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THE PROBLEM OF THE ATOMIC MOTION IN CICERO

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In the first book of *De finibus bonorum et malorum* the following can be read about Democritus' natural philosophy: "Democritus believes that what he calls "atoms" – that is, bodies which are indivisible on account of their density – move in an infinite void, in which there is no top, bottom or middle, no innermost or outermost point. They move in such a way as to coalesce as a result of collision, and this creates each and every object that we see. This atomic motion is not conceived to arise from any starting-point, but to be eternal."¹ The word *concurio* does not imply motion in a definite direction; on the contrary, atoms collide with each other because of their random motion. The following lines also seem to support this interpretation: "I turn to the failings peculiar to Epicurus. He believes that those same solid and indivisible bodies move downwards in a straight line under their own weight and this is the natural motion of all bodies."² Consequently, Democritus' atoms do not move downwards in a straight line and they have no weight. Or even if weight is a basic property of atoms, it can not account for their motion. The expression *pellere se ipsa et agitari inter se* to be found in *De natura deorum*³ is another evidence for atomic motion not having any determined direction, which is definitely consistent with the view attributed to Democritus by Cicero, namely that there are no definite directions in the void (cf. *Fin.* I 17). In other works of his Cicero claims

¹ Cic. *Fin.* I 17 (DK 68 A 56) *ille [sc. Democritus] atomos quas appellat, id est corpora individua propter soliditatem, censet in infinito inani, in quo nihil nec summum nec infimum nec medium nec ultimum nec extremum sit, ita ferri, ut concursu inter se cohaerescant, ex quo efficiantur ea, quae sint quaeque cernantur omnia, eumque motum atomorum nullo a principio, sed ex aeterno tempore intellegi convenire.* The translation is by R. Woolf (Cicero On Moral Ends. Ed. by Julia Annas. Cambridge 2001).

² *Fin.* I 18 *illae Epicuri propriae ruinae: censet enim eadem illa individua et solida corpora ferri deorsum suo pondere ad lineam, hunc naturalem esse omnium corporum motum.* (Transl. by R. Woolf in op. cit.)

³ I 110 *quae etiamsi essent [sc. individua corpora] quae nulla sunt, pellere se ipsa et agitari inter se concursu fortasse possent.*

that in Democritus soul is created from particles by a chance encounter;⁴ similarly, the haven and the earth were created not by compulsion of any natural law but by chance collisions,⁵ and Democritus' cosmos lacks any kind of control or reason.⁶ The passages cited so far refer expressis verbis to Democritus and they unanimously assert that atomic motion is unceasing, random and arbitrary.⁷ While moving about the atoms collide randomly. As a result of these chance collisions soul and everything else (the earth and the universe) are created.

But what does Cicero mean by chance? He seems to mean the lack of *causae efficientes*, that is motion without cause.⁸

Nevertheless, other passages in Cicero present Democritus as a determinist. In *De natura deorum* we can read that Epicurus introduced the theory of swerve in order to avoid the necessity escaped the notice of Democritus.⁹ In *De fato* the Abderite is mentioned among those who connect fate with necessity.¹⁰ According to Cicero the *fatalis necessitas* (the same as the Stoic *heimarmene*) is nothing but an unbroken sequence of causation.¹¹ Thus provided that our interpretations are right Cicero seems to attribute two opposing views to Democritus. On the one hand he claims that the coming into being is the result of random atomic motion lacking any cause; on the other hand he asserts that in Democri-

⁴ *Tusc.* I 22 *Democritum enim, magnum illum quidem virum, sed levibus et rotundis corpusculis efficientem animum concursu quodam fortuito omittamus; nihil est enim apud istos quod non atomorum turba conficiat.*

⁵ *Nat. deor.* I 66 *ex his [sc. atomis] effectum esse caelum atque terram nulla cogente natura, sed concursu quodam fortuito; Ac. post.* I 6 *Iam vero physica, si Epicurum, id est si Democritum probarem, possem scribere ita plane ut Amafinius. Quid est enim magnum, cum causas rerum efficientium sustuleris, de corpusculorum (ita enim appellat atomos) concursione fortuita loqui?*

⁶ *Nat. deor.* I 67 *Sed ubi est veritas? [...] An in individuis corpusculis tam praeclara opera nulla moderante natura, nulla ratione fingentibus?*

⁷ *Fin.* I 17; *Nat. deor.* I, 65 *abuteris ad omnia atomorum regno et licentia; Vö.* II 115 *haec omnis discriptio siderum atque hic tantus caeli ornatus ex corporibus huc et illuc casu et temere cursantibus potuisse effici cuiquam sano videri potest?*

⁸ *Ac. post.* I 6; *Fin.* I 18 *de materia disseruerunt, vim et causam efficiendi reliquerunt.*

⁹ *Nat. deor.* I 69 *Epicurus cum videret, si atomi ferrentur in locum inferiorem suo pte pondere, nihil fore in nostra potestate, quod esset earum motus certus et necessarius, invenit, quo modo necessitatem effugeret, quod videlicet Democritum fugerat; ait atomum, cum pondere et gravitate directo deorsus feratur, declinare paululum.*

¹⁰ *Fat.* 39 (DK 68 A 66) *omnia ita fato fieri, ut id fatum vim necessitatis adferret, in qua sententia Democritus, Heraclitus, Empedocles, Aristoteles fuit.*

¹¹ *Nat. deor.* I 55 *hinc vobis extitit primum illa fatalis necessitas, quam εἰμαρμένην dicitis, quicquid accadat, id ex aeterna veritate causarumque continuatione fluxisse dicatis; Div.* I 125 *fatum autem id appello, quod Graeci εἰμαρμένην, id est ordinem seriemque causarum, cum causarum causa nexa rem ex se signat. Ea est ex omni aeternitate fluens veritas sempiterna*

tus' world everything happens by necessity, i.e. everything is determined by causal connections.

I Sources other than Cicero

Naturally, the simplest solution would be to ask Democritus himself. But not surprisingly, as is the case with Presocratics, no quotation by the Atomist concerning this problem has come down to us. That is why the only fragment by Leucippus preserved in Stobaeus is particularly valuable for us. In it „Leucippus says that everything occurs by necessity and that that is the same as fate; for he says in *On mind*: “Nothing happens in vain; but everything happens for a reason and by necessity”.¹² Diogenes Laertius also states that in Leucippus' view the production of worlds, their increase, their diminution, and their destruction depend on a certain necessity, the character of which he does not explain.¹³ As it is highly unlikely that in such a basic question Democritus would have adopted a different view than his predecessor and hardly can we rely on any sources to make a distinction between the two philosophers' views, we can regard the statements attributed to Leucippus as views that the Abderite may as well have agreed with.¹⁴ Therefore, according to Leucippus-Democritus everything happens by necessity.¹⁵ In other testimonies necessity is identified with the whirl¹⁶ or with the resistance, motion or blows of matter.¹⁷

¹² Aetios I 25,4 (DK 67 B 2) Λεύκιππος πάντα κατ' ἀνάγκην, τὴν δ' αὐτὴν ὑπάρχειν εἰμαρμένην. λέγει γὰρ ἐν τῷ Περὶ νοῦ: «οὐδὲν χρήμα μάτην γίνεται, ἀλλὰ πάντα ἐκ λόγου τε καὶ ὑπ' ἀνάγκης»; F.E. Peters (Greek Philosophical Terms. A Historical Lexicon. New York–London 1967) defines *ananke* with reference to this Leucippus-fragment. *Ananke* is “the mechanical necessity of purely physical causes operating without purpose.” This view of causes operating without purpose, I suppose, shows Aristotle's influence in the definition as it can hardly be inferred from the fragment itself. When treating the entry *tyche* F.E. Peters identifies the two concepts by referring to Aristotle, that is to say *ananke=tyche*.

¹³ IX 31-33 (DK 67 A 1) εἶναι τε ὥσπερ γενέσεις κόσμου, οὕτω καὶ αὐξήσεις καὶ φθίσεις καὶ φθοράς, κατὰ τινα ἀνάγκην, ἣν ὅποια ἐστὶν «οὐ» διαφερεῖ.

¹⁴ C. Bailey's attempt to distinguish the two philosophers' views in *The Greek Atomists and Epicurus* (New York 1928.) cannot be regarded really successful; scholars did not accept it either.

¹⁵ DK 68 A 39 μηδεμίαν ἀρχὴν ἔχειν τὰς αἰτίας τῶν νῦν γιγνομένων, ἄνωθεν δ' ὅλως ἐξ ἀπείρου χρόνου προκατέχεσθαι τῇ ἀνάγκῃ πάνθ' ἀπλῶς τὰ γεγονότα καὶ ἔοντα καὶ ἐσόμενα.

¹⁶ Diog. Laert. IX 45 (G. S. Kirk–J. E. Raven–M. Schofield, *The Presocratic Philosophers*. Cambridge 1983, 566) πάντα τε κατ' ἀνάγκην γίνεσθαι, τῆς δίνης αἰτίας οὔσης τῆς γενέσεως πάντων, ἣν ἀνάγκην λέγει.

¹⁷ Aetios I 26,2 (KRS 567) Περὶ οὐσίας ἀνάγκης. - Δημόκριτος τὴν ἀντιτυπίαν καὶ φορὰν καὶ πληγὴν τῆς ὕλης.

What the notion of *ananke* means is thus uncertain but at any rate it appears to be related to the atoms' motion and the coming into being resulting from their collision.¹⁸ Nothing occurs by chance but "for a reason" (ἐκ λόγου). In short, most testimonies apart from Cicero do not ascribe any role to chance in the Democritean natural philosophy except for Aristotle, whose authority weighs most heavily, and Simplicius, who is of course not independent of him. In the second book of his *Physics* Aristotle writes that "There are some who make chance the cause both of these heavens and of all the worlds: for from chance arose the whirl and the movement which, by separation, brought the universe into its present order."¹⁹

All in all, the dichotomy between chance and necessity is present not only in Cicero but also in other texts independent of him that are concerned with Democritus' natural philosophy. The question is whether we are facing some kind of real inner contradiction within atomist philosophy or only an apparent contradiction resulting from ambiguous terminology. We cannot form an opinion on Cicero's passages until we obtain an appropriate answer to this question.

II The problem of motion

First of all we have to examine the texts treat the motion of the atoms in Democritus. I must mention in advance that I will not deal with the problem of whirl (which, in my opinion – and it is consistent with Alfieri's view²⁰ – does not describe the original, precosmic motion of the atoms but refers to their cosmogonic motion²¹) and I will also ignore considering the arguments about the exact meaning of the terms *palmos* and *peripalaxis*²² as they are of no great importance to us. What our texts unanimously claim is that the atoms are in

¹⁸ Cf. Diog. Onoand. Fr. 54 II 5-13. Smith μηδεμίαν μὲν ἐλευθέραν φάσκων ταῖς ἀτόμοις κίνησιν εἶναι διὰ τὴν πρὸς ἀλλήλας σύγκρουσιν αὐτῶν, ἐνθεν δὲ φαίνεσθαι κατηνανκασμένως πάντα κεινεῖσθαι.

¹⁹ II 4: 196 a (KRS 568) εἰσὶ δὲ τινες οἱ καὶ τοῦρανοῦ τοῦδε καὶ τῶν κόσμων πάντων αἰτιῶνται τὸ αὐτόματον· ἀπὸ ταυτομάτου γὰρ γενέσθαι τὴν δίνην καὶ τὴν κίνησιν τὴν διακρίνασαν καὶ καταστήσασαν εἰς ταύτην τὴν τάξιν τὸ πᾶν.
(Transl. by KRS in op. cit.)

²⁰ V. E. Alfieri, *Atomos idea. L'origine del concetto dell'atomo nel pensiero greco*. Galatina (Lecce) 1979, 87.

²¹ L. Edmunds in *Necessity, chance, and freedom in the early atomists*. [Phoenix 26(1972) 342-357.] argues persuasively for Democritean cosmogony being actually independent of the whirl (344).

²² Cf. J. Barnes, *The Presocratic Philosophers*. London–New York 1982, 366sq.

perpetual motion²³ and this movement has no starting time. Their motion is random without any determined direction and characterised by constant collisions. But if we wish to know what makes atoms move, i.e. what the cause of their motion is – a question that frequently arises in the texts – we get various responses like: 1) because of their dissimilarities between them and other differences;²⁴ 2) by virtue of their weight;²⁵ 3) because they collide;²⁶ 4) Democritus and Leucippus do not define the atoms' natural motion.²⁷

The first two views can be treated together for the atoms' weight – of course if we accept that Democritus' atoms possess weight²⁸ – can be regarded as one of their characteristic differences. Yet how can the differences, mainly weight, govern atomic motion in the void, in which as we have already seen there are no definite directions? Although we can use this difference to explain the formation of the whirl where the principle of like for like gives a good reason, hardly is atomic motion in general explicable in terms of weight even if it has already been attempted.²⁹ Likewise, many difficulties arise if we accept the assumption that atomic motion results from collisions. For it presupposes a state in which atoms were not yet moving and it is hardly imaginable that the huge number of atoms moving about in the void will not collide. We have only one fragment by Simplicius which seems to support the idea: „Democritus says that by nature the atoms do not move, and that they move by blows”.³⁰ This, how-

²³ DK 68 A 40 (KRS 565) [Δ.] ἔλεγε δὲ ὡς αἰὲν κινουμένων τῶν ὄντων ἐν τῷ κενῷ.

²⁴ DK 68 A 34 (KRS 578) στασιάζειν δὲ καὶ φέρεσθαι ἐν τῷ κενῷ διὰ τε τὴν ἀνομοιότητα καὶ τὰς ἄλλας εἰρημένας διαφοράς, φερομένας δὲ ἐμπίπτειν καὶ περιπλέεσθαι...

²⁵ DK 68 A 58 (KRS 582)

²⁶ KRS 580 οὔτοι γὰρ (σψ. Λεύκιππος καὶ Δημόκριτος) λέγουσιν ἀλληλοτυπούσας καὶ κρουόμενας πρὸς ἀλλήλας κινεῖσθαι τὰς ἀτόμους; Aet. I 12,6 (DK 68 A 47) Δ. τὰ πρῶτά φησι σώματα [...] βάρος μὲν οὐκ ἔχειν, κινεῖσθαι (δε) κατ' ἀλληλοτυπίαν ἐν τῷ ἀπείρῳ.

²⁷ KRS 577 διὸ καὶ Λευκίππῳ καὶ Δημοκρίτῳ, τοῖς λέγουσιν αἰὲν κινεῖσθαι τὰ πρῶτα σώματα ἐν τῷ κενῷ καὶ τῷ ἀπείρῳ, λεκτέον τίνα κίνησιν καὶ τίς ἡ κατὰ φύσιν αὐτῶν κίνησις. S. Sambursky in *The Physical World of the Greeks*. London 1960,² 112. definitely attributes it to the Atomists' sound scientific instinct that “they did not begin by raising the problem of the cause of movement, but accepted movement as a given fact, just as they did in the case of the atoms.”

²⁸ It is a most debated question with both pros and cons in modern scholarship. For cons see Sambursky's op. cit. 111 sqq.

²⁹ Relying on the view that weight is one of the basic properties of atoms Alfieri in op. cit. 89 sqq reaches the conclusion that the cause of atomic motion is their weight. Weight is considered as a ‘vectorial’ power by him, thus the direction of the atoms' motion is determined by the atoms with similar shape in their surroundings, and their speed is in proportion to their weight.

³⁰ Simpl. *Phys.* 42, 10 (DK A 68 47) Δ. φύσει ἀκίνητα λέγων τὰ ἅτομα πληγῇ κινεῖσθαι φησιν.

ever, contradicts the fact unanimously supported by our sources, i.e. that they have been moving for all eternity.

Are we thus left with the conclusion drawn by Aristotle (KRS 577) that neither Leucippus nor Democritus specified the natural motion of atoms? Does not atomic motion have a cause or is the cause simply not specifiable?

Was Democritus at all concerned by the problem of the cause of atomic motion? Is it possible that it was only Aristotle who raised the problem while Democritus held the view that atomic motion is eternal thus uncaused? But it is exactly the violation of the *nihil sine causa* principle that Aristotle would have criticised the Abderite for. For if the atoms move as a result of their mutual blows, this externally compelled motion presupposes a natural one. Democritus, nevertheless, says nothing about what cause made the first atom move until it collided with something else. According to another view³¹ it is the concept of cause and the explanation of causal relations that is of paramount importance in Democritus' philosophy, in which determinism is with no exceptions and the *nihil sine causa* principle is one of its basic tenets. This assertion is supported not by a fragment of Democritus alone,³² but also the above mentioned one by Leucippus (DK 67 B 2). Hence it is causality that appears to be the basic tenet of their mechanical conception of the world. Nevertheless, all experiments trying to define necessity in terms of causes seem to fail,³³ which can result from the Atomists not having set any specific causal law.³⁴ However contradictory it might seem, we can make this assertion despite causality and necessity being the basic principle of the Abderite theory. That is to say, I myself also share the opinion that the atomist theory of physics is not an explanation but a mere description of facts.

III The meaning of *to automaton*

As we have seen, Aristotle ascribed both whirl and atomic motion in general to chance. The concept of *automaton* used in his text is supplemented with another one, *tyche*, by Simplicius. If we do not take into consideration that Aris-

³¹ Cf. Alfieri op. cit. 98sq; W. Röd, Die Philosophie der Antike 1. Von Thales bis Demokrit. München 1988,² 198sq.

³² DK 68 B 118 Δημόκριτος γοῦν αὐτός, ὥς φασιν, ἔλεγε βούλεσθαι μᾶλλον μίαν εὐρεῖν αἰτιολογίαν ἢ τὴν Περσῶν οἱ βασιλείαν γενέσθαι.

³³ Cf. Bailey (op. cit. 132 sqq): The necessity is the cause of the original motion of the atoms. In Alfieri's opinion (op. cit. 104) *ananke* is mechanical necessity which in Democritean philosophy is the same as blind chance (*tautomaton*).

³⁴ Röd op. cit. 199.

totle is not absolutely consistent when using and defining these terms, the following can be stated: both *tyche* and *automaton* fall under the accidental causes, i.e. causes having an unintended effect.³⁵ With regard to the Atomists it would mean that coming about and motion result of spontaneous events in that they reach ends not determined beforehand.³⁶

What is most essential for us in these definitions is that in Aristotle's view both *to automaton* and *tyche* are causes, which means that chance does not refer to events lacking a cause.

The question is how accurately it reflects Democritus' view. Did Democritus use the term *automaton* at all? Provided he did, what sense did he attribute to it? The opinions regarding his usage are again quite different. According to some³⁷ – although Aristotle's terminus technicus does not reflect the atomist conception accurately – it is an accurate reflection of their tendency to exclude the idea of purpose or plan from their philosophical system. Another solution is to infer that Aristotle simply describes the atomist thought from his own point of view by using his own terminology. Thus there is no real contradiction between Aristotle and other testimonies which ascribe necessity to the two Atomists.³⁸ This assertion can be supported by passages in Aristotle that hold a similar opinion about atomist thought.³⁹

Others state that while denying the existence of chance Democritus used the concept of *automaton*⁴⁰ in a sense different from Aristotle's, i.e. not as the opposite of *ananke* but as something that is essentially the same as that. *Automaton* is a principle reconciling chance and necessity. That is to say, *automaton* in Democritus is not chance but natural necessity.

Thus we have reached the conclusion drawn as early as the 19th century⁴¹ and supported by numerous researchers since then that in Democritean philoso-

³⁵ Arist. Phys. II 5, 197a5-198a. Cf. Peters op. cit. (*tyche*): "As a metaphysical term *tyche* falls under the general heading of accidental cause (*symbebekos*), i.e., a cause having an unintended effect. Aristotle distinguishes such accidental causes (which are efficient causes, Phys. II, 198 a) into those where there is no deliberation, *automaton* (spontaneity), and those where there is some degree of rational choice (*proairesis*), in which case it is *tyche*."

³⁶ Cf. Edmunds op. cit. 351.

³⁷ Cf. Bailey op. cit. 139sq.

³⁸ Edmunds op. cit. 349sq.

³⁹ Cf. DK 68 A 68.

⁴⁰ According to Alfieri (p. 106. n. 15) it can be asserted even if the word itself can be found in only one ethical fragment by Democritus: DK 68 B 182. (The word *tyche* can also be met in ethical fragments only). For an interpretation of *tyche* in Democritus' philosophy cf. U. Hirsch, War Demokrits Weltbild mechanistisch und antiteleologisch? Phronesis 25 (1990) 228ff.

⁴¹ Cf. H. K. Liepmann, Die Mechanik der Leukipp-Demokritischen Atome. Berlin 1885, 34sq.

phy chance and necessity are not contradictory concepts that would exclude each other but concepts implying basically the same.

IV Summary. What might the source of Cicero's texts be?

It seems that in Democritus-Leucippus' natural philosophy necessity and chance mean the same, or rather, they refer to the same phenomenon from two different points of view.⁴² What these concepts mean is the mechanical, not previously determined process of atomic motion and collision which is purposeless, universal and without any exception. Democritean philosophy appears hence to be undoubtedly determinist with no real dichotomy between necessity and chance.

Can the same be stated about Cicero's texts? As we have observed, Cicero wrote about accidental colliding of atoms. On the basis of two fragments from *De natura deorum*⁴³ chance means either a non-planned event or an event that was not brought about by *causae efficientes*. As regards necessity, Cicero claims it to be connected to *fatum* in Democritean philosophy.⁴⁴ *Fatalis necessitas* is the same as the stoic *heimarmene*⁴⁵ and by this assertion Cicero attributes such a view to the atomist philosopher that he cannot have held. For the main aim of his mechanical world concept was to exclude any supernatural force that arouses fear, thus is incompatible with man's tranquillity of mind. In this world there is no higher reason that would determine or control the events. Democritus' necessity has nothing to deal with providence, the god identified later with the stoic concept of *heimarmene*.

At the same time the Stoics defined *heimarmene* as an immutable causal chain, and the cause was regarded as *causa efficiens*, αἴτιον καὶ ποιητικόν καὶ δι' ὃ⁴⁶, *id quod facit*, that is the cause "the maker", that brings about a result by working. This view is considered by Sextus Empiricus to be the basic concept of the Dogmatists; Seneca definitely ascribes it to the Stoics.⁴⁷ αἴτιον ποιητικόν is the specifically stoic view of cause, which is absolutely different from everything that Plato or Aristotle taught about causes.

⁴² Cf. KRS 592.

⁴³ *Nat. deor.* I 66, I 67.

⁴⁴ *Fat.* 39.

⁴⁵ *Nat. deor.* I 55.

⁴⁶ SVF II 347.

⁴⁷ Sext. Emp. *Pyrrh. Hyp.* III 13; cf. III 14 αἴτιον εἶναι κοινότερον κατ' αὐτοὺς δι' ὃ ἐνεργοῦν γίνεται τὸ ἀποτέλεσμα; Sen. *Ep.* 65,4 *Stoicis placet unam causam esse, id, quod facit.*

With this knowledge it is clear that Cicero does not mean chance in the sense of Aristotle's blind chance or spontaneous, which as we have seen is not incompatible with Democritus' *ananke* but he means it from the stoic point of view. Admittedly, Democritus did not give an account of the cause of atomic motion and collision. It, however, does not imply that motion and collision do not have a cause mainly because it would violate the *nihil sine causa, nihil ex nihilo* principle. In stoic thought chance does not exist, or at worst it is an event the causes of which man is unable to understand.⁴⁸ A similar view is attributed to Democritus as well. Therefore, if someone ascribes stoic *tyche* to Democritus in a stoic sense and from a stoic point of view, they deny the objective existence of chance in the Abderite's philosophical system, which is consistent with what we can infer from our sources apart from Cicero. Nevertheless, it does not imply that chance and necessity in Cicero are not incompatible either as in the other sources because the view of necessity attributed to Democritus is alien to the Atomist. Or is it not?

So far we have based our argumentation on the fact that in *De fato* 39 we can read about the stoic *heimarmene* defined in *De natura deorum* I 55 and *De divinatione* I 125. But the word itself, which started its great career within stoic philosophy, was also present earlier in presocratic tradition.⁴⁹ Besides, we must pay great attention to a well-known passage in Epicurus' letter to *Menoceus* (134), according to which it would be better to follow the myths about gods than be a slave to the fate of the natural philosophers (τῇ τῶν φυσικῶν εἰμαρμένῃ). The passage is most likely to be polemical against Democritus rather than the Stoics, that is Epicurus does not mean the stoic *heimarmene* here.⁵⁰ Furthermore, it seems that for Epicurus *heimarmene* and *ananke* mean fundamentally the same.⁵¹

What conclusion can be thus drawn regarding the places examined in Cicero? He may have encountered the term *heimarmene* in texts treating Democritus' philosophy, hence we need not presume that he attributed a later, stoic theory to Democritus. All things considered, however, Cicero does not seem likely to have clearly understood what the nature of Democritean necessity was. Hardly can we say if the problem lies in Democritus' philosophy or in the fact that his numerous works soon fell into oblivion. It seems quite certain that almost none of his writings on natural philosophy remained by Cicero's age. We

⁴⁸ According to stoic definition chance is αἰτία ἄδηλος ἀνθρωπινῷ λογισμῷ (SVF II 966).

⁴⁹ Cf. W. Gundel, Beiträge zur Entwicklungsgeschichte der Begriffe Ananke und Heimarmene. (Habilitationsschrift) Gießen 1914.

⁵⁰ Cf. D. Sedley, Epicurus' Refutation of Determinism. In: ΣΥΖΗΤΗΣΙΣ. Studi sull' epicureismo greco e romano offerti a Marcello Gigante. Napoli 1983, 34sqq.

⁵¹ M. L. Silvestre, Democrito e Epicuro: il senso una polemica. Napoli 1985, 139sqq.

must also consider what the aim of Cicero's philosophical works was. We must not forget that his targeted readers were not experts in philosophy. Accordingly, an important aim of his was to make his books as readable and interesting as possible. However sorry we are, the minute examination of some details or terms would have been incompatible both with his own aims and his readers' needs. On the other hand, in order to construct a lively debate instead of a sheer presentation of philosophical views he somehow had to simplify the problem given and exaggerate the seeming or real contradictions with provocative and sharp wording sometimes. Nevertheless, as the present example also proves, it did not result in distorting the philosophical views discussed in any way. At worst some details are missing or emphases have been transferred but the views are fundamentally consistent with the sources independent of Cicero.