἐξ ὧν εἰσι (i. e., in point of the constituting atoms) καὶ θέσει καὶ τάξει τούτων. The importance of the *specific ingredients* is emphasized in many ways, notably in connection with that refinement of the notion of a general mixture known as the theory of the pores and effluences. Cp. *de Gen. et Corr.* 315^b 13 (quoted below, n. 122) and Lucret. I. 677, 800, 814 913; II. 581. It is interesting to note that modern chemistry is contrariwise in certain cases; notably in regard to phenomena of isomerism, falling back on purely physical notions, such as position and arrangement.

had been of another kind.¹²⁰⁾ It was no doubt the intention of Democritus to strip the atoms of *all* special qualities;¹²¹⁾ but the traditional view had its revenge, since he left certain atoms so constituted that in and of themselves they must produce specific results, just as if they possessed the qualities in question.¹²²⁾

The mediate result of this doctrine was the formal distinction between primary and secondary qualities.¹²³⁾ This distinction Aristotle quite naturally equated with that between essential and accidental qualities, although the distinctions were by no means coincident. The former was the product of a train of thought having in view the physical definition of a thing in terms of mass; the latter resulted from the Socratic dialectic, ending in a logical definition *per genus et differentiam specificam*. It was the confusion of these two sets of notions, I believe, that led Aristotle to assert that Leucippus definitely recognized ἀλλοίωσις in a sense so like his own that he evidently mistook one for the other.¹²⁴⁾

¹²⁰⁾ Hence some of the historical problems touching Atomism cannot be solved. There were manifest inconsistencies in the handling of this notion of specific differences; cp. Theophr., *de Sensu* 68. There was also much uncertainty in regard to the occasions on which recourse was had to this principle of differentiation; cp. Theophr., *de Odor.* 64.

¹²¹⁾ The atoms are repeatedly spoken of as ἄπιοι; cp. fr. 117.

¹²²⁾ Democritus, to be sure, attributed these qualitative effects in part to our sense-organs, thus making the qualities subjective; but he also explained the relativity of qualities to the percipient by the mixture in the compounds, thus making the qualities really objective, cp. Theophr. *de Sensu* 67, and see n. 122. This same point of view is implied in giving specific shapes to certain atoms, upon which the possibility of such compounds really depends.

¹²³⁾ This distinction was not definitely stated by the Atomists: it is only an inference from such statements as that in fr. 117. Nevertheless it is only natural to recognize it as in principle involved in the system, although the many inconsistencies with which Democritus is charged by our authorities detract from its significance for his philosophy.

¹²⁴⁾ *De Gen. et Corr.* 315^b 7 ποιήσαντες τὰ σχήματα τὴν ἀλλοίωσιν καὶ τὴν γένεσιν ἐκ τούτων ποιῶσι, διακρίσει μὲν καὶ συγκρίσει (by composition and decomposition) γένεσιν καὶ φθοράν, τάξει δὲ καὶ θέσει ἀλλοίωσιν. This categorical assertion would seem to be decisive; but there is nothing to support it, and everything else contradicts it. In fact Aristotle's own words, which immediately follow, disprove the inference which one might think to draw from this utterance: ἐπεὶ δ' ὅλοντο τὰ ληθές ἐν τῷ φαίνεσθαι, ἐναντία δὲ καὶ ἄπειρα τὰ

Aristotle, to be sure, was predisposed to find ἀλλοίωσις in the Atomists as in the other pre-Socratics. Their fundamental principle of the homogeneity of all things was enough to justify this conclusion to his mind.¹²⁵) But Aristotle stands convicted of error out of his own mouth. The most that can be said for his position is that Democritus, inconsistent in this as in other details, sometimes attributed a change to differences of position and arrangement without specifically mentioning the factor of recombination. But he did not recognize a real distinction between the two cases, such as Aristotle suggests in marking off γένεσις and φθορά from ἀλλοίωσις.

It remains for us to consider the question as it relates to the Atomist's theory of sense-perception. Theophrastus begins his account by saying that Democritus did not declare himself on the point, whether perception was due to interaction between similars or dissimilars.¹²⁶) So much we may accept as beyond question. Theophrastus, however, is not content to let the matter rest there. After considering the problem from many points of view, he appears to reach the conclusion that Democritus on the whole inclined more

φαινόμενα, τὰ σχήματα ἄπειρα ἐποίησαν, ὥστε ταῖς μεταβολαῖς τοῦ συγκειμένου (by changes in composition) τὸ αὐτὸ ἐναντίον δοκεῖν ἄλλῃ καὶ ἄλλῃ, καὶ μετακινεῖσθαι (evidently the Atomist's own expression, for which Aristotle would substitute ἀλλοιοῦσθαι) μικροῦ ἐμμειγνομένου καὶ ὅλως ἕτερον φαίνεσθαι ἐνὸς μετακινή-θεντος· ἐκ τῶν αὐτῶν γὰρ τραγωδία καὶ κωμῳδία γίνεται γραμμάτων (but not in the same proportions etc.). Cp. also n. 117. The doctrine of relativity is explained here just as it is (see above, n. 120) by Theophr. *de Sensu* 67. Compare the statement in *de Gen. et Corr.* 314^a 21 foll. quoted above, n. 117, and Simplic., *Phys.* 36, 1 κατὰ τὴν τῶν σχημάτων αὐτῶν καὶ τῆς θέσεως καὶ τάξεως διαφορὰν τὰ μὲν θερμὰ γίνεσθαι κτλ. Cp. *Aët.* IV. 9, 8, and the scheme of color-changes in Theophr. *de Sensu* 73 foll., evidently based on Empedocles's conception of change of character by mixture. Cp. above, n. 96.

¹²⁵) *De Gen. et Corr.* 314^b 1 τοῖς μὲν οὖν ἐξ ἐνὸς πάντα κατασκευάζουσιν ἀναγκαῖον λέγειν καὶ τὴν φθορὰν ἀλλοίωσιν. Arist., fr. 208 (Rose) εἰ τοίνυν ἡ μὲν γένεσις σύγκρισις τῶν ἀτόμων ἐστίν, ἡ δὲ φθορὰ διάκρισις, καὶ κατὰ Δημόκριτον ἀλλοίωσις ἂν εἴη ἡ γένεσις. This latter passage is to be compared with those on Empedocles and Anaxagoras, nn. 105 and 110.

¹²⁶) *De Sensu* 49 Δ. δὲ περὶ μὲν αἰσθήσεως οὐ διορίζει, πότερα τοῖς ἐναντίοις ἢ τοῖς ὁμοίοις . . . 72 ὥστε καὶ κατὰ τὸ ὑποκειμενον ἔδει διορίζειν, πότερον ἐξ ὁμοίων ἢ ἐξ ἀνομοίων ἐστὶ, καὶ πῶς ἡ τῶν αἰσθήσεων ἀλλοίωσις γίνεται.

to the assumption of perception by opposites or dissimilars.¹²⁷⁾ In this discussion we find reappearing the same arguments that we met in connection with Heraclitus and Anaxagoras; but the Peripatetic prejudices and presuppositions are here so undisguised that one readily discerns that there was no sufficient reason, at least on the score of his doctrine of sense-perception, for imputing ἀλλοίωσις to Democritus.

Democritus appears to have said, in words which we cannot exactly determine, that perception was an affection of the sense-organs, his desire being to assert the subjectivity and relativity of sense.¹²⁸⁾ To an Aristotelian this thought at once suggested the word πάθος¹²⁹⁾ to characterize sense, and this term inevitably associated itself in turn with διάθεσις¹³⁰⁾ and πάσχειν.¹³¹⁾ The former of these words was connected with the ancient observation¹³²⁾ that perception and the 'frame of mind' depend on the condition of the individual. From the time of Parmenides this notion took on the form of an assumed difference in the proportions existing between the elementary constituents of man. Theophrastus elsewhere infers from this conception that the thinkers in question

¹²⁷⁾ This will be evident to one who reads attentively the whole passage 49—83.

¹²⁸⁾ See above, n. 120.

¹²⁹⁾ Cp. the frequent use of πάθη, as. e. g. 60 Δ. δὲ πάντα πάθη τῆς αἰσθήσεως ποιῶν (cp. 61), 63 πάντα πάθη τῆς αἰσθήσεως ἀλλοιουμένης, etc.

¹³⁰⁾ 64 ἐτι δ' αὐτοὺς μεταβάλλειν τῇ κρήσει κατὰ τὰ πάθη καὶ τὰς ἡλικίας· ἤ καὶ φανερόν ὡς ἡ διάθεσις αἰτία τῆς φαντασίας. — 58 περὶ δὲ τοῦ φρονεῖν ἐπὶ τοσοῦτον εἴρηκεν ὅτι γίνεται συμμέτρως ἐξούσης τῆς ψυχῆς κατὰ τὴν κρῆσιν. ἐὰν δὲ περίθερμός τις ἢ περίψυχρος γένηται, μεταβάλλειν φησί. δι' ὃ τι καὶ τοὺς παλαιούς καλῶς τοῦθ' ὑπολαβεῖν ὅτι ἐστὶν ἀλλόφρονεῖν (cp. Arist., *de Anima* 404^a 30). ὥστε φανερόν, ὅτι τῇ κράσει τοῦ σώματος ποιεῖ τὸ φρονεῖν. This doctrine of κρᾶσις was clearly borrowed from Parmenides and Empedocles, and is to be interpreted accordingly.

¹³¹⁾ 49 εἰ μὲν γὰρ (τῷ) ἀλλοιοῦσθαι ποιεῖ τὸ αἰσθάνεσθαι, δόξειεν ἂν τοῖς διαφόροις· οὐ γὰρ ἀλλοιοῦνται τὸ ὅμοιον ὑπὸ τοῦ ὁμοίου· πάλιν δ' (εἰ) τὸ μὲν αἰσθάνεσθαι καὶ ἀπλῶς ἀλλοιοῦσθαι (τῷ) πάσχειν κτλ.

¹³²⁾ Theophr., *de Sensu* 72 ἀλλὰ περὶ μὲν τούτων ἔοικε συνηχολουθηκέναι τοῖς ποιούσιν ὅλως τὸ φρονεῖν κατὰ τὴν ἀλλοίωσιν, ἥπερ ἐστὶν ἀρχαιοτάτη δόξα. πάντες γὰρ οἱ παλαιοὶ καὶ ποιηταὶ καὶ σοφοὶ κατὰ τὴν διάθεσιν ἀποδιδοῦσι τὸ φρονεῖν.

accepted the dictum ὁμοιον ὁμοίῳ.¹³³⁾ In this instance he unaccountably concluded to the opposite principle. And as for πάσχειν, the term invariably suggested to the Aristotelian interaction between dissimilars or opposites, which is what Aristotle called ἀλλοίωσις. The chain of associated ideas is thus complete, and Theophrastus unhesitatingly accepted the conclusion that Democritus held the doctrine. In this he was confirmed by the psychological principle of contrasts,¹³⁴⁾ in relation to perception and images: but we have come to know that this notion had nothing to do with the problem.

We saw above that Democritus did not expressly state whether or not his theory of perception presupposed the interaction of like with like and that Theophrastus on the whole inclined to think he proceeded on the opposite view. This conclusion I regard as wholly without justification. The reason why Democritus did not expressly declare himself on this question was simply that there was no need of it. There was only one view at that time current, namely that all interaction took place between similars, and Democritus had himself stated this principle¹³⁵⁾ unequivocally and comprehensively, and his entire theory of perception proceeds upon it. One needs only to be reminded that vision results from effluences in the form of images similar to the objects that give them off.¹³⁶⁾ This theory of effluences and pores was borrowed from Empedocles. The contrary has been asserted,¹³⁷⁾ but it is to me inconceivable

¹³³⁾ Cp. *de Sensu* 1 and 3.

¹³⁴⁾ Cp. ἀλλόχρως *ibid.* 50 and 54, and see n. 113 above. We have repeatedly shown that this principle did not conflict with the dictum ὁμοιον ὁμοίῳ.

¹³⁵⁾ See above, n. 118.

¹³⁶⁾ Theophr., *de Sensu* 50 ὁμοσχημονεῖν τοῖς ἀποτυπουμένοις. Cp. Usener, *Epicurea* p. 220, 25.

¹³⁷⁾ Diels, Ueber Leukipp und Demokrit, in *Verh. der 35. Versamml. deutscher Philologen etc.*, Stettin, 1880, p. 104, n. 28; and Zeller, Zu Leucippus, *Archiv für Gesch. der Philos.*, XV., 137 foll. Diels lays stress on the point that the theory of pores is absurd on the assumption of a *plenum* such as Empedocles posited, whereas it has meaning on the Atomic assumption of a void. But this is not so certain. The assumption of a void and the postulate that all interaction is by impact render absurd the system of

that the theory should have originated with a philosopher who, like Leucippus, believed that *all* matter was homogeneous. The theory of *μίξις*, with its corollaries, the homogeneous effluences and pores, and atoms of specific shapes and consequently of specific characters, is an incongruous survival in Atomism from the philosophies of Parmenides and Empedocles. And from these philosophies comes with the doctrines in question the implication of interaction between similars. Theophrastus himself had a lurking sense that Democritus's theory of sensation involved the principle *ἴσμιον ὁμοίῳ*,¹³⁸) thus yielding the last defense of *ἀλλοίωσις*.

We come now to Diogenes of Apollonia, the latest philosopher whom we shall study in detail. Diogenes himself has much to say of *ἐτεροίωσις*,¹³⁹) and Simplicius cannot help marvelling¹⁴⁰) that while he regards all particular things as modifications (*ἐτεροιώσεις*) of air, he maintains the eternity and immortality of the element, only the variations arising and passing away. His surprise is in no small degree due to his Peripatetic preconceptions; for, with Aristotle, Simplicius doubtless understood *ἐτεροίωσις* as *ἀλλοίωσις*. Diogenes however distinctly taught that the differentiations of the

special effluences fitting into specific pores. Ho wabsurd this assumption becomes may be seen in Epicurus, *Epist. ad Herod.* 47 ὅθεν καὶ τάχῃ ἀνυπέρβλητα ἔχει (sc. τὰ εἶδωλα), πάντα πόρον σύμμετρον ἔχοντα. This is not the place to argue the question at length; but this consideration seems decisive.

¹³⁸) See the discussion *De Sensu* 49, and in 50 τὰ γὰρ ὁμόφυλα μάλιστα ἔκαστον γνωρίζει. Yet Sext. *Empir.* VII. 117 ἀλλ' ὁ μὲν Δ. ἐπὶ τε τῶν ἐμψύχων καὶ ἀψύχων ἴστησι τὸν λόγον κτλ. seems to suggest that Democritus, contrary to the doctrine of Plato, limited it to animals and things inanimate, excluding man.

¹³⁹) See fr. 2 and 5.

¹⁴⁰) Simplic., *Phys.* 153, 17 θαυμαστὸν δὲ ὅτι, κατὰ ἐτεροίωσιν τὴν ἀπ' αὐτοῦ (sc. ἀέρος) λέγων τὰ ἄλλα γίνεσθαι, αἰδίων ὅμως αὐτό φησι λέγων (fr. 8)· 'καὶ αὐτὸ μὲν τοῦτο καὶ αἰδίων καὶ ἀθάνατον σῶμα, τῷ δὲ τὰ μὲν γίνεται, τὰ δὲ ἀπολείπει'. All this proceeds on the principle, emphatically affirmed in fr. 2, that in order that there may be interaction the world must be in substance one, as only like reacts on like. Theophrastus does not attribute to Diogenes interaction of dissimilars (see *de Sensu* 39), though the function of contrast in perception is referred to (*ibid.* 42). The dependence of Diogenes on Empedocles appears in his use of *σύμμετρα* (*ibid.* 41 and 42), which probably involved the theory of pores and effluents.

elemental air were mere changes in extension and mass, effected by rarefaction and condensation.¹⁴¹⁾ It is reported, to be sure, that this involved qualitative change, and the terms are those of the traditional ἀλλοίωσις;¹⁴²⁾ but we must bear in mind that Theophrastus was thoroughly imbued with the spirit of Aristotle, who, as we know, scented this conception wherever there was a monistic system and wherever recourse was had to rarefaction and condensation.

We thus meet once more the system of Anaximenes with certain important points of difference. The most significant difference is this, that whereas Anaximenes had not expressly declared the *unity* of the elemental substance, Diogenes as the epigone felt constrained to do so. Interpreting this declaration, as he was prone to do, as involving the Eleatic notion of absolute unity and homogeneity, Aristotle could conceive of difference within it only as *arising by qualitative change*. But Diogenes did not so understand unity, asserting that it *included*¹⁴³⁾ difference.

Again, Anaximenes had made some concession to popular ideas in recognizing the *maxima mundi membra* as in some degree characteristic stages of existence. This is not at all surprising since even the Atomists and Epicurus, with far less theoretical justi-

¹⁴¹⁾ Laert. Diog. IX. 57. This is due to κίνησις αἰδίου, as with Anaximenes; cp. Strom. 12, Dox. 583, 2 foll.

¹⁴²⁾ Simplic., Phys. 25, Dox. 477, 8 τὴν τοῦ παντός φύσιν ἀέρα . . . ἐξ οὗ πυκνουμένου καὶ μανουμένου καὶ μεταβάλλοντος τοῖς πάθεσι τὴν τῶν ἄλλων γίνεσθαι μορφήν. Zeller I. 264 speaks of 'qualitative Veränderung' on the strength of this passage. Diogenes himself (fr. 4) says ἔστι γὰρ πολύτροπος (sc. ὁ ἀήρ; naturally the Peripatetics say εὐαλλοίωτος), καὶ θερμότερος καὶ ψυχρότερος καὶ ξηρότερος καὶ ὑγρότερος καὶ στασιμώτερος καὶ ὀξυτέρην κίνησιν ἔχων, καὶ ἄλλαι πολλὰ ἑτεροιώσεις ἐνεῖσιν καὶ ἡδονῆς καὶ χροτῆς ἄπειροι. The word πολύτροπος here means 'varied' implying not *change* but *difference*. The cold and the hot are of course synonymous with the dense and the rare; the dry and the wet (earth and water, for example) are likewise, and the stationary and the moving are also to the mind of Diogenes inseparably connected with the same. There remain tastes (or odors?) and colors. How did he conceive of them? Certainly he thought of each as determined by its specific constitution, though it is not clear whether he posited mixed ingredients or stated all differences *immediately* in terms of rare and dense.

¹⁴³⁾ See ἐνεῖσι in the preceding note. Cp. n. 34.

fication, did the same. Diogenes apparently did not so; for he seems to have combatted the notion of the four 'elements'.¹⁴⁴) He asserts that no two beings are wholly alike, each occupying a place apart in the graduated scale of tenuity and density,¹⁴⁵) seeing that if they were wholly alike they would be identical. Here then we find in a rather striking doctrine the logical consequence of the Eleatic identification of the $\xi\nu$ and the $\delta\muοιον$. Yet Diogenes appears to have been somewhat inconsistent in his theory of perception; for, according to Theophrastus, *de Sensu* 39 *fol.*, he recognized the principle of mixture in the constitution of man as affecting sense. This doctrine presupposes aggregates of somewhat stable and determinate character, sufficiently unlike to make it necessary to bridge the chasm between them, on the principle $\xi\muοιον\ \delta\muοίω$, by a mixture that would bring them together. Thus Diogenes has his affinities also with the $\muίξις$ -doctrines of Empedocles and Anaxagoras; but there is no proof of $\alpha\lambda\lambdaοίωσις$ in the sense of Aristotle.

¹⁴⁴) Fr. 2.

¹⁴⁵) Fr. 5.