

EMPEDOCLEAN INFLUENCES ON THE TIMAEUS

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ACCORDING TO ARISTOTLE (*Metaph.* 987a 29 f.), Plato was acquainted from his youth with Cratylus and the Heraclitean view that sensibles are in flux.¹ Parmenides' influence on Plato in the *Sophist* and elsewhere seems obvious.² And although Plato's comments on or references to the Presocratics are generally casual or uninformative, he mentions many by name and occasionally quotes from their works.³ But if A. E. Taylor's interpretation of the *Timaeus* is correct, Plato's debt to Empedocles probably far exceeds that to other previous thinkers save Pythagoras. According to Taylor, the *Timaeus* is "a deliberate attempt to amalgamate Pythagorean religion and mathematics with Empedoclean biology."⁴ Throughout his commentary, Taylor refers to Timaeus' doctrines vis-à-vis those of Empedocles, claiming that it is "a mistake to look in the *Timaeus* for any revelation of the distinctively Platonic doctrines."⁵ F. M. Cornford challenged Taylor's views, remarking that it is difficult to understand how Plato, "the greatest philosopher of that period, at the height of his powers, could have wasted his time on so frivolous and futile an exercise in pastiche."⁶ But Cornford, too, saw Empedoclean influence in passages of the *Timaeus*, e.g., at 32c, and he and Taylor are not alone in finding allusions to Empedocles in the work.⁷ In brief, although Taylor's

¹For opposite assessments of Heraclitus' influence on Plato, see H. Fränkel, *Wege und Formen frühgriechischen Denkens* (Munich 1955) 244-246, 255-271, 281-282, and G. S. Kirk, *Heraclitus: The Cosmic Fragments* (Cambridge 1954) 13-16. Fränkel insists on the great extent and profundity of Heraclitus' influence on Plato, whereas Kirk maintains that Plato's knowledge of Heraclitus was evidently limited. As for Aristotle's report, H. Cherniss rightly remarks that Plato's "dialogues offer no positive corroboration of Aristotle's statement that it was Cratylus from whom Plato adopted the theory of flux; but neither do they offer any ground for disbelief, and we have no other basis on which to challenge the account . . ." (*Aristotle's Criticism of Plato and the Academy* 1 [Baltimore 1944] 219, continuation of n. 129).

²See, for example, the recent study of F. Solmsen, "Parmenides and the Description of Perfect Beauty in Plato's *Symposium*," *AJP* 92 (1971) 62-70.

³*Soph.* 241d-251 is Plato's longest systematic survey of previous thought. *Phd.* 96 f. also has a Platonic synopsis of fifth-century speculation.

⁴A. E. Taylor, *A Commentary on Plato's Timaeus* (Oxford 1928) 11. Hereafter Taylor.

⁵*Ibid.* For other references, see Taylor's "Index I. Personal Names," 696.

⁶F. M. Cornford, *Plato's Cosmology* (reprinted New York 1957) viii. Hereafter Cornford.

⁷E. Bignone presents a detailed discussion in *Empedocle* (reprinted Rome 1963) 613-623. He argues for "imitazioni o accenni empedoclei;" see also J. B. Skemp, *The Theory of Motion in Plato's Later Dialogues* (Cambridge 1942) esp. 52-64; W. K. C. Guthrie, *A History of Greek Philosophy* 2 (Cambridge 1965) esp. 237-238; J. Bollack, *Empédocle*, 1: *Introduction à l'ancienne physique* (Paris 1965) 358, and 3: *Les origines*,

over-all interpretation is probably extreme, the presence of Empedoclean doctrine in the *Timaeus* deserves serious consideration.

This study attempts to provide a reasonably comprehensive account of Empedocles' probable influence on the *Timaeus*. Such an undertaking is difficult for various reasons. Most important perhaps is the fragmentary state of Empedocles' poems: possibly Plato knew passages no longer extant. There is also the problem of knowing Plato's own mind, since he has left little or no account of his own philosophical development.⁸ Several criteria, however, seem reasonable for determining influence on a given author: (1) explicit reference by that author to the works or thoughts of others; (2) obvious verbal echoes, either direct quotations or apparent paraphrases, including the use of similar or identical terms; (3) similar if not identical basic concepts or ideas. The criterion of similarity, however, is sometimes difficult to apply, for what appears similar to one scholar may not appear so to another. For example, Taylor finds *Timaeus*' description of the human head's need for a body (44d) a "humorous polemic" against Empedocles.⁹ But Cornford is neither convinced the passage is humorous (evidence of design is a "serious matter" to Plato) nor satisfied that there is any reference to Empedocles, despite the "oddly archaic character" of the description.¹⁰ This sort of problem in application will on occasion arise, but the criteria are still of value, and will be used as the norms of interpretation in the subsequent discussion.

The *Timaeus* contains, of course, no explicit references to Empedocles or to his teachings. *Timaeus* is from Locri in Sicily, Empedocles' home-

commentaire 2 (Paris 1969) 647, has lists of references to the *Timaeus*, but many are not discussed in detail by him; D. O'Brien, *Empedocles' Cosmic Cycle* (Cambridge 1969) esp. 22-23 and 144-145. O'Brien considers some views of *Timaeus* to be "corrections" of Empedocles. More recently, O'Brien has published "The Effect of a Simile: Empedocles' Theories of Seeing and Breathing," *JHS* 90 (1970) 140-179, in which he defends the originality of Plato's theories, though he is inclined to see some Empedoclean influence on Plato's theory of breathing. F. Solmsen's article, "Tissues and the Soul," *PR* 59 (1950) esp. 446-458, is very important for its assessment of Empedocles' influence on *Timaeus*' views on tissues of the human body. There are also references to Empedocles in the other standard translations of and commentaries on the *Timaeus*, e. g., those of Stallbaum, Archer-Hind, Fraccaroli, Apelt, and Rivaud. None of these, however, adopts a thesis so sweeping as Taylor's, and there is no extensive discussion of Empedocles' doctrines in connection with those of *Timaeus*. (Authors of books mentioned in this note will be referred to hereafter by name only.)

⁸Plato's *Seventh Epistle* is probably genuine (see, for example, K. von Fritz, "The Philosophical Passage in the Seventh Platonic Letter and the Problem of Plato's 'Esoteric' Philosophy," in *Essays in Ancient Greek Philosophy*, ed. J. Anton and G. Kustas [New York 1971] 408 f.). It has some value for an understanding of Plato's development and interests, but provides no insight into his actual attitudes to Empedocles or other thinkers.

⁹Taylor 276.

¹⁰Cornford 151.

land, a fact which creates presumption of his familiarity with the latter's thought. Moreover, when Socrates describes Timaeus (20a), he praises him as second to none in birth and as one who has attained his city's highest offices and reached the "pinnacle of all philosophy" (ἐπ' ἀκρόν φιλοσοφίας ἀπάσης). J. Bollack has seen here a "correction" of B3 where Empedocles warns Pausanias not to let mortal honours force him to say more than is "holy" (ὁσίης), and thus to sit on the "heights of wisdom" (σοφίης ἐπ' ἀκροισι θαάζειν).¹¹ Socrates' praise of Timaeus, however, may not recall this line of Empedocles; as Taylor observed, Pindar's praise of Locri's *eunomia* (*Ol.* 10.13 f.) probably involved a compliment on her defeat of Anaxilas, tyrant of Rhegium, and near the end of *Ol.* 11 Pindar calls the Locrians a *στρατὸς ἀκρόσοφος*, almost as Timaeus is said to have arrived at the "pinnacle of all philosophy."¹² That is, Locrian affairs were in the hands of *sophoi* or intellectuals, and Socrates' praise of Timaeus and the Locrians need not be considered a "correction" of Empedocles. The phrase ἐπ' ἀκρόν φιλοσοφίας ἀπάσης is, in any case, peculiar to Plato, and cannot readily be regarded as a clear reference either to Empedocles or to Pindar.

It is also hazardous to view the general structure of Plato's dialogue as an index to possible influence. According to Cornford, the *Timaeus* is a poem "no less than the *De rerum natura* of Lucretius...".¹³ The language of the *Timaeus* is, of course, sometimes solemn and even metrical (see, e.g., the Cretico-Paeonic metre of 41a f.), and there are invocations of divine aid (27c-d and 48d-e) reminiscent of the epic tradition to which Empedocles' poems probably belong.¹⁴ But Cornford's estimate of the *Timaeus'* poetic qualities seems exaggerated, the general resemblances of form between it and Empedocles' works being hardly adequate for establishing influence, or for placing the *Timaeus* in the poetic tradition to which Empedocles and Lucretius belong.

In addition to 20a, scholars have claimed to find other verbal echoes of Empedocles in the *Timaeus*. Two such alleged echoes occur in Timaeus' account of the body of the cosmos (31b-32c), with its four primary con-

¹¹Bollack writes, 3.1.33, "on comparera *Timée* 20a, où Platon corrige Empédocle en montrant que le philosophe ne doit pas se retirer de la cité, mais qu'il y trône en pleine dignité sur les hauteurs du savoir. . . ." Socrates' praise of Timaeus follows his critique of the itinerant life of the sophists.

¹²Taylor 49.

¹³Cornford 31. Cornford is perhaps following Fraccaroli, who also maintained that the *Timaeus* "... è un poema, più essenzialmente poema, che non siano la filosofia verseggiata di Senofane, di Parmenide, di Empedocle. . ." (G. Fraccaroli, *Il Timeo* [= *Il pensiero greco* 1 (Turin 1906)] 29). See also Bignone 613. According to him, the *Timaeus* and Empedocles' poems are "i maggiori poemi cosmici della letteratura greca."

¹⁴Despite Aristotle's remark (*Poet.* 1447b 17), Empedocles and Homer have more in common than the metre. See, for example, Bollack's interesting discussion of Empedocles as "l'Homère de la nature," 1. 277 f.

stituents, fire, air, water, and earth. *Prima facie* the discussion recalls Empedocles' four roots, a doctrine which will be examined later in this study. For the moment, it is important to note that, according to Timaeus, some kind of δεσμός or proportional bond is needed to hold the elements together, since "two cannot hold together well without a third to serve as a bond" (δύω δὲ μόνω καλῶς συνίστασθαι τρίτου χωρὶς οὐ δυνατόν, 32b8–c). Bignone maintained that Timaeus' notion of a bond has an affinity with some views of Empedocles (see B96, B98), and that the previous phrase is an echo of Empedocles B32, δύω δέει ἄρθρον.¹⁵ It is not clear, however, that *Tim.* 32b8–c is an echo of B32, especially as the fragment's meaning is uncertain, owing to textual problems and the lack of any full discussion of the fragment in its context in *De lin. insecab.* 972b 29.¹⁶ The second apparent echo occurs at 32c 4. Commenting on the demiurge's construction of the cosmos from the four elements, Timaeus remarks that its body was brought into concord by means of proportion, and from these it had amity (φιλίαν τε ἔσχεν ἐκ τούτων). Thus united, the cosmos or *ouranos* was indissoluble except by the demiurge.¹⁷ Several commentators have seen a reference to Empedocles' *Philia* in this passage.¹⁸ Taylor, for example, remarked that "... this may be an allusion to the names φιλότης, φιλία, 'Ἀφροδίτη given by Empedocles,"¹⁹ but his caution indicates that the suggestion is tenuous. First, in Timaeus' account, φιλία is a term used simply to describe the harmonious unity of the world. Later at 34b he considers the *ouranos* γνώριμος and φίλος to itself. For Empedocles, however, "Love" is an active force which draws together and unites the four roots; it is not merely a descriptive term for a cosmic state of affairs, as it seems to be for Timaeus. Second, there is no contrary force of *Neikos* ("Strife") in Timaeus' scheme, a fact noted by Cornford.²⁰ In sum, there seems to be no good reason to see a reference to one of Empedocles' powers at 32c, and no justification for capitalizing *philia* in translation, "Amity," as Cornford does.

But perhaps the previous conclusions on the alleged echoes of Empedocles in *Tim.* 31b–32c are premature. First, when Proclus comments on *Tim.* 31b 6: "and nothing can be visible without fire" (χωρισθὲν δὲ πῦρ οὐδὲν ἂν ποτε ὁρατὸν γένοιτο), he quotes B52 and refers to Empedocles' view

¹⁵Bignone 614.

¹⁶See Diels-Kranz, *Vorsokr.*⁷ 325, hereafter DK. The ms reading is διὸ δέει ὁρθῶς. See also Bollack 3.2.310.

¹⁷In the *Timaeus* Plato usually uses *ouranos* or *cosmos* = the entire world. Taylor (66) is probably correct in noting that "this is because Timaeus and Plato himself hold that there is only one οὐρανός."

¹⁸See, for example, R. D. Archer-Hind, *The Timaeus of Plato* (London 1888) 99, n. on line 9; Fraccaroli (above, n. 13) 174, n. 2; Bignone 615; Taylor 100; Cornford 44, n. 4.

¹⁹Taylor 99.

²⁰Cornford 44, n. 4.

that there are streams of fire under the earth.²¹ Valuable as Proclus' quotation and remarks are, they do not prove that Timaeus was thinking of or paraphrasing Empedocles when giving his account of the world's body. A second, and much more important consideration for determining whether Timaeus was influenced by Empedocles in 31b–32c seems to be found in the ensuing discussion at 33b f. According to Timaeus, the cosmos is σφαιροειδές, and since it revolves uniformly in the same place and within its own limits (34a f.), it has no need of limbs. The cosmos is “without feet or legs” (ἀσκελὴς καὶ ἄπους). Moreover, the demiurge made it a circle whirling in a circle, one, single, and solitary (οὐρανὸν ἓνα μόνον ἔρημον κατέστησεν). At first glance, Timaeus' account seems to recall Empedocles' description of the pre-cosmic Sphere. When the roots were fully united and Strife was absent from them, there was a rounded Sphere enjoying “circular solitude” (μονίῃ περιηγεί γαίων, B27.4, B28.2), and “two branches did not spring from its back, nor feet, nor swift knees, nor reproductive genitals (μήδεα γεννήεντα), but it was (ἔην) a sphere, and from every direction equal to itself” (⟨πάντοθεν⟩ ἴσος ἐαυτῷ), B29. It would be perverse to deny Empedoclean influence on Timaeus here, but his and Empedocles' descriptions are different. First, Timaeus' account concerns the present cosmos; Empedocles envisages a past state: ἔην. Second, although both describe limbless entities, Empedocles specifically denies reproductive organs; these are not mentioned by Timaeus. Third, and more important, although sphericity is a central feature of Empedocles' and Timaeus' descriptions, the latter's σφαιροειδές echoes Parmenides' Being equally as well (see Parmenides B8.29–30, B8.43–44). Finally, Timaeus' attribution of solitude (ἐρημία) to the cosmos may recall Empedocles' μονίῃ (in B28.2 above), though J. Bauer and J. Bollack have recently argued for μονίῃ as meaning “eins” (“unicité”) and not “Einsamkeit” (“solitude rend mal le sens”).²² If their views are correct, Timaeus' ἐρήμος seems hardly intended to recall Empedocles' μονίῃ. The latter term can also, of course, be understood as “rest” or “stability,” from μένειν.²³ In either case there is no way of knowing how Plato might have understood μονίῃ, or if he was thinking of Empedocles' description of the Sphere. If any echo of Empedocles is present in Timaeus' account of the cosmos, it is in the notion that the universe is one and single (cf. B17.1, B17.16), though even this view shows Parmenidean influence

²¹According to Bollack, 3.1.228, the last phrase of Proclus' report, χωρεῖ γὰρ πάντα δι' ἀλλήλων καὶ ἔστι τὸ ἐπικρατοῦν ἄλλο ἐν ἄλλοις, “renvoient l'écho tenace de la pensée d'Empédocle; peut-être même est-ce une paraphrase (cf. 31, 33: δι' ἀλλήλων θέοντα et 68, 1: ἐν δὲ μέρει κρατέουσι . . .).”

²²See J. B. Bauer, “μονίῃ Empedokles B27, 4 und B28, 3,” *Hermes* 89 (1961) 367 f., and Bollack 3.1.137, who cites Bauer in support of his translation.

²³See Jaeger's discussion in his *The Theology of the early Greek Philosophers* (reprinted Oxford 1960) 141; cf. 237, n. 56.

equally as well (see Parmenides B8.1 f., where only one [μόνος] account of a way remains, and where Being is considered “whole of limb” or “unique,” and “one”).²⁴ In sum, it is difficult to find any clear verbal resemblances between Timaeus’ account of the cosmos and Empedocles’ description of the pre-cosmic Sphere. Perhaps Timaeus was thinking specifically of Empedocles, and his views are a “correction” of the latter; such a possibility can be neither categorically denied nor confidently affirmed.²⁵

One passage of the *Timaeus* which seems to show the clear influence of Empedocles, if not in language, at least in thought, is 73e f., where the god’s creation of bone is described; the god

having sifted out earth that was pure and smooth kneaded it and soaked it with marrow; then he plunged the stuff into fire, next dipped it into water and again in fire and once more in water and by thus shifting it several times from one to the other he made it insoluble by either.

Compare Empedocles:

Thus at that time Cypris, when she drenched earth in a heavy shower, busying herself with shapes (?), gave it to darting fire to harden . . . (B73)²⁶

Grateful earth obtained in broad melting-vessels two of eight parts from gleaming Nestis (water), four from Hephaestus (fire); the white bones came into being, fitted together divinely by the cementing of Harmonia (B96).

The same three “elements,” water, earth, and fire, are found in both accounts. Moreover, Timaeus’ god and Empedocles’ Cypris (presumably Philotes, Aphrodite, or Philia) have active functions in the formation of bone.²⁷ It is, in fact, in connection with the work of the demiurge and younger gods that Timaeus uses some terms reminiscent of Empedocles: *συναρμόττων* and other related terms (see 35a 8, 41b 1, 47d 2, 74c 7, 81d 5): cf. B71.4, B96.4, B107.1; *συνεκόλλων* (43a 2) and *ἐκόλλησεν* (75d 2):

²⁴On the decision between *μουννογενές* (lit. “only begotten,” “unique”) and *οὐλομελές* (“whole of limb”) see L. Tarán, *Parmenides* (Princeton 1965) 88–93. Burnet thought that the reading *μουννογενές* crept in by someone’s writing *μ, ν, γ* above the line in the Academy copy of Parmenides with *Tim.* 31B 3 in mind. The passage in *Early Greek Philosophy* (reprinted New York 1957) 174, n. 4 is quoted by Tarán (89). If *oulomeles* is the correct reading, Plato’s denial of limbs could as well be indebted to Parmenides as to Empedocles.

²⁵According to O’Brien, 145, the passage in the *Timaeus* is a “correction” of Empedocles. According to Bignone, 615, it has an “accenno polemico.”

²⁶Unless otherwise indicated, the translations of Empedocles are mine. For the *Timaeus* Cornford’s translation is used, and the Greek text is that of J. Burnet, *Platonis Opera* 4 (reprinted Oxford 1962). In B73 the term translated “shapes” is *εἶδεα*. Assuming the correctness of the reading, it is still hard to know what Empedocles meant by the term. See Bollack 3.2.378, who believes that they may be the *typoi* mentioned in B62; he translates them as “les formes,” 2.162.

²⁷For a good discussion of this passage, see Solmsen (above, note 7) 447.

cf. B34 and B96.4; numerous forms of *μῆλαι* and *μῆλις* (35b 1, 36b 5, 41d 6, 42a 7, 47a 7, 59a 4, 59d 4, 60b 7 and 8, 73c 1, 74c 7, 80e 2): cf. B8.3, B9.1, B35.7, 16, B61.3. Other possible echoes of Empedocles' terminology are *γόμφοι* (43a 3): cf. B87;²⁸ *σφίγγει* (58a 6): cf. B38; *σύνοδος* (58b 5, 60b 1): cf. B17.4; *συνέδησε* and related forms (45a 7, 32b 7, 41b 6): cf. B33. Since most of these terms are common in Greek, though not necessarily employed in the sense given to them by Timaeus or by Empedocles, and since much of Empedocles' poems has been lost, it cannot be determined with certainty how many of these and other terms Timaeus may have borrowed from Empedocles. Timaeus' use of some in describing the work of the demiurge and other gods suggests that he was thinking of Empedocles' Love, for several of the terms above connote the activities of craftsmen, and Timaeus' gods and Empedocles' Love sometimes function as such.²⁹ But, as Solmsen has noted, Plato's divine craftsman or demiurge "is a conception much too original to be explained as a synthesis of earlier thinkers' ideas."³⁰

On the whole, there seem to be no clear or obvious verbal echoes of Empedocles in the *Timaeus*; certainly no direct quotations or paraphrases that can be readily identified. Even 73e f., quoted above, when examined closely, is not very similar in expression or terminology to the fragments of Empedocles. The similarity between the passages is largely in conception, a similarity which seems, of course, significant. For Timaeus' gods and Empedocles' Love do sometimes function as divine craftsmen in the production of various entities, and some of Timaeus' terms may indeed be taken from Empedocles or meant to recall his teachings. Much more cannot be confidently asserted. An examination, however, of some principal doctrines of Timaeus and of Empedocles may establish clearer connections between the thinkers.

There is no doubt that the basic principles of Empedocles' cosmogony and cosmology are the four roots (earth, air, fire, and water) and Love and Strife. He also conceived of these six as interacting to form all that exists, though interpreters disagree concerning the nature of the interaction. Many maintain that Empedocles believed in a cosmic cycle of four periods, two of total unity and of total separation, and two of increasing Love and of increasing Strife. Others, however, have denied that Empedocles envisaged a cosmic cycle, and the problem remains

²⁸Bollack (3.2.313 f.) rightly observes concerning the *gomphoi* of B87 that "Platon reprend, dans le *Timée*, les mêmes expressions artisanales; les dieux façonnent les corps mortels . . . comme l'Aphrodite d'Empédocle . . ."

²⁹On the similarities between Empedocles' and Plato's concepts of Love and the demiurge, see F. Solmsen, "Nature as Craftsman in Greek Thought," *JHI* 24 (1963) esp. 476 f.

³⁰*Ibid.* 480.

unsettled.³¹ The following discussion will deal with the main features of Empedocles' system of the physical world in conjunction with those of the *Timaeus*, principally the four elements (στοιχεῖα), Reason (Νοῦς), Necessity (Ἀνάγκη) and Becoming (Γένεσις).

To his four roots Empedocles assigned divine names (B6), although he used no fixed terminology in referring to them; fire, for example, is "flame" (B85), "Elector" or "Helios" (B22.2, B40), or "Hephaestus" (B96.3). The term "roots" is probably intended to suggest animate, biological qualities: the roots "love" one another (B22.5), they "long for" one another (B21.8; B110.9), and when they are united to form the Sphere, it "rejoices" (B27; B28). Endowed with such properties, they seem to have a power of movement independent of Love and Strife: fire desiring to reach its like sends up "whole-natured" forms (B62.6); Love gives the forms to fire to strengthen (B73); and in B90 the sweet, bitter, sour, and hot rush at one another in almost epic combat.³² In short, the roots are almost living, organic components of things, not simply inanimate, quantitative matter.

Apparently Empedocles believed in the existence of these four, and four alone. Pausanias, his listener, is simply told that they exist (B6); even in B38, where the roots are distinguished from the cosmic masses representing them, there is no argument or "deduction" from these masses to the four roots: "Come, I will tell you ... from what (roots) the things we now see have become evident... ." According to Aristotle (*Metaph.* 985a 31), it was Empedocles who introduced the doctrine of the four elements into Greek thought. In addition to the probable correctness of Aristotle's view, it seems clear that Empedocles' doctrine of the roots is in continuity with even earlier Greek thought. The oldest Greek literary texts recognize, for example, a division of the cosmos into four parts (see *Il.* 15.190 f., Hes. *Theog.* 106 f.): earth, sea, heaven (*ouranos*), and the darkness of Hades and Night. If darkness be replaced by ἀήρ and *ouranos* by αἰθήρ, the scheme can be assimilated to that of Empedocles' roots.³³

³¹See D. O'Brien 179 f., where one is presented with a generally accurate summary of the recent discussions of Empedocles' cycle by Hölscher, Solmsen, and Bollack, all of whom deny the "traditional" interpretation of the cycle. Their own views, of course, differ. O'Brien's summary is presented for polemical purposes, but it partially illustrates the problems of interpreting the cycle. See also M. Stokes, *One and Many in Presocratic Philosophy* (Cambridge, Mass. 1971) 153 f.

³²See C. E. Millerd, *On the Interpretation of Empedocles* (Chicago 1908) 35. Her view that "the elements are clearly to be thought of as endowed with motor attributes," seems extreme, but Guthrie speaks of the "internal motive powers of the elements," 2.164, and Bollack writes "mais si le feu tend vers le haut, ce n'est pas qu'il cherche à rejoindre son lieu, c'est par désir de trouver sa race (γέννα)," 1.51. In sum, it is hard to avoid thinking that the roots have some power of movement apart from or in addition to that of Love and Strife.

³³See the excellent discussion of the origins of the doctrine of the four elements in C. Kahn, *Anaximander and the Origins of Greek Cosmology* (New York 1960) 134 f.

Moreover, Empedocles' choice of four roots seems in accord with those of early Greek philosophy, e.g., Anaximenes' air, Xenophanes' earth and water, and Heraclitus' fire. Empedocles' innovation lay in the recognition that these and only these four were the roots of all that exists, or, according to Aristotle (*Metaph.* 984a 8), in his being the first to consider them the four genuine *archai*: none is prior to any other, nor is anything else more fundamental.

From an examination of the *Timaeus*, it is apparent that Plato's doctrine of the elements is basically different from and more complex than that of Empedocles' roots. First, at 31c Timaeus deduces the existence of four elements from bodily form, the tangibility and visibility of τὸ γινόμενον, and geometrical proportion. Unlike Empedocles, Timaeus argues for the existence of four, and no more than four elements; their existence is not simply asserted or assumed. Second, the term στοιχεῖα is quite different in meaning and emphasis from ῥιζώματα. Whereas the latter suggests the roots of a tree or plant, and is vital and organic in connotation, the former, assuming its primary reference to be to the letters of the alphabet, suggests the inert or inorganic, something that is the result of artifice rather than of nature.³⁴ More importantly, however, when Timaeus makes a new start in examining the nature of the four elements (48b f.), he expresses doubt about the appropriateness of the term *stoicheia* (48b 5–48c 2):

... but we speak as if men knew what fire and each of the others is, positing them as original principles, elements (as it were, letters) of the universe; whereas one who has ever so little intelligence should not rank them in this analogy even so low as syllables.

Thus, at 49b f. Timaeus begins to argue that the four are not permanent, irreducible elements of the visible cosmos. Considered in relation to the Receptacle, or Nurse of Becoming, the four undergo continuous transformation, and are "distinct and self-identical characteristics," entering and leaving the Receptacle: they are τῶν ὄντων ἀεὶ μὲν ματα (50c 4–5).³⁵ In 51b–e Timaeus succinctly defends his assumption of the existence of intelligible realities of which these characteristics are "copies" or "images," and in 53c–55c, the four kinds or γένη of water, fire, etc., are constructed by the god from geometrical shapes. In sum, the discussion of the four elements in the *Timaeus* is in a language and conceptual scheme far removed from that of Empedocles' roots. Perhaps it is a disguised polemic against the latter's doctrine. It is tempting, for example, to consider Timaeus' discussion of the elements' transformation into one

³⁴For the history of *stoicheion*, see H. Diels, *Elementum* (Leipzig 1899); its original sense is discussed 58 f.

³⁵The interpretation of the elements as "distinct self-identical characteristics" is derived from H. Cherniss. See his "A Much Misread Passage of the *Timaeus* (49c 7–50b 5)," *AJP* 75 (1954) 113–130, especially the supplementary remarks 128–130.

another (at 49c), with its remark: *κύκλον τε οὕτω διαδιδόντα εἰς ἄλληλα ... τὴν γένεσιν* (49c 6–7), as containing an echo of B17.34 f.:

ἀλλ' αὐτ(ὰ) ἔστιν ταῦτα, δι' ἀλλήλων δὲ θεόντα
γίγνεται ἄλλοτε ἄλλα καὶ ἡνεκὲς αἰὲν ὁμοῖα.

In general, there is no doubt that Timaeus (or Plato) has accepted the four “elements,” earth, air, fire, and water, first proclaimed in Empedocles’ doctrine of the four roots; this remains an essential fact about the system of the *Timaeus*, and of all later Greek physics. Since the doctrine of four elements, however, became the common currency of physics after Empedocles’ time, it is possible that Plato is drawing on this common tradition, and not directly on Empedocles at all. This is not to maintain, of course, that Empedocles did not have an important influence on that tradition. When the elements, for example, endowed with geometrical shapes, are transformed into one another to form various compounds (see 58c f.), the recurrent notion of *mixis* (see, for example, 59a 4, 59c 3, 59d 4, 59e 6, 60a 2) clearly suggests the action of Empedocles’ Love, for the mixing of the elements (by the demiurge or by Philotes) seems common to both. Here the strongest point of similarity is the *mixis* of the four elements; their mutual transformation or changing into one another is specifically and distinctively Platonic.

Besides the doctrine of the four “elements,” some have thought that Timaeus’ *kinesis* doctrine also has antecedents in Empedocles’ system. This theory has perhaps been most strongly maintained by J. B. Skemp, and his views will be the focus of the present discussion.³⁶ No doubt it is alluring to see with him a parallelism between Empedocles’ Love and Strife, and Timaeus’ Reason and Necessity.³⁷ For both thinkers, these are major sources of motion within the cosmos (excluding Timaeus’ demiurge, who seems to be the ultimate *ἀρχὴ κινήσεως*). According to Skemp, there is a close relationship between Empedocles’ Strife and Timaeus’ Necessity:

for *ἀνάγκη*, like *νείκος* in Empedocles, has for one of its effects this bringing of like to like, which Cornford would make into a separate moving force. Like *νείκος*, the working of *ἀνάγκη* makes against the interfusion of the four bodies and therefore an agency to counteract it must be sought.³⁸

Skemp’s analysis of the “like to like” principle as a result of Strife’s activity is not, however, firmly supported by the fragments of Empedocles’ work. From B22.1 f., where the *ἄρθμια πάντα* suggest the power of Philotes,³⁹ it seems clear that the visible masses, sun, earth, sky, and

³⁶See Skemp 52 f.

³⁷*Ibid.*, esp. 58, 63.

³⁸*Ibid.* 59.

³⁹See J. Bollack, 3.1.230, who remarks that the *arthmia erga* “évoquent ailleurs (31, 22) le pouvoir de Philotes” For another, similar detailed discussion of the fragment, see O’Brien 305–313.

sea, are "close fitting" with their own parts, and when things are made alike by Aphrodite, they cling close to each other (B22.4-5). In general, the "like to like" principle is sometimes associated with Strife and sometimes with Love in Empedocles' thought. D. O'Brien seems correct in remarking that

in fr. 22 we see how 'like to like' also embraces the activity of Love. For elements that under Strife would be most *unlike* when they are joined together are *made alike* by Aphrodite, *ὁμοιωθέντ' Ἀφροδίτῃ*. Thus 'like to like' is not to be identified exclusively with the work of Strife nor exclusively with the work of Love, nor yet is it a wholly independent principle. 'Like to like' describes the activity of both Love and Strife.⁴⁰

Further comparison of Empedocles' Strife and Timaeus' Necessity shows how tenuous the similarity between them is. For Timaeus, Necessity is the "aimless" or "wandering cause" (*πλανώμενη αἰτία*), perhaps best described as the "indispensable 'underworkman' of *Noûs* in the production of a good world."⁴¹ Though responsive to Reason's persuasion, it is not wholly subordinate, and in itself is not purposive. As the "aimless cause," it probably represents that which is contingent, not purposive in nature, the "mechanical," subordinate cause of things. For Empedocles, however, Strife is responsible for the separation of the roots comprising natural bodies (see, for example, B20), and ultimately for the disruption of the pre-cosmic Sphere. The application of the "like to like" principle is most unlikely to have been the monopoly of Strife, though the latter's disruption of the Sphere probably first involved the roots' separation into the four great masses of the cosmos.⁴² Strife's activity is destructive of the Sphere as well as of organic compounds. But for Timaeus, Necessity is not as such a disruptive force, responsible, for example, for the dissolution of the cosmos. Moreover, Empedocles has his own view of Necessity (see B115, B116, Arist. *Phys.* 252a 7 f.). Such *Ananke*, however, referred to only in those fragments assigned to the *Katharmoi*, cannot readily be identified with the Love or Strife of the *Peri Physeos*. So if comparisons are to be made, a comparison of Empedocles' Necessity with that of Timaeus would seem more appropriate than a comparison of Empedocles' Strife and Timaeus' Necessity. But this comparison in turn yields little in the way of similarity of doctrine, and one must

⁴⁰O'Brien 312-313. See also W. Müller, *Gleiches zu gleichem* (= *Klass. philolog. Studien* 31 [1965]) 30, where he writes: "... jede Verbindung von Elementen ist nun als Freundschaft zu begreifen und stellt eine Wirkung der Philotes dar, gleichgültig, ob sich das Fremdartige mit dem Fremdartigen oder das Gleiche mit dem Gleichen vereinigt. Feindschaft und Hass, die Werke des Neikos, die gleichbedeutend mit Trennung sind, entstehen dagegen nur zwischen dem Artfremden; das Gleichartige kann sich nicht verfeinden...."

⁴¹Taylor 300.

⁴²See F. Solmsen, "Love and Strife in Empedocles' Cosmology," *Phronesis* 10 (1965) 117 f.

conclude that, in this matter as in earlier ones, it is unlikely that Timaeus has been influenced by Empedocles.

The possible influence of Empedocles' notion of Love on Timaeus' *Nous* may also be questioned. Skemp himself is more uncertain on this matter than he seems to be on the alleged connection between Strife and Necessity:

If Plato could take over the *ρίζώματα* and, to some degree, *νέικος*, and if he followed Empedocles in an implied denial of the void, why should he refuse to bring into his cosmos the old binding force of *φιλία*, as Empedocles had done, when the phenomena demanded it?⁴³

This seems to be a rhetorical question, which leaves a number of problems unresolved: (a) to what degree, if any, did Timaeus appropriate Empedocles' Strife; (b) to what extent does Timaeus' denial of a void owe more to Empedocles than to Parmenides, or even Melissus; (c) and even if one grants the truth of the antecedents, does the consequent follow? That there is a binding force in Timaeus' cosmology cannot be denied, but to see this as the result of Empedocles' influence hardly does justice either to Timaeus' imagination, or to the obvious need of any cosmology for explaining the cohesion of various entities, including the cosmos itself. More importantly, the one alleged echo of Empedocles at 58a 4–6 is not sufficient to establish a connection between his Love and Timaeus' Reason:

ἡ τοῦ παντός περίοδος, ἐπειδὴ συμπεριέλαβεν τὰ γένη, κυκλοτερὴς οὖσα καὶ πρὸς αὐτὴν πεφυκυῖα βούλεσθαι συνιέναι, σφίγγει πάντα καὶ κενὴν χώραν οὐδεμίαν ἐξλείεσθαι.

No doubt spherical shape is a work of Reason; similarly, the Sphere is the result of Love's activity. A comparison, however, of 58a 4–6 with B8.3–4,⁴⁴

γαῖα τε καὶ πόντος πολυκύμων ἢ δ' ὕγρὸς ἄηρ
Τιτὰν ἢ δ' αἰθὴρ σφίγγων περὶ κύκλον ἅπαντα

suggests that, apart from the striking term *σφίγγων*, there is no sure basis for seeing here Empedoclean influence on Timaeus.⁴⁵ Whatever *περίοδος* means at 58a 5, it seems hardly equivalent to Empedocles' *Τιτὰν*

⁴³Skemp 64.

⁴⁴See Archer-Hind (above, note 18) 209 and Taylor 398. Taylor is, however, somewhat critical of Archer-Hind's interpretation of the passage. It is strange that Skemp does not cite B38. 3–4, especially since he is concerned to show similarity between Timaeus' *Nous* and Empedocles' *Philia* in the context of the *períodos*.

⁴⁵Bignone, however, thought that *σφίγγει* is "un' espressione poetica certamente tolta ad Empedocle" (619), and the image of the circling *períodos* (though not the word) is similar to Empedocles' *dine* (see B35. 3 f.), though it is difficult to correlate this with his Love, which is found "in the middle of the whirl."

ἡδ' αἰθῆρ σφιγγων The activity of "constricting" or "embracing" is attributed to the *aither* by Empedocles; it is attributed to the *periodos* by Timaeus. Precisely how this might establish a connection between Timaeus' Reason and Empedocles' Love is not clear.

It appears that Timaeus' views of Reason and Necessity owe little, if anything, to Empedocles' notions of Love and Strife. Perhaps, however, Timaeus' thesis about the world's eternity and uniqueness is directed against Empedocles. To be sure, Timaeus does not claim that the world is absolutely indestructible. Only the demiurge, however, could dissolve it (32c), and it is unlikely he would do so because of his goodness. Thus, Timaeus envisages no future destruction of the cosmos, and therefore no cyclic process involving its periodic dissolution and reconstruction. In any case, Timaeus seems more concerned to emphasize the world's uniqueness (see 31a-b), and his arguments do not seem primarily directed against the doctrine of a succession of worlds. Bignone, Taylor, and Cornford have suggested that Timaeus' affirmation of the world's uniqueness and eternity may be directed against Empedocles.⁴⁶ This is certainly possible, but without going into the much vexed problem of Empedocles' belief, if any, in a cosmic cycle, suffice it to note that the idea of a succession of worlds may also have existed in other ancient systems, e.g., Anaximander's (though the meaning of his "infinite worlds" is still in dispute).⁴⁷ In brief, there is no definite indication that Timaeus was thinking of Empedocles, and Plato had his own reasons for asserting the world's eternity and uniqueness, the divergence from Empedocles being secondary at best. More specifically, Plato's primary reasons for asserting the world's eternity and uniqueness are the demiurge's goodness and perfection (29d f.), and the existence of a single, eternal model embracing all "living creatures" (30c f.). Neither doctrine is found in Empedocles.

Thus far, with the exception of the *mixis* of the four elements, and some probable verbal echoes or conceptual similarities in connection with divine craftsmanship, it has been hard to find significant influence of Empedocles on the *Timaeus*. If one turns, however, to Timaeus' biological views, the likelihood of influence has seemed greater to many scholars.⁴⁸

Much has been written on Timaeus' and Empedocles' theories of vision,⁴⁹ beginning probably with Aristotle, who associated their views (*Sens.* 437b 10 f.). Yet he seems to offer two different accounts of Em-

⁴⁶See, for example, Bignone 615 f.; Taylor 79 and *passim*; Cornford 43.

⁴⁷See Guthrie 106 f.

⁴⁸Besides the standard commentaries on both thinkers, see, for example, Solmsen, "Tissues and the Soul" (above, note 7), or J. I. Beare, *Greek Theories of Elementary Cognition* (Oxford 1906), esp. 14-23 for Empedocles' views, and 42-56 for those of Timaeus.

⁴⁹For a good annotated bibliography see O'Brien, *art. cit.* (above, note 7) 158-159.

pedocles' theory of vision. According to him, Empedocles sometimes attributes vision to fire emerging from the eyes and at other times to effluences from visible objects (437b 23). The latter interpretation of Empedocles' theory of sight is also found in Theophrastus, *Sens.* 7–8: he says nothing, however, about fire leaving the eye as a factor in the act of vision.⁵⁰ It seems reasonably certain that Aristotle's first interpretation is based on B84, the only extensive fragment of Empedocles dealing with vision (see also B68). *Prima facie*, Timaeus' theory of vision is also based on B84. According to his account, the essential organ of vision is a stream of gentle fire (not having a caustic quality) similar to the fire of daylight. In vision, this stream issues from the eye, fuses with the surrounding light or "fire," and forms a single compacted body. The "visual ray" thus formed is actually a temporary organ of the body, as sight results from this organ's contact with external bodies. At night, since there is no sunlight, the fusion is impossible. Hence, we do not see in the dark. Moreover, at night, the fire which normally goes through the eye's passages is turned back to the organism's interior, equalizing motion there and causing sleep. Ultimately sight, like hearing, reveals to us the world's harmony, and so is purposive in function.

If Timaeus' account is compared with Empedocles' in B84, it is clear that an important similarity between them is the notion that there is a fine fire within the eye's membranes. Otherwise, B84 seems to be a brief description of the eye's composition and structure which Aristotle may have misapprehended; for B84 may not be a theory of vision, but only an attempt to explain the gleaming and flashing of the eyes.⁵¹ It is also quite possible that Aristotle's meaning in *Sens.* 437b 10–438a 5 has been misunderstood by commentators, for if D. O'Brien is correct, Aristotle did not make fire leaving the eye responsible for vision in Empedocles' theory. Empedocles is only associated with those who, like Aristotle, think the eye is made of fire. It was Plato who extended Empedocles' theory to make outward-flowing fire responsible for vision,⁵² and in doing so he may also have diverged from Empedocles' view on effluences and pores. According to Archer-Hind and other interpreters, Empedocles maintained that sensations are primarily caused by effluences (*ἀπορροαί*)

⁵⁰*Ibid.* 140, n. 3. O'Brien observes that Cherniss and Bignone are exceptional in denying any part to outward-flowing fire in Empedocles' theory of vision (141, n. 5), but see also Bollack 3.2.314, 361, 365. Bollack (361) rightly observes that "la théorie d'Empédocle inspire, en effet, Platon dans le *Timée*, bien qu'il s'en soit éloigné dans le détail . . .," and, according to him, "les rayons s'arrêtent à la surface de l'oeil" (365).

⁵¹See H. Cherniss (above, note 1) 318, n. 106. O'Brien's conclusion that outward-flowing fire does not play an important role in Empedocles' theory of vision, but that B84 describes the composition or structure of the eye, does not seem to differ from Cherniss's interpretation of the fragment.

⁵²O'Brien 146.

from objects, which fit into passages (πόροι) of the sense organs.⁵³ Theophrastus reports (*Sens.* ch.7 f.) that Empedocles used the theory to explain colour vision: e.g., effluences from white objects fit the eyes' fiery passages; those from black the watery (cf. *Pl. Meno* 76c-d). In *Tim.* 45b f., however, there is no mention of "pores," and as Archer-Hind observed, Timaeus' assumption of effluences of rays from objects "has little resemblance to the Empedoklean ἀπορροιαί."⁵⁴ Taylor partly met this objection, noting that Timaeus is unconcerned with colour vision in 45b f., but in 67c, where he does deal with it, "Empedocles' sense physiology is carefully reproduced. ... So the 'effluences' are ultimately in Timaeus' account too ..." (see 67c 6, where colour is explained as φλόγα τῶν σωμάτων ἐκάστων ἀπορρέουσιν ὅψει σύμμετρα μόρια ἔχουσιν πρὸς αἴσθησιν).⁵⁵ Taylor's rejoinder, however, is not wholly convincing, since the pores are still not clearly found in 67c f. In fact, Timaeus continues to think primarily of the visual ray or stream, and it is this which is affected by the "particles" (μόρια) of colours. This visual ray, however, can be affected by rapid or piercing motion of certain fiery particles right up to the eyeball's passages (τὰς διεξόδους, 67c 8; the term perhaps recalls Empedocles' πόροι). In any case, Plato was quite familiar with Empedocles' notion of effluences and pores (see *Meno* 76c-d),⁵⁶ and it seems odd that this latter feature is hardly present, if at all, in Timaeus' account of vision. Even Theophrastus, who reports Plato's theory of vision (*Sens.* ch.5), while emphasizing Plato's belief in "effluences," leaves the existence of *poroi* unclear. In sum, Timaeus, unlike Empedocles, thinks that vision is primarily a matter of fire leaving the eye and joining fire outside to form a ray along which movements from a visible object are communicated to the eye. He also gives little emphasis to effluences and none to pores, the main elements of Empedocles' theory.

Two minor points in connection with Empedocles' and Timaeus' theories of vision remain for consideration. The first concerns their

⁵³Archer-Hind 156 f. (above, note 18). See also Bollack 3.1.330 f., O'Brien, *art. cit.* (above, note 7) 158-159.

⁵⁴Archer-Hind (above, note 18) 157.

⁵⁵Taylor 280.

⁵⁶Archer-Hind (248; above, note 18) is probably correct in remarking that "Plato's conception differs from the Demokritean or Empedoklean effluences, inasmuch as he does not hold that any object of the image is thrown off." See also G. M. Stratton, *Theophrastus and the Greek Physiological Psychology before Aristotle* (London 1917) 220, who claims that Theophrastus' report (*Sens.* ch. 91) that Timaeus generally agrees with Empedocles on colours does "great violence to Plato's doctrine." On the *Meno* passage, Diels concluded "dass also Platon an dieser Stelle nicht bloss nach ungefährender Kenntnis des Empedokleischen System sich selbst eine Definition gebildet hat, steht ganz sicher" ("Gorgias und Empedokles," *SBBerl* 19 [1884] 346). In support of his remarks, Diels noted Plato's use of ἀπορροιαί and ἀρμόττειν, terms found in B89 and B107. On the *Meno* passage, see also Bollack 3.2.361 f.

treatment of mirror images; the second, the actions of Timaeus' god and Empedocles' Love.

In his *Placita* (Empedocles A88, DK), Aetius briefly reports:

Concerning images in mirrors, Empedocles says that they are produced through the effluences which collect on the surface of the mirror and are condensed by the fire which is expelled from the mirror and carries with it the air in front into which the streams are carried.⁵⁷

Guthrie is probably correct in remarking that Empedocles' attempt to explain mirror images "must have seemed especially perplexing to scientific students unacquainted with the simplest laws of optics,"⁵⁸ and it may have provided the impetus for Plato's discussion in *Tim.* 46a-c. According to Timaeus:

As a result of the combination of the two fires, inside and outside, and again as a consequence of the formation, on each occasion, at the smooth surface, of a single fire which is in various ways changed in form, all such reflexions necessarily occur, the fire belonging to the face (i.e. the face seen in the mirror) coalescing, on the smooth and bright surface, with the fire belonging to the visual ray.⁵⁹

There may, of course, be similarity between the two accounts (Bollack sees Guthrie's comparison of Aetius' report on Empedocles with the *Timaeus* as "justifié"),⁶⁰ but Guthrie himself notes that Plato departed from Empedocles' "explanation of mirror-images by making no use of 'air.'"⁶¹ It is, moreover, doubtful whether Plato's two "fires," internal and external, were derived from Empedocles' theory; for, if the previous discussion is correct, Empedocles did not explain vision in terms of fire issuing from the eye and joining with the surrounding light. In general, it is risky to base any conclusion about Empedocles' influence on Timaeus' view of mirror-images on Aetius' summary, which Guthrie himself rightly considers "inadequate."⁶²

The second point concerns the end of Timaeus' account of vision beginning at 68d. According to Timaeus, the god has power to blend many into one, and again to dissolve the one into many, and this view seems reminiscent of Empedocles B17.1 f., where a one grows out of many, and a many grows out of one. Moreover, Timaeus speaks of compound colours as if they were pigments such as a painter makes, mixing together other pigments; cf. B23, where Empedocles employs a simile, likening the pro-

⁵⁷Guthrie's translation, 2.237.

⁵⁸*Ibid.* 2. 237-238.

⁵⁹Cornford's translation (154), partially elaborated by Guthrie (2.238). On the notion of "inside and outside" the eye, see Guthrie 2.238, n. 3.

⁶⁰Bollack 3.1.272, n. 2.

⁶¹Guthrie 2.238.

⁶²*Ibid.*

duction of natural objects to the activity of painters.⁶³ But similarities such as these between Timaeus' demiurge and Empedocles' Philotes are not enough to prove Timaeus' dependence on Empedocles for his theory of vision. Indeed, apart from the common notion of fire in the eye, and perhaps that of effluences and mirror-images, it has been difficult to find any clear influence of Empedocles on his theory.

Another section of the *Timaeus* much discussed in connection with Empedocles' supposed influence is the account of breathing in 77e–79e.⁶⁴ Bignone was perhaps the first to suggest that there is a close parallel between Timaeus' account (especially 79c f.) and that of Empedocles in B100.⁶⁵ More recently, D. Furley has argued that, since Timaeus maintains a circulatory account of breathing, there is here an indication that Empedocles held the same belief.⁶⁶

There is, of course, no doubt that Timaeus presents a circulatory explanation of breathing. When air is expelled from the lungs through the mouth and nose, it displaces the air outside the body. This displaced air must go somewhere, and, according to Timaeus, it enters the body through the pores of the skin. Hence, the entire time that air leaves the body through the nose and mouth, other air enters through the pores. Similarly, when air is inhaled through the nose and mouth, air is simultaneously expelled through the pores, the whole motion being governed by the motions of the hot element inside the body (see 79d).

It has been commonly thought that Empedocles' simile of the clepsydra in B100 describes breathing through the skin, *διὸν*, as well as through the mouth and nostrils, and that Aristotle misunderstood *διὸν* in his *De respiratione* 473a 15–474a 24.⁶⁷ But, according to N. B. Booth and recently D. O'Brien, it is impossible to derive any circulatory account of breathing

⁶³For a detailed discussion of the fragment, see Bollack 3.1.120 f. According to him, "le peintre reçoit le privilège démiurgique du penseur. Connaissant le secret des couleurs, il imite l'action d'Aphrodite artisanne qui mélange les éléments . . ." (122).

⁶⁴For a good annotated bibliography of modern interpretations of Empedocles' theory of breathing see O'Brien, *art. cit.* (above, note 7) 169 f. There is, however, a misprint in his note's title: for "vision" read "breathing."

⁶⁵Bignone 621, n. 5.

⁶⁶D. J. Furley, "Empedocles and the Clepsydra," *JHS* 77 (1957) 31–34. Archer-Hind (above, note 18) was more cautious. According to him, Timaeus' theory "bears a certain resemblance to that of Empedocles," but he points out that Aristotle's statement in *De respiratione* 437b 9 is "not very clear" (295).

⁶⁷See, for example, Cherniss (above, note 1) 263 f., and O'Brien's other references, *art. cit.* (above, note 7) 169 f. Bollack, 3.2.471 f., who is convinced that *διὸν* means "peau," offers an unconvincing argument in support of Aristotle's accuracy. According to him, Aristotle begins by describing breathing through the nose, "mais la première partie de la critique d'Aristote ne s'applique pas étroitement au contenu de 550" (550 = B100). But Aristotle's résumé in 473b 1–10, which corresponds to the first eight verses of B100, shows that Aristotle also knew of breathing through the skin. Contrary to

from B100.⁶⁸ To summarize Booth's discussion first: *ῥινῶν* in B100 probably means "nostrils,"⁶⁹ but whether it refers to the nose or skin, the air comes in and out through only *one* channel. Hence, if Empedocles intended to give a "circulatory account of breathing, including both breathing through the nose *and* breathing through the skin, all we can say is that he has not given it either here or in any other extant fragment."⁷⁰ O'Brien agrees that B100 is meant to describe breathing through the nostrils and not through the skin, but he argues against Booth's supposition that water in the clepsydra represents air in breathing, and that air in the clepsydra represents blood.⁷¹ According to O'Brien, the simile of the clepsydra in B100, indeed the entire fragment, was largely misunderstood in attempts to compare it with Plato's account in the *Timaeus* (for example, Furley's "Platonising interpretation"), and if the comparison of the skin's pores and the clepsydra's perforations (at the bottom of the vessel) is abandoned, the relation of air and water in the clepsydra "matches exactly the relation of air and blood in breathing."⁷² In sum,

Bollack, however, nothing shows clearly that Aristotle's discussion of B100 has moved from breathing through the nostrils to breathing through the skin. If so, why does Aristotle immediately return to a discussion of breathing through the mouth and nose after quoting B100?

⁶⁸N. B. Booth, "Empedocles' Account of Breathing," *JHS* 80 (1960) 10–15 and O'Brien 150 f.

⁶⁹Booth, *ibid.* 14; see also O'Brien, *art. cit.* (above, note 7) 146–147 and 173, who admits *ῥινῶν* is ambiguous between "skin" and "nostrils," but attempts to solve the ambiguity in light of Aristotle's evidence and the sense of B100 as a whole. Bollack, 3.2.481, takes the word as meaning "peau," and remarks that it is only ambiguous "pour les interprètes qui tantôt, lorsqu'ils choisissent le sens de *peau*, ont considéré qu'Aristote en parlant des narines . . . s'était trompé . . . , tantôt ont adopté le sens qu'ils trouvaient chez lui" For him, it is not necessary to accept either alternative. On the contrary, "Aristote perce la signification que revêt le mot: la peau est criblée de *bouches* et de *narines*, comme de *palpes* . . . La narine est l'organe qui comprend toutes les formes de la respiration." Despite his interpretation, however, he does not seem to want to admit "nécessairement un double mouvement circulaire comme dans la théorie du *Timée*," 3.2.474. If O'Brien's discussion is correct, Bollack's interpretation of B100 seems needlessly complicated and fanciful. There is no clear evidence that Aristotle understood *ῥινῶν* as anything other than "nostrils," and how the notion that the skin is pierced with "mouths *and* nostrils" shows that the nostril is "l'organe qui comprend toutes les formes de la respiration," is not at all clear.

⁷⁰Booth (above, note 68) 14. Italics mine.

⁷¹Bollack 1.244 and 3.2.475 f. equates both air and water in the clepsydra with air in breathing, while he thinks blood is represented by the girl's hand. For a critique of this view see O'Brien, *art. cit.* (above, note 7) 178. See also 151 f. and n. 72 below.

⁷²More specifically, "the clepsydra is filled alternately with air and water, in the same way that the lungs or chest are filled alternately with air and with blood. Air passes up and down through the neck of the clepsydra, in the same way air is breathed in and out through the mouth or nostrils. Water passes in and through the base of clepsydra, in the same way that blood wells up and then drops back through veins in the lungs or chest" (152).

if Booth's and O'Brien's discussions are substantially correct, Empedocles' influence on Timaeus' account of respiration is largely non-existent. O'Brien does not, of course, deny a possible relationship between Timaeus' and Empedocles' accounts of breathing, since for Empedocles, as for Plato, breathing may have served to avoid a vacuum, and also to provide for a cooling of an organism's inner heat. O'Brien admits, however, that his suggestions are "speculative" and "conjectural," and nothing definite can be ascertained concerning Empedocles' influence on Timaeus' account of breathing.⁷³

Finally, the possible influence of Empedocles on Timaeus' theory of bodily tissues deserves serious consideration, especially in view of Solmsen's discussion, to which much of the following is indebted.⁷⁴ For Timaeus, tissues such as marrow, bone, and flesh are mixtures of some or of all the four elements: bone consists of earth, water, and fire (Empedocles claimed a similar combination: see B73, B96); flesh consists of water, earth, and fire with a "ferment composed of acid and saline" (for Empedocles, flesh has all roots in equal or almost equal proportions: see B98);⁷⁵ marrow, the first and basic tissue, also has the four elements harmoniously mixed (Empedocles' conception of this tissue, if he had one, has not survived).⁷⁶

Marrow is, of course, the substance of the brain and of sperm, and in both manifestations marrow is related to immortality; the brain is the seat of human intelligence, the divine part of the soul; mankind prolongs its earthly life by reproduction; and the marrow includes some soul "forms" which determine an individual's lives in future reincarnations.⁷⁷ Empedocles, however, apparently did not influence this theory of Timaeus. According to Empedocles, blood, not marrow, is the seat and agent of "thought" (*νόημα*). Like flesh, it consists of equal portions of the four roots (see Theophr. *Sens.* ch.10 f.), presumably because these are each needed in the right amount so that the individual (who "thinks" with the blood: see B105) can comprehend the external world, which is akin to and homogeneous with human thought, the four roots being in all things. But for Timaeus, the blood is primarily the agent of nutrition, and he completely ignores Empedocles' identification of blood with "thought." In brief, other than the presence of the four roots or elements in both, Empedocles' account of blood and Timaeus' discussion of marrow have little in common.

⁷³*Ibid.* 167-168. As in the case of Plato's theory of vision, so in the case of his theory of respiration, O'Brien is inclined to stress Plato's originality (*ibid.* 157, n. 2 and 166 f. respectively).

⁷⁴Solmsen (above, note 7) esp. 446 f. Timaeus' account of the tissues begins at 42e 7 f.

⁷⁵In Plato's account of flesh, air is absent. Solmsen (*ibid.* 448) takes this as a "revision" of Empedocles' description.

⁷⁶*Ibid.*, especially 446 and 458.

⁷⁷*Ibid.* 450 f.

Timaeus proceeds to explain other tissues, e.g., skin, nails, and hair, which also received attention from Empedocles (for nails, see A78). In particular, his account of hair (76b f.) may have been partly influenced by Empedocles. According to Timaeus' account, as skin is a scum formed on the flesh's exposed surface, hair is a mixture (*mixis*) of what is left of the water mingled with earth, also an ingredient in flesh. As Taylor observed, the view that earth is a "prominent ingredient in flesh seems to go back to Empedocles," for in B76 turtles and shell-fish are given as examples of creatures in which earth forces itself to the outside of the skin.⁷⁸ But more to the point, in B82 Empedocles seems to anticipate comparative morphology, noting that hair, feathers, leaves, and scales are all the same kind of thing, and at 91d 7 Timaeus makes use of this identity of hair and feathers established by Empedocles, though his subject is reincarnation, not "homology."

That there are similarities between Empedocles' and Timaeus' accounts of the tissues of the body cannot be denied. The basic notion common to both is that of mixture (*mixis*) of the four roots or elements. There is, however, an important difference between their explanations of tissues, and that is the absence, as in the case of their explanations of vision, of any obvious teleological considerations in Empedocles' thought. The notion of teleology may, of course, apply in some sense to Empedocles' thought. Insofar as Love finds its "end" or purpose in the creation of living things, Empedocles has a kind of teleology.⁷⁹ Yet generally Empedocles seemed to think of things as "just happening." For example, fire "chanced to meet" a little earth in the making of the eye (B85); "by the whim of chance (*τύχη*) all things think" (B103); "insofar as the finest bodies met by chance in their fall" (B104). In citing these examples Simplicius adds: "one may find many such expressions in Empedocles' *Physica*" (*Phys.* 331.10).⁸⁰ On the whole, whatever "teleology" there may be in Empedocles' thought, it seems minimal at best. But for Timaeus the notion of teleology is pervasive. For example, bones were formed in order

⁷⁸Taylor 538.

⁷⁹As perhaps in B96, where the four roots are about equally mingled in the "perfect harbours of Cypris" (1.3) to form blood. See Solmsen's interesting remarks (above, note 7) 439, and compare these with Bollack 1.44 and 68, 3.2.453.

⁸⁰Apropos of Bollack's comments on B103, I cannot accept his interpretation that the *τύχη* of this fragment "n'est pas la chance du langage des hommes . . . mais, réinterprété, le bonheur de Philotès" (3.2.453). Granted that Aristotle's interpretation of Empedocles may be based on "un parti pris" (see 1.68), and that *τυγχάνειν* in Empedocles need not always mean "to chance," but can also mean "to get, acquire, or receive," e.g., at B75.2, it is by no means clear that "loin de désigner l'accident et l'exception, il implique la réussite" (1.68). Bollack's discussion does not take sufficient account of Simplicius. In *Phys.* 330.21 f. Diels. Simplicius was certainly familiar with a large portion of Empedocles' poems, and nothing in his commentary can be used in support of Bollack's claims. For a more balanced judgment on chance in Empedocles see Guthrie 2.161 f.

to protect the marrow; in turn, sinew and flesh were devised to protect the bone; hair protects the brain. Ultimately, the organs or tissues are viewed not in relation to the safety and well-being of the organism, but in relation to that of the intellect (see 45a 7 f.) and the destiny or purpose of mankind. Indeed, teleological considerations are present throughout Timaeus' account, and herein can be discerned a fundamental difference between his and Empedocles' explanations of the tissues.

In conclusion, if the three criteria for determining influence initially proposed in this study are adequate, it is clear that: (a) there are no direct references to Empedocles or to his works in the *Timaeus*; (b) there are no apparent quotations, or readily identifiable verbal echoes or paraphrases; (c) there are similarities of thought, especially in connection with mixture (*mixis*) and the roles of Empedocles' Love and Timaeus' gods as craftsmen. There is certainly a resemblance in their accounts of bodily tissues, and some similarity between their theories of vision, notably the fiery nature of the eye; that Plato's theory of respiration has been influenced by Empedocles is less clear. No doubt Plato has been influenced by Empedoclean tradition, if not by Empedocles himself, in the belief that the main components of the physical world are the four roots or elements. The other cardinal doctrines of Empedocles and Timaeus, however, concerning the existence of Love and Strife, and of Reason and Necessity, seem to bear little, if any, resemblance to one another. It is, of course, possible that Timaeus' declaration that his account is "likely" or "probable" is directed against Empedocles' "genuine" or "undeceitful" account (cf. *Tim.* 29c-d and Empedocles B17.25 f., B3), though there is no specific indication that Timaeus had Empedocles in mind. No doubt it can be presumed that Empedocles' views became common currency in antiquity and that Plato was familiar with them (see *Meno* 76c, *Tht.* 152a, *Soph.* 242e f.), but from this it does not follow that Empedocles' influence on the *Timaeus* was as great as Taylor claimed.⁸¹ Moreover, Empedocles himself drew on previous thinkers, especially Parmenides, and though Diels' evaluation of this work as "ein interessanter Eklekticismus" with "wenig originellen Gehalte" is much too harsh,⁸² it helps to illustrate the problem of knowing what doctrines in the *Timaeus*, e.g., the sphericity of the cosmos (33b),⁸³ the apparent denial of void (58a), and the trans-

⁸¹See above, p. 145.

⁸²Diels (above, note 56) 343.

⁸³Bollack (3.1.107) notes that Simplicius (*In Phys.* 31.18 f.) found "dans Empédocle la préfiguration du *Timée* (1.23 ss.) où les quatre idées (les êtres vivants assimilés aux quatre régions cosmiques, dieu = ciel = feu, oiseaux = atmosphère = air, poissons = mer = eau, quadrupèdes = sol = terre, *Timée*, 39e-40a) . . .," but this does not prove that Plato's spherical universe was derived from Empedocles, nor is the *Timaeus* passage any justification for a neo-Platonic interpretation of Empedocles such as that of Bollack. For a criticism of Bollack's general interpretation of Empedocles see O'Brien 161 f.

migration of souls (91e f.), can clearly be attributed to Empedocles. That there are some important influences is most likely, but much more cannot be asserted with confidence, and it would, in any case, be a mistake to minimize such obviously original Platonic conceptions in the *Timaeus* as the demiurge or *stoicheia*.⁸⁴

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⁸⁴I am grateful to Friedrich Solmsen for reading this study in varying stages and giving me the benefit of his acumen and learning, and to a reader of *Phoenix* for a helpful critique of an earlier draft.