XX
The Neo-Ionian World Picture

(a) *Scientific explanation*

The Eleatic philosophers had argued that nothing can ever be generated or destroyed, that nothing can ever alter, that nothing can ever move—and that, were change possible, there would be no reason why it should ever occur. In this chapter I shall discuss the neo-Ionian response to those perturbing conclusions; and I begin with the last: could the neo-Ionians explain change, if change should prove to be possible?

The Peripatetics gave the verdict to Elea. Of Empedocles Aristotle writes:

> And at the same time he gives no explanation of the change itself [i.e. of the change from the rule of Love to that of Strife], except to say that it occurs thus by nature *(houtôs pephuke):*
>
> > But when Strife grew great in the limbs, and rose to office as the time was accomplished which had been fixed in alternation for them by a broad oath **[B30]**
>
> —that it is necessary for the change to occur; but he gives no explanation for the necessity (**332:** *Met* 1000b12–17).[1]

Eudemus faults Anaxagoras not only because he says that motion which did not before exist begins at a certain time, but also because he omits to say anything about its continuing or future cessation, though the matter is not evident. For,' he says, 'what prevents mind from determining at some time to stop all things, just as, according to him, it determined to move them?' (**341:** Eudemus, fr. 111 W=**59 A 59**).

And of the Atomists:

> About motion—whence or how it belongs to existent things—these men too, like the others, lazily shelved the question (**342:** *Met* 985b19=**67 A 6**). Whence the principle of natural motion comes, they do not say (**343:** Alexander, **67 A 6**).

In detail these criticisms presuppose Peripatetic doctrine, but behind them there lies a simple question: *Why* does Strife give way to Love and vice versa? *Why* does mind start the cosmogony rolling? *Why* do the atoms move?

The case of Empedocles is complicated, and it raises no issue which does not arise in the other two cases; hence I shall consider only the criticisms of Anaxagoras and of the Atomists. According to Anaxagoras, all things were motionless up to the cosmogonical

instant *t;* then, at *t*, mind began to move stuffs and to create the cosmos. Eudemus' question, which has evident Eleatic ancestry, is just this: Why *t*? The question is ambiguous: it may mean either 'What feature of the world before *t* brought it about that mind acted at *t*?' or else 'What feature of the world at *t* gave mind its reason for creating at *t*?' But on both interpretations the question seems fatal: before *t*, there was no change and there were no events; any two times, *t*1 and *t*2, prior to *t* were quite indistinguishable. Suppose, then, Anaxagoras suggests that the state *S*, holding at *t-n*, caused mind's creation at *t*, or was mind's reason for creating at *t;* then, by way of an argument already familiar, we can infer the absurdity that for any t_i prior to *t*, mind created at t_i. For *S* obtains at every instant up to *t;* hence it obtains at $t_i - n$; and if *S*'s obtaining at *t-n* brings it about that mind creates at *t*, then *S*'s obtaining at $t_i - n$ brings it about that mind creates at t_i.

The argument is not, in fact, lethal. Anaxagoras has more than one answer.[2] First, he may deny that there is any time earlier than *t* at which mind could have created things: take a Peripatetic leaf from your opponents' book, and hold that time implies change; infer that before *t*, the first instant of change, there was no time: how, then, could mind have created the world before *t*? The state *S* at *t* itself caused mind to embark on its cosmogonical operation; and since there was no t_i prior to *t*, the *reductio* argument does not begin. Was there a time before the creation? The question was hotly debated by later philosophers, and it is too deep and difficult to be discussed here. It is worth saying, however, that many philosophers have taken the view I have offered to Anaxagoras, and that it is not simply silly.

Second, Anaxagoras may reject the Universalizability of Explanation. Suppose that *S* at *t-n* explains creation at *t;* why infer that *S* at t_i-*n* requires creation at t_i-*n*? Why not take it as a brute fact that *S* is effective at *t-n* but not at t_i-*n*? A cigarette lighter sometimes flames when the cap is flicked, and when it does, the flicking causes the flaming. But not every flicking, as ordinary experience confirms, causes a flaming. This second answer of Anaxagoras' has also had adherents: it, too, raises difficult questions; and it, too, is far from being captious or silly.

Third, Anaxagoras may reject the Principle of Causality: that 'every event has a cause' is an unargued dogma; it has no basis in experience where, for all that we know, countless events and states are uncaused; and it is not an *a priori* truth, for we can easily conceive of an undetermined event. (Physicists who believe in sub-atomic indeterminacy conceive of such events daily; and if their belief is true then a myriad of events do really lack causes.) Elea asks: Why does cosmogony start at *t*? Anaxagoras answers: Mind moves things at *t*. The Peripatetics come to the defence of Elea: 'You explain why cosmogony *starts*, but not why it starts *at t;* for why does mind begin its operations at *t*?' And Anaxagoras in effect, says: For no reason. I can see nothing philosophically disreputable in his retort.

The Atomists are committed to the Principle of Causality and cannot countenance uncaused events. How, then, can they explain 'whence and how motion belongs to the things that exist'?

Their explanation is simple: atom *a* moves because it was struck by moving atom *b*. An infinite regress opens up; for if there were a first moment of motion, then the first atomic motion would be inexplicable, since it could not have been occasioned by

collision with a moving atom.[3] But the regress is not vicious; and it was explicitly embraced by the Atomists:

> Leucippus and Democritus say that the primary bodies [i.e. the atoms] are always moving in the unlimited void (**344:** Aristotle, *Cael* 300b8=**67 A 16**);

and in the doxography eternal motion is a standing characteristic of the atoms (see above, p. 365). Since the atoms are always in motion, each atomic trajectory was preceded by, and may be explained in terms of, an atomic collision: *a* moves because *b* hit it; *b* moved because *c* hit it; and so on. And that is all there is to say; every atomic locomotion, and hence every natural change, is equipped with an explanation.

> Aristotle was not satisfied.
>
> They should say what motion it is and what is their natural motion **(345),**

he grumbles in the *de Caelo* (300b9–10=**67 A 16**). But the Atomists do say a fair amount about the nature of atomic motion; and they implicitly deny that atoms have any 'natural' motion: all atomic motion is, in Aristotelian jargon, violent, *biaios*. The *Metaphysics* adds another criticism:

> Some—e.g., Leucippus and Plato—suppose an eternal activity; for they say that motion always exists. But they do not say why or what, nor the explanation of why it is thus or thus (**346:** 1071b31–3=**67 A 18**).

It is the first 'why' that bears the weight; it is repeated in the *Physics:*

> In general, to think that it is a sufficient principle to say that it always is or comes about thus, is to hold a mistaken belief; Democritus reduces the causes of nature to this state, saying that earlier things also happened thus, but he does not think to look for acauseofthe 'always' (**347:** 252a32–b1=**68 A65;** cf *GA* 742b17–29).

There are, I think two ways of construing Aristotle's criticism. The first fits **346** better: 'Any individual atomic motion can perhaps be explained; but the explanation implies eternal atomic motion: and why do atoms move eternally?' To that question Democritus has an entirely adequate answer, and his answer has an important generalization. All atoms move eternally provided that every sentence of the form '*a* moves eternally' is true; and '*a* moves eternally' is true provided that every sentence of the form '*a* moves at *t*' is true. Now every sentence of this last form is, by hypothesis, true; and the fact it expresses is in every case explicable by way of some sentence of the form '*b* struck *a* in fashion ϕat *t-n*'. In this way the eternity of atomic motion is explained; for every fact necessary for the occurrence of eternal motion has been explained. It is worth looking at the argument schematically. The *explanandum* is:

(1) For every object, *x*, and time, *t*, *x* is moving at *t*. For every case of (1), there is available, in theory, a truth of the form:

(2) *a* moves at t_i because *Q*.

Hence (1) itself is explained. In general, we explain why everything is ϕ if we explain, in the case of every individual, why it is ϕ: All the people I invited to the party stayed away. Why? One was ill, one forgot, one couldn't stand the thought of another party, and so on; once individual explanations for each invited friend are given, the complete vacuity of my party is explained. It is absurd for me to accept all these individual excuses and still ask why *everyone* stayed away, as though that were a further question. The case is analogous to the explanation of conjunctive facts: Why is the grass so long and wet that the mower won't cut it?—It is long because it hasn't been cut for two weeks; it is wet because last night's dew has not had time to evaporate. There is no room for the further question: Why is it long *and* wet?

The second interpretation of Aristotle's criticism seems to fit the *Physics* passage quite neatly. Suppose that atom *a* moves with velocity *v* at *t*. Why so? Because, Democritus answers, *b* collided with it at *t-n*, and the velocities of *a* and *b* at *t-n* were v^a and v^b. But what makes that an *explanation* of *a*'s velocity at t? Well, 'it always …comes about thus'; i.e., whenever an atom of the same type as *b* moving at v^b strikes an atom of the same type as *a* moving at v^a, its subsequent velocity is *v*. But why is *that* the case? Democritus offers no answer: 'he does not think to look for a cause of the "always"'.

That is an entirely different criticism from the former one. In effect, Aristotle ascribes to Democritus a regularity theory of explanation; and he rejects it as inadequate. Democritus explains individual causal links in terms of universal regularities; but he does not think to explain those regularities. *E* occurs because *C* occurs. Behind this there lies a regularity: every *C*-type event is followed by an *E*-type event. That regularity may, in a sense, be explained; for it may be subsumable under a higher regularity: every *C*-type event is a *C*1-type event; and every *C*1-type event is followed by an *E*-type event. And *C*1 may give place to *C*2, and so on. But the regress cannot be infinite; for the ways of specifying atomic events are finite. Thus there will be some ultimate regularity which evades explanation.

Aristotle may mean no more than that Democritus did not push his explanations far enough: he was satisfied with low-level regularities and did not attempt to construct high-level laws. And that criticism was doubtless justified. But I suspect that Aristotle intends a more profound criticism: regularity as such, he thinks, requires explanation; and Democritus cannot satisfy that requirement, since he has nothing but regularities to appeal to. No doubt Aristotle requires a ideological account of natural regularities: things regularly happen thus because it is good that they should so happen. But here again, the Atomists are right: even if teleological explanation has a place in natural science, it is far from clear that every natural regularity is ideologically grounded; and I see no reason for believing that there is anything ultimately unsatisfying about the notion of an inexplicable regularity.

The first round goes to the neo-Ionians: even with Aristotle on their side, the Eleatics lose the fight.

(b) *Locomotion*

Empedocles and Anaxagoras accepted the Eleatic *plenum* and attempted to insinuate locomotion into it; the Atomists boldly defended a universe riddled with vacancies, and thereby dulled the edge of Melissus' logical razor: has Melissus any reply to either of their suggestions?

Antiperistasis does, I believe, show that locomotion in a *plenum* is possible; and to that extent Melissus' arguments fail. And if the Atomists are successful in their defence of the void, then the arguments are inapplicable. But Melissus, I think, should not have been unduly dismayed by either of these facts; for his arguments constitute what is, logically speaking, an unnecessarily devious manoeuvre. Consider any volume of space, *V*, whether full or pitted with void; and suppose that some of the occupants of this space move between *t*1 and *t*2. Suppose that, at *t*1, the occupants are arranged in a pattern *P*1, and that at *t*2 they are arranged in *P*2. Now it may be that *P*1=*P*2; and indeed, it may be that at every instant t_i between *t*1 and *t*2 P_i=*P*1: locomotion does not strictly imply any change in pattern, as Aristotle's spinning tops indicate. But such a changeless locomotion is no good to the neo-Ionians: if the only locomotion the universe may undergo is of that sort, then plainly locomotion cannot lead to the minglings and collisions which in neo-Ionian physics explain the diverse appearances of the world. Moreover, if *V* is the whole of space, and if at any t_i, P_i=*P*1, then it is plausible to infer that the occupants of *V* do not move at all; for none of them ever changes its position relative to anything else.

If locomotion entails change of relative position, Melissus is home. Formally, his argument runs like this: 'Suppose, as before, that there is locomotion in *V* between *t*1 and *t*2. Then there must be some volume *V*1, whose inhabitants are rearranged between *t*1 and *t*2; i.e., there must be some t_i between *t*1 and *t*2 such that $P_i^1 \neq P_1^1$. But rearrangement, or *metakosmêsis,* is a kind of alteration; and the general argument against alteration shows, as Melissus explicitly points out, that *metakosmêsis* is impossible. Therefore locomotion is impossible. Void or no void, motion involves rearrangement; void or no void, motion is logically absurd.'

I do not know whether Melissus saw that point: he does not make it expressly, though his particular attention to *metakosmêsis* leads me to suppose that it was not far from the surface of his mind. I do not think that any neo-Ionian got a glimpse of the danger, or took any evasive action. And evasive action is necessary: if the neo-Ionians hope to do away with alteration and retain locomotion, then Melissus has thwarted their hope before it was expressed; and if they intend to admit alteration by grounding it on locomotion, then Melissus has proved their intention topsy-turvy—before they can vindicate locomotion they must defend alteration. In either case, victory goes to Melissus: only if the neo-Ionians can defeat him on alteration will they obtain their mobile world.

What of the void? The Atomists argued that there is empty space, on the grounds that there is no more reason for there to be body than for there to be space. Melissus will hardly accept that: after all, he has provided a reason against the existence of the void, and the Atomists have done nothing to discountenance it. The Atomists agree with Melissus that no substance has vacuous parts: Abderite bodies, like Melissan bodies, are full, massy, or solid. But Melissus has argued that any existent body is spatially infinite;

hence there is no empty space outside his body. And if vacancy can be found neither within nor without body, vacancy cannot be found at all. Melissus may accept the distinction between existence1 and existence2 (above, p. 404); but he has no reason to accept the exist ence2 of void.

Here, too, Melissus wins the fight. But here his victory is only a technical one: the Atomists should have attacked his argument for the spatial infinity of body; they did not do so, but they could have done so with little difficulty. For that argument is perhaps the weakest link in Melissus' deductive chain.

(c) *Alteration*

Alteration, it might appear, is the key to the neo-Ionian treasure chest: give them that, and they will show us again the familiar world of changing phenomena; withhold it, and they cannot even describe a mobile world. Alas, the neo-Ionian attitude to alteration yields no satisfaction at all: either they were discreetly taciturn, or fate has chosen to hide their wisdom from us; at all events, we can learn remarkably little about this crucial issue. I shall briefly survey the few facts that do present themselves.

> First, Anaxagoras. According to Aristotle, He states that coming to be and being destroyed are the same as alteration (**348:** *GC* 314a 13=**59 A 52**).

Some scholars find an original fragment lurking in this sentence; but that is improbable.[4] In any case, the purport of the sentence is quite obscure: does it mean that Anaxagoras held on to alteration and explained generation in terms of it? Or does it rather imply that, in conflating generation and alteration, he abandoned the latter along with the former? Some look to **B 10** for a general rejection of alteration; but the fragment cannot be taken in that way (below, p. 437). Nor will general considerations of Anaxagorean physics help us. Take a pint of water and freeze it: has it, according to Anaxagoras, lost one set of qualities and acquired a new set? Is there something which was fluid and is now solid? which was transparent and is now opaque? Or is it rather the case that the stuff has had all its qualities all along, now manifesting one set, now another? And if that is so, is not its coming to manifest a different set of qualities in itself an alteration in the stuff? There is no advantage in pursuing these questions: as far as we know, they were never posed by Anaxagoras.

The Abderites fare a little better: atoms are unequivocally immutable (above, p. 346); so that if there is any alteration in the Abderite world, it can only occur at the macroscopic level. And atomic motions are said to account for macroscopic changes:

> Democritus and Leucippus, having made their shapes, make alteration and generation from them: generation and destruction by association and dissociation, alteration by order and position (**349:** Aristotle, *GC* 315b6–9=**67 A 9**).

The Atomists ascribe locomotion to their atoms:

> and this is the only *kinesis* they give to the elements, reserving the others for the compounds; for they say that things grow and diminish and change and come into being and perish as the primary bodies congregate and separate (**350:** Simplicius, **68 A 58**).

But what exactly are these macroscopic changes? Does freezing water change from being transparent to being opaque? Does grass in high summer change from green to brown? Transparency and opacity, green and brown are not 'real' qualities; they exist only 'by convention' (above, pp. 370–77). Then perhaps the changes are similarly unreal, occurring only 'by convention'. Does the world contain *apparent* changes from green to brown, or *genuine* changes from apparent green to apparent brown? As far as I can see, the Abderites did not pose these questions; nor did they grasp the importance of alteration in the neo-Ionian answer to Elea.

Of Empedocles we hear a little more; but that little is hardly satisfying. Once, Empedocles seems to allow that his 'roots' may alter:

> …running through one another, they become different-looking (*alloiôpa*): such is the change that mixture makes (**351:31 B 21**.13–14).

But the corresponding lines in **B 17** are significantly different:

> …running through one another, they become different things *(alla)* at different times and are always absolutely homogeneous (**352: B 17**.34–5).

Aristotle perhaps has this last phrase in mind when he argues that, according to Empedocles, the elements are 'preserved *(sôzomena)*' when they mingle to form compounds (*GC* 337a29=**A 43**). And Philoponus expands the point critically:

> He contradicts the phenomena when he does away with alteration which evidently occurs, and himself when he says on the one hand that the elements are immutable and that they do not come from one another but the other things come from them [=**B 17**.35], and on the other hand he says that when Love is in power they all become one and form the Sphere which is qualityless [cf., e.g., **B 35**.5], since in it is preserved the characteristic property *(idiotês)* neither of fire nor of any of the other [elements], each of the elements losing its own form **(353: A 41)**.

There are thus two related criticisms of Empedocles: he expressly makes his elements 'always absolutely homogeneous' or immutable; yet first he holds that at the time of the cosmic Sphere there is just *one* mixed stuff in the universe; and, second, he says that during the periods of cosmic growth and decay the elements 'become different-looking'. I think that Empedocles is undeniably confused on both these counts; and I see no plausible answer to the first charge of inconsistency. But it is the second charge that is more interesting here: what should Empedocles have said about the status of macroscopic alteration?

First, he might have said that his elements, like Abderite atoms, never alter: no quantity of fire ever loses any of its characteristic qualities or ever gains any extra properties; masses of fire may split or coagulate, mix, mingle and associate with other elements; but no bit of fire ever alters. When Empedocles says that fire 'becomes different-looking' or 'different things', he is speaking with the vulgar, not with the learned (cf. **B 9**.5), and we should not charge him with strict inconsistency.

Yet that defence leaves us uneasy: what, after all, happens when we vulgar speakers say that Socrates grows pale? Not, admittedly, an alteration in any constituent element of Socrates; but surely the mixed mass of elements which we vulgarly call a man alters? Surely that particular volume of stuff, considered as a whole, changes in colour? Does Empedocles mean to deny this? Would he say that Socrates does not really change at all? and would he explain this by a theory of sensible qualities Abderite in tone? Again, we simply do not know.

These animadversions on the neo-Ionian attitude to alteration may seem a trifle crotchety or at least ungenerous. Yet it does appear to be the case that the neo-Ionians were careless and cavalier in their account of alteration: locomotion and generation engaged their close attention; but they failed to see the strength and cohesion of the Eleatic position—of the Melissan version in particular—and they made no attempt to come to grips with the neat argument by which 'change in bright colour' was allegedly abolished.

But after all, the Eleatic rejection of alteration is firmly based on their rejection of generation; and it will be said, reasonably enough, that if the neo-Ionians saw a route to the defence of generation they may properly have taken the defence of alteration for granted. I turn, therefore, to generation.

(d) *Generation*

Empedocles is forthright and plain:

> [Mortal men are] fools; for their thoughts are not deep, since they think that what before did not exist comes into being, or that something dies and is completely destroyed **(354:31 B 11)**.

That Eleatic conclusion was based on Eleatic reasoning; for **354** must originally have been followed by **B 12:**

> It is impossible for anything to come into being from what is not; and it is unattainable and unaccomplished for what exists to perish; for wherever anyone ever takes a stand, there it will always be **(355)**.[5]

The argument is cribbed from Parmenides, **156**.7–9. (Empedocles' argument against destruction is presented in a corrupt text: no emendation I know of gives a sense which is both clear and interesting.)

Anaxagoras holds the same Eleatic view: 'No thing comes into being or is destroyed' **(59 B 17)**. And he too probably adopted the Parmenidean argument; for

> He held the common opinion of the natural scientists to be true—that nothing comes into being from what is not (**356:** Aristotle, *Phys* 187a27–9=**A 52;** cf. Aëtius, **A 46**).

Some scholars catch the Eleatic scent in **B 10** which asks, rhetorically, 'How could hair come into being from non-hair, or flesh from non-flesh?' **(212)**. Aristotle appears to connect the view implicit in **B 10** with 'the common opinion of the natural scientists'; and we can make sense of the connexion. Suppose that the general principle lying behind **B 10** is:

(1) If something *F* comes into being from *a*, then *a* is *F*. Evidently, (1) is closely related to the Principle of Synonymy which I have already discussed (above, pp. 88, 118). A special case of (1) is:

(2) If something existent comes into being from *a*, then *a* is existent. And (2) can be read as bearing on the Parmenidean problem of 'absolute' generation; for it effectively denies the possibility of generation 'from what is not'.

Unfortunately the application is un-Eleatic and pointless. It is un-Eleatic because in (1) the phrase 'from *a*' marks *a* as the *source* of the *F* product; and in the Eleatic argument 'from *a*' is taken in a different sense. It is pointless because there is no way of moving from (2) to a rejection of generation; indeed, (2) comes uncomfortably close to rehabilitating generation. The purpose of (1) is to indicate that *F*s are produced from other *F*s; why, then, cannot (2) be taken to indicate that generation is possible, provided that existents are produced from other existents? At the very least Anaxagoras needs to argue that generation 'from what is' is impossible; and there is no hint in our texts that he ever did that. Thus I do not believe that **B 10** has any bearing on generation (for my reading of it see above, p. 333); and I suspect that Anaxagoras, like Empedocles, simply adopted the orthodox Parmenidean argument for his own.

In two respects, however, the accounts of generation in Anaxagoras and Empedocles do go beyond anything in Parmenides. First, they both reject 'epigenesis', the theory that there might come into being new things in addition to the present ungenerated furniture of the world. Here is Anaxagoras' argument:

> And when these things are separated out in this way, you must know that all of them are in no respect less nor more (for it is not possible to have more than all), but all are always equal **(357: B 5)**.

Thus: 'There can never be more than all the things there are; so things will always be equal in number.' Both the premiss and the conclusion of this argument are 'untruisms' (above, p. 167). The premiss may be glossed by either of:

(3a) For any time *t*, if there are exactly *n* things at *t*, then there are no more than *n* things at *t*.

(3b) For any times *t* and *t'*, if there are exactly *n* things at *t*, then there are no more than *n* things at *t'*.

And the conclusion may be glossed by either of:

(4a) For any time *t*, the number of things existing at *t*=the number of things existing at *t*.

(4b) For any times *t* and *t′*, the number of things existing at *t*=the number of things existing at *t′*.

Anaxagoras is certainly not entitled to (3b), so it is natural to take his parenthetical premiss as (3a); he is hardly interested in the trivial conclusion (4a), so it is natural to take his conclusion to be (4b). Now (3a) does not entail (4b); but (3b) does: Anaxagoras surreptitiously mates the truth of (3a) with the powers of (3b), and produces a logical monster.

Empedocles' argument against epigenesis goes like this:

> And in addition to these [sc. the four roots, (?) and Love and Hate], nothing comes into being or declines. For if they perished outright they would no longer exist. And what could increase this totality? And whence could it come? And where could it be destroyed, since nothing is empty of these? (**358: B17**.30–3).

The argument is not pellucid;[6] but the following gloss seems possible. 'Suppose that at *t* some new root *R* comes into existence, and suppose that there is an empty space for *R* to occupy at *t*. Since at present the four roots occupy all the space there is, some of them would have to have perished before *i*, to make room for *R;* and it is impossible for the roots to perish. Hence there is no empty space at *t* for *R* to occupy; thus *R* cannot be added to the universe at *t;* nor, for that matter, can it come *from* anywhere or pass away *to* anywhere.'

The argument presupposes Empedocles' rejection of 'the void' or empty space **(287);** and its last two clauses are jejune, reminiscent of Epicharmus' satire rather than of Parmenides' philosophy. But those points apart, the argument is sound; and it makes a mildly interesting addition to the Eleatic armoury. What is its purpose? Why argue specifically against epigenesis when you have a general argument against generation as such? Perhaps Empedocles indulged in the following train of thought: 'Parmenides' argument shows that if *a* exists, then *a* was not generated, and hence that none of the present furniture of the world can have come into being; but he has omitted to show that the present furniture cannot be augmented; and I shall repair the omission.' But that is a poor line of thought: Parmenides' argument does not apply simply to present existents.

The second respect in which Empedocles and Anaxagoras went beyond Parmenides reflects their greater consideration for the common man and his common language.[7] I have already quoted a sentence from **59 B 17;** here is the whole fragment:

> The Greeks do not think correctly[8] of coming into being and being destroyed; for no thing comes into being or is destroyed, but it is from existing things that things are commingled and separated out. And in this way they would correctly call coming into being commingling and being destroyed separating out **(359)**.

In place of the generation of new items Anaxagoras offers us the rearrangement of old items; instead of the destruction of existent items Anaxagoras offers us the rearrangement of their parts.

There is a similar passage in Empedocles:

> I will tell you another thing: there is birth *(phusis)* for none of all mortal things, nor is there an end in doleful death; but there is only mixing and interchange of what is mixed—and the name of birth is applied by men to this **(360:31 B 8)**.[9]

Again:

> And when they [sc. the four roots] are mixed in the shape of a man† and come into the light,† or in the shape of a kind of wild beast or of plants or of birds, then (?) they say that this comes into being (?); and when they [sc. the roots] are separated apart, this again [they call] wretched fate: (?) they do not name them as is right (?) but I too myself comply with the custom (**361: B 9;** cf. **B 10, 15, 35**).

The text of **361** is desperately corrupt;[10] but its general drift is clear enough: like Anaxagoras, Empedocles is offering us comminglings and separations in place of generations and destructions.

Men talk of 'generation' and 'destruction': according to Parmenides, such talk is mere verbiage (**156**. 40); Anaxagoras and Empedocles agree that the talk is necessarily false, but they assert that it is readily translated into an unobjectionable idiom: replace '*a* is generated' and '*a* is destroyed' by 'comminglings and separations of such and such a sort occur'. And Empedocles at least is prepared to 'comply with the custom' and speak with the vulgar: 'It is impossible, even in the most rigid of philosophic reasonings, so far to alter the bent and genius of the tongue we speak, as never to give a handle for cavillers to pretend difficulties and inconsistencies. But a fair and ingenuous reader will collect the sense from the scope and tenor and connexion of a discourse, making allowance for those inaccurate modes of speech which use has made inevitable' (Berkeley, *Principles* §52).[11]

Philolaus and the Atomists differ from Empedocles and Anaxagoras in the matter of generation. In **277,** Philolaus asserts that 'the things that exist…have come into being'; and nothing forbids us to take this text at its face value. Leucippus set up his system precisely in order to defend generation and destruction; for:

> He thought he had arguments which, by saying what agreed with perception, would not do away with either generation or destruction or motion and the plurality of existent things (**362:** *GC* 325a33–5=**67 A 7**).

Philolaus' principles, and the Abderites' corpuscles, are ungenerated and indestructible; but the macroscopic objects of the world which come from the principles and are constituted by the corpuscles can and do come into existence and cease to exist.

In Philolaus' system, macroscopic entities are generated by a harmonizing *(harmozein)* or arranging *(kosmein)* of the elements; and it is reasonable to suppose that he hoped to immunize generation against the Eleatic disease by explaining it in terms of the interconnecting of the ungenerated elements. Thus '*a* is generated' may be true; but

its truth conditions are given by some proposition of the form '*b*1 and *b*2 are harmonized'. The same account is explicitly ascribed to the Atomists:

> If generation is the association of atoms and destruction their dissociation, then generation will be alteration (**363:** Simplicius, **68 A 37**).
>
> These atoms, separated from one another in the unlimited void and differing in shapes and sizes and position and order, travel in the void and overtake and strike one another; and some rebound wherever it chances, but others catch onto *(periplekesthai)* one another by virtue of the symmetry of their shapes and sizes and positions and orders, and stay together *(summenein),* and in this way the generation of composites is achieved (**364:** Simplicius, **67 A 14**).

Empedocles and Anaxagoras deny that anything is ever generated: the process we habitually call generation is, they say, in fact a commingling of ungenerated stuffs. Philolaus, Leucippus and Democritus, on the other hand, hope to save generation: things, they say, certainly are generated and destroyed; but generations and destructions are in fact comminglings and dissolutions of one sort or another. Consider the two sentences: *P*—'an *F* is generated'; *Q*—'*a, b, c,*…commingle in such a way as to take on an F-like appearance'. According to Anaxagoras and Empedocles, *P* is always false, *Q* sometimes true; and *Q* in fact describes the type of event men typically mean to refer to when they use *P*. According to Philolaus and the Atomists, *Q* is sometimes true; and *P* is equivalent to *Q;* so that *P,* too, is sometimes true.

That distinction may seem fairly trifling: after all, both parties 'reduce' generation to comminglings (and hence to locomotion); for both claim to account for the phenomena we usually refer to as generations by way of comminglings.[12] Yet there are at least two significant differences between the parties: one will emerge in the next section; the other I state briefly now. The Atomists' analysis of generation has certain formal similarities to Aristotle's; in particular, they, like Aristotle (above, p. 197), make generation *ex nihilo*, or creation, a self-contradictory notion. For *a* to be generated is for pre-existent entities to rearrange themselves: the sentence form '*a* was generated at *t* and nothing existed before *t*' is inconsistent. Now Empedocles and Anaxagoras are equally opposed to generation; and they too think that creation is logically impossible. But the impossibility in their case has Parmenidean roots: sever the stem of the Eleatic argument, show the objections to 'not-being' misguided, and creation becomes possible. If Elea were refuted, Empedocles and Anaxagoras might countenance creation: the refutation would have no such liberating consequence for the Atomists.

What, finally, would Melissus have said to all this? He would not have been impressed: 'Empedocles and Anaxagoras deny generation but accept locomotion; they thereby commit themselves, whether they like it or not, to alteration; and alteration entails generation. Their position is tediously inconsistent. Philolaus and the Atomists accept generation for non-elementary objects, and defend it by analysis in terms of commingling. They do not explain how their analysis constitutes a defence; and they do not indicate where they think the Eleatic arguments against generation fail. Their

position may not be internally contradictory; but it amounts to no more than an unargued rejection of Eleatic metaphysics.'

I have sympathy with Melissus' hypothetical retort; and I believe that the neo-Ionians never apprehended the power of the Eleatic deduction. Empedocles and Anaxagoras must drive a wedge between '*a* becomes *F*' and '*a*'s Fness comes into being'. I do not see how they can do that. Philolaus and the Atomists must point to the flaws in Parmenides' argument: flaws there certainly are; but no Presocratic put his finger upon them. The neo-Ionians threw off the intellectual paralysis with which Parmenides had threatened Greek thought: they manfully attempted to tread again the scientific road, and they took many progressive steps even if their feet remained shackled by Elea. And of course the neo-Ionians are more right than the Eleatics: things do move, they do alter, they are generated. For all that, the neo-Ionian revival is fundamentally a flop: it does not answer Elea.

(e) *Ontology*

Generation and existence are connected by the tightest of conceptual bonds: to be generated is to come into existence; if *a* is generated at *t*, then *a* exists immediately after *t*. Thus anyone who holds that '*a* is generated' is always false must maintain that '*a* exists' is true only if *a* is eternal—ungenerated and indestructible. Now philosophers, evidently, are not eternal; nor can they be generated, according to Empedocles and Anaxagoras: hence no philosophers exist. Do men, horses, trees, clouds, chairs, books exist? Empedocles and Anaxagoras must answer: No.

As far as we know, Anaxagoras did not recognize this consequence of his views; Empedocles perhaps did. At **31 B 17**.34 (**=B 26**.3) he says of the four roots:

> But these themselves exist; and running through one another they become different things at different times and are always absolutely homogenous (**365;** cf. **352**).

The words 'these themselves exist' translate *'aut' estin tauta':* one permissible paraphrase of the Greek is: 'these alone exist'.[13] If that paraphrase is right, Empedocles assigns existence to his roots and to nothing else. At least one ancient critic seems so to have understood Empedocles: Colotes, Plutarch's Epicurean opponent, asserted that in Empedocles' view men do not exist (Plutarch, *adv Col* 1113 AB). And it is worth quoting a fragment of Empedocles' younger contemporary, Ion of Chios. His philosophical work, the *Triagmos*, began as follows:

> The beginning of my account is this: all things are three, and there is nothing more or less than these three things **(366:36 B 1)**.[14]

We know almost nothing of Ion's philosophical stance; and it would be rash to put much weight on these words. Yet the obvious interpretation is this: apart from the basic primordial entities, nothing at all exists.

But can we really believe that Empedocles or Ion meant to deny the existence of chalk and cheese? Of course not: Empedocles means that there are no *elemental* stuffs other than the four roots; and Ion means that everything is made from just the three things that constitute his elements. Empedocles surely did not see what he was committing himself to in denying generation.

Philolaus and the Atomists have not the same need for a parsimonious ontology: macroscopic objects are generated; they may be ephemeral and yet existent. Philolaus explicitly asserts that macroscopic objects do exist; indeed, they are paradigmatically *ta eonta* (cf. **277**). Yet Philolaus distinguishes, I think, between the ontological status of his elements and that of their compounds. At all events, he uses, in **277,** the ordinary verb '*einai'* for the existence of ordinary things, but applies '*huparchein* (subsist)' to the elements; and while ordinary objects are designated *ta eonta*, the elements are *ta pragmata*. The difference in terminology may, I suppose, be merely an accident of style; yet I am inclined to think that it is deliberate: the difference in language is employed to signal a difference in fact. To see the point of this we may turn to the Atomists.

In discussing the Abderite divide between what exists *nomôi* and what exists *eteêi* I considered only the status of qualities on the *nomôi* side of the fence (above, pp. 370–7). And indeed all our authorities, with the exception of Plutarch, make *nomôi* entities exclusively qualities. Plutarch adds *sunkrisis*, 'combination', to the *nomôi* list. A *sunkrisis* is a macroscopic body, or atomic conglomeration: '*sunkrinein* (to combine)' is regularly used for the formation of complex bodies from the elementary corpuscles (e.g., **213,** Aristotle; Sextus, **68 A 59**); and elsewhere those bodies are called *sunkrimata* (e.g., Diogenes Laertius, IX.44=**68 A 1;** Galen, **A49**) or *sunkriseis* (e.g., Aëtius, **A 105**). Plutarch's gloss on *sunkrisis* is thus correct:

> And when [the atoms] come close to one another of fall together or intertwine, of the conglomerated masses one seems to be water, one fire, one a plant, one a man; and the atoms, which he calls *ideai*, are all that exist; nothing else does **(367:68 A 57)**.

Stuffs and macroscopic substances only *seem* to be *(phainesthai);* atoms alone really exist: water and men, fire and plants, stand on the *nomôi* side of the great divide.

The obscure philosopher Cleidemus gave the following account of lightning:

> There are some who, like Cleidemus, say that lightning does not exist but is an appearance *(phainesthai)*, suggesting that the occurrence is similar to what happens when one strikes the sea with a stick; for the water appears *(phainetai)* as flashing in the night. In this way when the moisture in the clouds is struck, the appearance *(phantasia)* of brightness is the lightning (**368:** Aristotle, Meteor 370a10–15=**62 A 1**).

Cleidemus' point is this: when water is struck with an oarblade, it cannot be supposed to undergo a genuine change of colour, or to emit a tongue of flame or the like; all that happens is that the water *appears* differently to the striker. Similarly, the lightning flash

is not a substance in its own right, nor yet a coloration of the clouds: what happens is simply that the cloud *appears* differently.

Why Cleidemus advanced this view we do not know; nor am I interested here in Cleidemus' meteorology. I cite the passage because it is echoed in the doxography on Leucippus:

> All things happen in accordance with *phantasia* and *dokêsis* and none in accordance with truth; but they seem *(phainesthai)* in the way of the oar in the water (**369:** Epiphanius, **67 A 33**).

The report is not clear, and the reporter is not worth much; yet behind his words there may lie an account of macroscopic items similar to the one which Plutarch ascribes to Democritus—they do not really exist.

At all events, the Atomists have a good argument for denying reality to macroscopic ephemera—not the Eleatic argument, which they cannot employ, but a reasoning of their own.

> Democritus says…that it is impossible for one thing to come from two or two from one (**223:** Aristotle, *Met* 1039a9=**68 A 42**).

Thus the interweaving *(periplokê)* of the atoms

> makes them touch, and be next to one another but does not generate any genuinely single nature whatever out of them; for it is absolutely silly to think that two or more things could ever become one (**213,** Aristotle).

Anything that truly exists is *one* thing, a unity; macroscopic objects are conglomerations of atoms; no conglomeration of objects can ever constitute *one* thing, a unity; hence macroscopic objects do not truly exist. That, I suppose, is the metaphysical foundation of the Atomists' view that macroscopic objects are unreal.

But why suppose that 'two or more things cannot become one'? As it stands, that proposition seems to be a trivial falsehood. Two or more things do frequently make one: a nib and a penholder make a pen; four limbs, a head and a torso make a body; engine and bodywork make a motor-car; and—in just the same way—many million corpuscles make a desk or a tree or a cloud. Most of the things we see are compounds in an evident way. That does not derogate from their unity: my pen is *one* thing, viz. one pen; it is a cohesive item with a unifying function; it shows no tendency to fall apart, atomize, or disintegrate. What could be more unitary than that?

Yet it would be wrong to dismiss the Atomist principle out of hand. Let us approach it obliquely. There is a classical conception of substance, originating with Aristotle, according to which substances are ultimate subjects of predication: things are said of them, they are not said of anything else. Substances are ontologically indispensable objects. In a more up-to-date jargon: 'If a complete account of what there is would need some substantival expression referring to the *F*s, then the *F*s are substances; but not otherwise'.[15] Non-substances may be said to exist or to 'have being'; but their existence is essentially parasitic upon the existence of substances. Pride, doubtless, exists: there is

such a thing as pride. But all talk about pride can be analysed, one would imagine, into talk about proud men; and for pride to exist is simply for there to exist men who are proud. Prejudice exists; but truths about prejudice are presentable as truths about men who prejudge matters; for prejudice to exist is simply for there to be men who are thus given to prejudging.

Pride and prejudice are non-substances. A further type of non-substance is an aggregate: aggregates are the sums of their parts; any truths about aggregates can be expressed as truths about those parts, and all facts about aggregates are no more than facts about their parts. The meteorological truths about clouds dissolve into truths about their constituent water-particles; anatomical facts are facts about the constituent cells of the body; and, in general, macroscopic facts are facts about the constituent atoms of macroscopic bodies. Clouds exist just in so far as water droplets congregate; there are bodies only if cells are suitably harmonized; and, in general, for macroscopic bodies to exist is for atoms to be collected together.

We can now give a more plausible sense to Democritus' assertion that two things cannot be one: no aggregate of two or more real things or substances is itself a real thing or substance. Aggregates are not substances; hence aggregates of substances are not substances. Since all macroscopic objects are atomic conglomerates, no macroscopic object is a substance: no such object exists *eteêi*.

Anaxagoras and Empedocles, it might be thought, are not far from the Atomists here: they make certain stuffs eternal and substantial, and they are committed to denying real existence to everything else. They differ from the Atomists only in a certain conceptual poverty: denying existence to men and clouds, they were obliged to say that, in strictness of speech, there are no men and there are no clouds; the Atomists, availing themselves of a distinction between two senses of 'exist' (above, p. 404), can say that men and clouds do exist_2 but do not exist_1. There are men and clouds; but men and clouds are not real. In Philolaic terminology, men and clouds exist *(einai)*, they do not subsist *(huparchein)*.

However that may be, it is only the Atomists from among the neo-Ionians whose ontology and philosophy have had any influence on later scientific ages. That philosophy can be briefly stated as follows: 'The proper language of science is thin and meagre: the only objects it names are atoms; the only predicates it contains are those denoting primary or proper qualities of bodies, and those denoting certain elementary spatio-temporal relations between objects. All facts can be expressed in this language; for any sentence in our ordinary language can be uniquely paired with a scientific sentence which has the same truth conditions as it has: "grass is green", "bread is nutritious", "ink dries quickly", can each be paired with a sentence mentioning only atomic structures and atomic predicates. Ordinary language is, ordinarily, indispensable; but for the purposes of science—that is to say, with regard to the pursuit of truth—it is grotesquely ornate, and a plain, severe style is preferable.'

Scientifically, Atomism is ancient history. No scientist believes anything that Democritus said; and the modern successors to atomism have long ago repudiated the primitive image of a world of billiard balls rolling about on a vacant three-dimensional cloth. Philosophically, on the other hand, the Atomist system remains an interest and a challenge: as the first exercise in reductive ontology, it is the ultimate source of a popular pastime of modern philosophical logicians. The questions 'What *really* is

there?' and 'What *must* there be?' still trouble and perplex; and some at least of the modern answers to them have a complexion curiously reminiscent of Abdera. Again, as the first fully conscious attempt to provide a thorough-going materialist account of the world, Atomism remains alive: to that issue I shall turn in a later chapter.