THE UNIVERSITY *of* EDINBURGH

Plato's Causal Theory of the Nature of Man in The Timaeus 69a6-92c9

Níels Hermannsson

PhD

The University of Edinburgh

2016

Declaration

a) This doctoral thesis, entitled ***Plato's Causal Theory of the Nature of Man in The Timaeus 69a6-92c9*** has been composed by myself, ***Níels Hermannsson***; and

b) is the candidate's own work; and

c) has not been submitted for any other degree or professional qualification other than this PhD as currently specified.

Níels Hermannsson

_____

Date

_____

Table of Contents

Acknowledgements

I started work on this thesis at the encouragement and under the supervision of Dr Inna Kupreeva and I brought it to conclusion under the supervision of Professor Theodore Scaltsas. I thank them both for their respective contributions. Dr Andrew Mason gave invaluable feedback and criticism of my ideas and text in their final phases, persuading me to rethink and reshape important parts of my argument, for which I will remain grateful.

Of course, I alone bear full responsibility for all the faults and shortcomings of the results. In the course of the work I have had the privilege to meet and to engage with scholars and fellow students in the field and I extend them all my sincere gratitude.

My sons, Pétur and Ari, have been enduring sources of inspiration and support for which I humbly thank them. My greatest debt of gratitude is to my wife Jo Clayton for her unfailing love, support and skilful help at all stages of this challenging study.

Abstract

Timaeus 69a6-92c9 is a causal theory of the nature of man. Demigods, created heavenly bodies, take over soul and four elements, structured by a divine, good craftsman, who uses mathematical processes on things of two unlike origins. Imitating their creator, the demigods build man and leave him to run his life. What each individual man 'takes over' varies as does his individual and society's handling of it, resulting in human lives ranging from the god-like to the murkiest low-life. This, through cycles of reincarnation, diversifies fauna bringing life, and extending the influence of reason into every elemental region; in a word it brings the heavens down to earth.

Presented as anatomy, physiology, nosology and care of man, this is ancient Greek medical theory in the widest sense, including the use of hypothesis and claims about the soul. It mentions but stops short of addressing social and political levels. As cosmogony it is concerned with a micro-cosmos, but as cosmology with the running of this micro-cosmos within the macro-cosmos and as a part serving its overall being and purpose, as an organ serves and is served by the whole body of which it is an inner part. As a medical theory it brims with debated issues. Has Plato successfully answered the objections against using hypotheses, raised in *On Ancient Medicine* (Ch. III)? Is Aristotle's objection to the theory of breathing a challenge to Plato's analogy of macro- and micro cosmology? Why did Plato, unlike Galen later, chose to include soul in medicine, and to emphasise the elements, rather than the humours? Does movement as a cause of change and the different kinds of movements available for man's self-care (Ch. V), mirror the intellectual and motivational division of human soul? Is the shaking receptacle a paradigm for vital human self-reflection?

Chapter I discusses how introductions to English translations of the *Timaeus* reflect the old debate on keeping either to the heavens or to earth, to theology or to physics. Chapter II contains an introductory discussion on the *Timaeus* as a whole, with emphasis on its structure. In chapters III on anatomy, IV on physiology and in V on diseases and care of man, I focus on the structure of the causal account with regard to man as a mixed being. Using other texts purely for contrast and comparison I keep, to the extent possible, to the *Timaeus*, and mostly to 68e1-92c9. I argue that the transition between demiurgic and lesser gods' causation at the junction of our main text and the previous lines, later carries over from the demigods to man's self-care, individually and collectively, and that it mirrors the division of labour between Timaeus, Critias and Hermocrates, as natural philosophers, whereas Socrates, the fourth participant is a philosopher of a different kind along the line of division drawn at 29b.

This thesis offers an outline of an argument for re-evaluating the *Timaeus* on the nature of man, particularly with regard to its formal logical side and its relation to rational persuasion.

Introduction

The *Timaeus* holds out a powerful lure to those interested in the relationship between philosophy and science in antiquity and in how this relationship shaped the history of each field. Michael Frede[1] has argued that philosophers'

> interest in physiological explanation of human beings got stronger in the course of the fifth century when humans and human behavior became more and more the center of attention of philosophers,[adding that] it took philosophers like Plato and Aristotle to ensure the continued study of natural philosophy in general.[2]

In my brief comparison of Xenophon's and Plato's defence for Socrates with regard to natural philosophy, a difference related to the narrower versus the wider approach also reveals a fundamental difference in religious attitude. This is a reminder of the challenges involved for man in making himself the subject of his own philosophical and scientific investigation. Sarah Broadie in her 2012 book[3] demonstrates how Plato, in the *Timaeus*, never allows us to forget the inevitable tension between having to assume an extra-mundane standpoint in any study of the world as a whole and the equally undeniable intra-mundane standpoint of any man performing such a study. To try and be aware of both standpoints and to remain epistemologically disciplined with regard to both has proven to be a challenge. David Sedley[4] warns the even after using quite some time in his book on "sketching the background to the *Timaeus*" he "cannot even begin to do justice to this uniquely rich and seminal text." Brooke Holms[5] reminds us that some of the difficulties involved remain with us. Trained as a classicist and comparatist, she remarks that: "Interdisciplinarity is often praised, but it is hard to practice. Despite sea changes in the humanities and social sciences over the past thirty years, there is a lingering sense that "we must… be alert lest the

---

[1] Michael Frede, *Philosophy and Medicine in Antiquity*, in Essays in Ancient Philosophy, Oxford 1987, XXVII, pp. 225-242
[2] Ibid, pp. 226-7.
[3] Broadie, (2012), pp. 2-3. In retrospect I happily acknowledge that Broadie is arguing for inclusion of parts which have often been side-lined or dismissed in the interpretation of the *Timaeus,* such as the proto-historical beginning and the demiurge. See her p 5.
[4] Sedley, D. (2007). *Creationism and its Critics in Antiquity*. Berkeley, Los Angeles London: University of California Press, p. 95.
[5] B. Holmes; *The Symptom and the Subject, the Emergence of the Physical Body in Ancient Greece*, Princeton , (2010). Pref. p. x.

crossing of disciplines involve a relaxing of discipline." Mark J. Schiefsky[6] demonstrates how both the author of the Hippocratic treatise *Nature of Man*, and the author of *On Ancient Medicine*, take "a clear stand against the attempt to base medicine on theories of the origin and development of the human being."[7]

In light of the above reminders of the problems involved with an investigation proceeding across disciplines, or here rather, the history of the intertwining of two or more disciplines in antiquity, it is hardly surprising that in a thesis like the present one, hard choices will eventually have to be made in order to limit the material to a manageable variety of type and extent. In my study I undertake to relate the study of man in the *Timaeus* under the headings of anatomy, physiology and care of man, to the rest of the dialogue. My main aim is to show that this section is intimately related to the other parts of the *Timaeus*, both conceptually and logically. Reference to and comparison with other authors in natural philosophy and in medicine therefore comes second or rather third after comparison within the *Timaeus* and the occasional reference to other works by Plato. Keeping it within the *Timaeus* provides some limitation and still gives us the wider view of involving natural philosophy beyond just medicine. But our gain in this latter respect comes at the cost of accuracy and depth on each of these major subjects. In my main text and in the summary and conclusion, I hope to justify this cost against the gains it may bring. For further description of the structure or the text I refer you to the abstract.

[6] Mark J. Schiefsky, *Hippocrates On Ancient Medicine*, translated with introduction and commentary, Brill, (2005).
[7] Ibid, pp. 22-23.

Chapter I - Scope and Aim Against the Background of the Main English Translations

Scope and aim

This is an investigation into Plato's *Timaeus*,[1] in particular the last part, from 69a6 - 92c9, which has been called[2] *The Cooperation of Intellect and Necessity in the Psychophysical Formation of Man and Other Living Things.*

The added subtitle contains a great deal: Plato's 'Intellect' we will at this point call Reason, 'Necessity', Nature. The unfolding saga of these forces is about the formation of man and other living things. That this part[3] of the project is based on cooperation between Intellect and Necessity is stressed in the beginning and reiterated in the word 'psychophysical', pertaining to the mixed nature of a living thing, that to be a living thing is to be, or partake of, Intellect and Necessity, Reason and Nature. The subtitle is not Plato's own; it rather reflects the tradition of commentaries on his work.[4] In what follows I reflect critically on what seems to me a selective and therefore misleadingly simplified interpretation of the *Timaeus*. Plato announces summaries and change of task, but this involves looking back in the text as well as forward, and last but not least taking a hard look at what is said at this very point in the narrative, regarding the changing role of the newly arrived at conclusion, as a hypothesis in the argument which is about to be embarked upon. My main concern is that each new starting point contains in the new guise of an accepted

[1] I will for the most part be using the translation of Cornford 1937, reprint 1997, and for the Greek text the Oxford 1978 edition, edited by Johannes Burnet. Greek text in mine is copied from TLG.
[2] E.g. by Zeyl, D. J. (2000). *Plato, Timaeus*. Indianapolis: Hackett Publishing Company Inc. p xciv.
[3] Much has happened in the dialogue before 69a6 and all of that has bearing on our main topic, even the Introductory Conversation and the Prologue, as Johansen argues in Johansen, T. K. (2004). *Plato's Natural Philosophy, A study in the Timaeus-Critias*. Cambridge, Cambridge University Press, ch. 2 and 3.
[4] See Claghorn, G. S. (1954). *Aristotle's Criticism of Plato's Timaeus*. pp. 1-2., Cornford on the assumption by most, although not Taylor, that "All the ancient Platonists from Aristotle to Simplicius and all the mediaeval and modern scholars to our own day have assumed that this dialogue contains the mature doctrines of its author." p. vi. For a more detailed summary of the history of the dialogue see Zeyl (2000), p xiv-xv, where Zeyl rightly connects some of the fate of the dialogue to changes in attitude towards metaphysics.

starting point, that which was delivered by another agent, another speaker as a logical conclusion of an argument or creation. There are nuances and overlaps on these turning points which are hard to render by subtitles, however useful they are otherwise.

I strive to keep to the text of the *Timaeus* for my arguments, although I also refer to other works, mainly by Plato and mainly the *Phaedo*. There are many reasons for keeping to the text of the *Timaeus*. Apart from the "extraordinary range of subjects matter and style,"[5] the parsimony necessary in such a wide-ranging text makes it necessary to refer or to assume a reference to previous parts of the text, especially if it is presented as a continuous argument or account, as the *Timaeus* is. Working on marginalised or dismissed parts of such text, as I will argue that both the first part, prior to Timaeus' speech and the chapter on the nature of man and what follows it is, makes it a huge task in itself just to relate these parts convincingly to the much more studied parts on divine and on natural causation. In this sense the problem of excess of commentary on the two types of causation and deficit of research on the other parts creates a twofold problem: in a pioneering work on the neglected parts one has little to go on, but when attempting to relate it to the other parts there will be a lot of interpretations which are hostile to it or at least incompatible with such effort. In this dissertation my emphasis is on the first task; that is to relate my main text to the rest of the dialogue and argue that even the fantastical part near the end is consistent and coherent with the foregoing argument throughout.

The *Timaeus* is presented as biology of a living god, cosmos, and kinds of living things in it. Living things are psychophysical, a merger of soul and matter. This means in Platonic parlance that reason is present and involved. Thereby questions of how to live the best life are brought to the fore.[6] Here Plato enters the field of medical science and epistemology. For Plato, health and well-being are a matter of both soul and body, both their peculiar workings *per se* and their interaction in health and diseases. Plato's ontological and epistemological emphasis

[5] Rutherford, 1995, p. 286. "The main speech in the *Timaeus* embraces an extraordinary range of subject matter and style," Note that Rutherford qualifies his statement to the main speech.
[6] Johansen (2004) makes this a leading thread in his interpretation. See e.g. p. 1 and p. 198.

on the good is expressed in his concern for health and healthy living[7] rather than the classification of sicknesses and treatment specific to them. On a pure speculation, one may wonder whether this limitation, at least with a view to the authority, status and practice of the emerging medical profession, contributed to the dismissal of the medical ideas and approach expressed in the *Timaeus*. A relevant question is whether there is a level of medical science where the ideas and arguments of the *Timaeus* might be relevant, even useful. Neither question will be pursued in this dissertation. Nor will I discuss *Timaeus* relevance to the interaction of medical theory and philosophy, during and after Plato[8].

While Plato's philosophy of science has long had its defenders amongst philosophers of science and some scientists, particularly in physics[9], none, with the notable but also challenging exception of Galen, have taken Plato's physiological and medical theory to the task. This is an astonishing fact and a worthy subject for investigation in itself. That though would belong more to the history of philosophy than the scrutiny of Plato's writing. Given Plato's contribution to, and place in our cultural identity it is high time to start exploring this territory of his authorship. As indicated above, Plato's philosophical activity [10] coincided with a revolution in medical thinking, although it is disputed what part the Theory of Forms plays and how.[11] Morrow (1968) argues that alongside the theory of primary bodies, Plato develops a late Doctrine of Forms. It seems to me hard to deny that the forms of the Same, the Different and Being, play a paradigmatic role at the *Tim.*28c6-29a2, are the ingredients of cosmic soul at the *Tim.* 31b4-34b9, and of the earthbound soul at the

---

[7] Vegetti, M. (1998). 'Between Knowledge and Practice: Hellenistic Medicine' in M. Grmek (ed.), *Western Medical Thought from Antiquity to the Middle Ages*. Cambridge Mass., London, England, Harvard University Press: p. 73) says that the making the understanding of health central to medical science was central to the transformation of medicine in the third century.

[8] See Nutton, V. (2004). *Ancient Medicine*. London and New York, ch. 8, pp. 115-128, for a recent discussion of this.

[9] For a fuller discussion of this, see Lloyd, G. E. R. (1968). 'Plato as a Natural Scientist', *The Journal of Hellenic Studies* 88: 78-92 and Lloyd, G. E. R. (1991). 'Plato on Mathematics and Nature, Myth and Science', *Methods and Problems in Greek science*. Cambridge, 333-

[10] On the presence of the theory Forms in the *Timaeus* see Ferber 1997, for causation, Lennox, 1985, Sharples and Sheppard, 2003 chapter 5, Ostenfeld, 1997, Yonezawa, 1991. For discussion on the connection between the Theory of Forms and primary bodies see Morrow 1968.

[11] For a detailed analysis and discussion of this see Brisson, L. (1974). *Le Méme et l'Autre dans la structure ontologique du Timeé de Platon*. Paris, Publications de L'Université De Paris X Nanterre, Éditions Klincksieck, Ch. 2.2 pp. 136-151.

Tim. 41d4-42e4, while the form of the Good has a teleological role throughout the dialogue[12]. Plato's peculiar corpuscular theory as well as his view of living beings as psychophysical is, I think, worth reviewing and examining, not just with an eye on ancient times but also with our own current peculiar mismatch between scientific and technical knowledge on the one hand and the state of health and health policy on the other. While my main concern is to open up interesting and rewarding lines to research into Plato's biological and medical philosophy, I suspect that such discussion might contribute to a rewarding reflection on modern concerns regarding health, health science and health policy.

Sources, both translations and commentaries

Apart from Aristotle's comments, the reception of Plato's *Timaeus* in antiquity is not a field of study I will address here. I choose to look, at this stage, primarily at the introductions to several English translations and commentaries. Although this is by no means a historical investigation, I was curious about the differing views and motivations of those who had undertaken this labour. The story of the English translations contains a strong reminder of how profoundly interpretations can vary between individuals with strong and mutually respectful knowledge of both language of and cultural background to the text translated. A.E. Taylor's commentary on the *Timaeus* is praised by his colleagues,[13] although none of them accepts his overall interpretation of the philosophical content or authorship of the dialogue.[14]

My renderings of Cornford and Zeyl are shorter than the older works of Thomas Taylor, Archer-Hind, A.E. Taylor, Benjamin Jowett and R.G Bury, for they will feature more in the ongoing discussion, although the commentary of A.E. Taylor will be a constant companion on that journey.

---

[12] Johansen, (2004) makes much of the role of the good. Claghorn (1954), e.g. pp. 126-135 offers a comparison of Plato' and Aristotle with respect to teleology, finding more that unites their view than diverges, though he also maintains that the difference between them is clear.
[13] See Cornford (1937), pp v-x, Brisson, p. 9 on both A.M. Taylor and Cornford and Zeyl, (2000), p. ix on A.M. Taylor.
[14] Ibid.

English translations of and commentary on the Timaeus

Thomas Taylor 1758-1835

Educated at St Paul's School, a devotee of Mathematics and Classics, Taylor worked as a bank clerk and then a secretary for the Society for the Encouragement of Art. He was a Neoplatonist and admired Proclus and Iamblichus. He translated extensively from ancient Greek and his work has recently been re-published by a Christian charity, the Prometheus Trust. He seems to have had his main influence on poets, a group often called the metaphysical poets; In the UK Blake, Shelley, Wordsworth and on the west side of the Atlantic, Emerson, Alcott and Mead. Among philosophers, only one friend is mentioned; John "Walking" Steward.

We now look at Thomas Taylor's 43-page introduction to his translation of the *Timaeus*, first published in 1804. Taylor begins by referring to Proclus and states that the *Timaeus* presents a comprehensive physiology which is compatible[15] with investigation into nature. Thomas Taylor seems to maintain that Plato wrote his *Timaeus* based on a book written by Timaeus of Locri[16]. And further that the book is "composed after the Pythagoric manner" of division into three parts. Taylor writes that the book presents all primary causes of nature and a little later it is clear that he is referring to Aristotle's four types of causes, from the *Physics* II, but with his own twist: Plato followed the Pythagoreans in delivering

> as the concauses of natural things, an all-receiving matter, and a material form, as subservient to proper causes in generation; but, prior to these he investigates primary causes, i.e. the producing, the paradigmatical and the final.[17]

In other words, Plato has the same division of causes but places them differently than Aristotle, with a view to the ontological realms. Taylor sees the all receiving matter and the material form as *sunaitia*. By the latter division I take Taylor to be referring to the realm of ideas, even to the idea of the Good, by final cause, and to the heavenly bodies by the 'paradigmatical'.

---

[15] Taylor, T. (1995, first ed 1804). *The Works of Plato*. Somerset, The Prometheus Trust, p. 375, uses "is conversant" and in the same sentence "speculation of the universe", which I take to be what others have called "investigation into nature" or " *peri phusios historia*."
[16] A 5th century Pythagorean.
[17] Thomas Taylor, 1996, vol ii p. 376.

Taylor ascribes to the view of "the divine Iamblichus" that "the whole theory of Plato is comprehended in these two dialogues" that is the *Parmenides* in the "intelligibles" and the *Timaeus* on the "sensibles"[18].

The order of material in both major dialogues is seen as that of exercising in discourse to that of contemplating the universe, from "athletic contention through strenuous doubts about ideas, to betake ourselves to the mystic speculation of the unities of beings."[19] On p. 379, Taylor informs the reader that Plato is not a simple materialist about nature, but "establishes its essence between soul and corporeal powers." In nature Taylor sees both the embodied soul and the ensouled body, of which the nature, by which Taylor must mean the Receptacle, verges towards material and individuation, whereas "the soul is separate from body" keeps to itself and its participation in the intellect, and "at the same time illuminating the obscure nature of matter with secondary life." (p. 379). Taylor explains Plato's use of the word 'God' as all those beings which partake of the Gods. (ibid) On p. 381 Taylor undertakes to present a comprehensive view of Plato's works to prepare the reader, and he argues for the necessity for all to be the most excellent since their first cause is "*The God*". In such order all must be aligned by "habituation or alliance" and be divided into movers and moved. The world of generation is, for Taylor, perpetually generated, but at the same time has "perpetuity of duration, though this is no more than a flowing eternity". (p. 382). Taylor has a long discussion about the elements and about earth being the centre of the universe, despite what modern men think they see through telescopes. Thomas Taylor puts his trust in the ancients of his own choice. I leave out a long chapter on Taylor's version of combined theology and cosmology, going next to his comments on various parts of the *Timaeus*. On the Atlantis story, Thomas Taylor follows those of the ancients, i.e. Iamblichus, Syrianus and Proclus, who look on it as reflecting perpetual opposition between various opposites such as essence and accidence, unity and multitude, bound and infinity, sameness and difference, etc. (see p. 393). So Taylor takes the story about Atlantis as real. On p. 396 Taylor turns to the question of generation and temporality. Taylor

[18] Thomas Taylor, 1996, vol. ii, p. 380.
[19] Ibid.

writes that by *generation* Plato expresses the "flowing and composite nature" (p. 396) of the world and not a point of coming into being, or as Taylor puts it "temporal commencement of its existence." (ibid) and of the division between generated and un-generated he writes:

> Every thing prior to soul always *is*, and is never generated; but soul both *is*, and is perpetually generated; and the world never *is* but is always generated: and whatever the world contains in like manner never is; but instead of being always generated, like the whole world, it is so at some particular time.

Further, on p. 397, referring to Proclus; "Plato means nothing more by *generation* than the formation of bodies, i.e. a motion or procession towards the integrity and perfection of the universe." His discussion of the demiurge as Jupiter I find difficult to comprehend, and pass over since this is not of major importance to this study. However, he seems to refer to the version of Plato's theory of Forms, which some interpreters read out of the *Philebus*, speaking of triads. The hierarchy Thomas Taylor describes is *The One*, a unifying energy, intellect, being the demiurge (I take it) and soul, as the principle of moving or "moving all" as Taylor writes. (p. 397) He uses the simile of a potter, speaking of "matter invested with form and distributed into order." (p. 397). On what might have been the order in time and the state of matter, probably referring to the traces in the Receptacle, Thomas Taylor writes:

> priority here implying nothing more than that which must be considered first in the construction of the world. Nor was it [matter] hurled about in a disordered state prior to order; but this only signifies its confused and tumultuous nature, when considered in itself, divested of the supervening irradiations of form. (p. 398)

On the elements he refers us to Proclus. He moves from the elemental qualities, such as "subtle, acute, movable" of fire to numerical ratios, such as 3 x 5 x 4 , (also for fire). There are many kinds of each element, and one should not think that the characteristics of fire are heat of upward motion: that applies only to earthly fires, but visibility, although our eyes are not meant for their celestial variant, for there are both immaterial and material kinds of fire (p. 399). The opposition of fire on the one hand and earth on the other is motion, fire being "always in motion but earth always immovable." (ibid) If 'movement' is taken to mean transformability into other elements, Taylor is quite in unison with Plato's text. (See the *Tim.*56 d6-7). He then

describes the intermediate and mediating status and function of air and water between the extremes of fire and earth.

Thomas Taylor has a lot to say on the embodied soul, or the "mundane soul", as he calls it (p. 399). He claims it to have, by necessity, five genera, "*essence, permanency, motion, sameness, difference*," (ibid) although, "Plato for the sake of brevity, assumes only three of these." (p. 400). Taylor then describes the numerology and musicology of the soul, citing Proclus and Syrianus as ancient sources and support. Taylor's emphasis is on the intermediate nature of the human soul and the separation of forms from things affected by them. He writes, "With respect to harmony, soul is neither harmony itself, nor that which subsists in harmonized natures" (p. 403). Yet its harmony is "imparting harmony to others, and being the first to participate of it herself." (p. 404). There is a lengthy discourse on the numerical and mathematical construction of the soul, and Taylor claims that it "essentially pre-assumes all disciplines;" (p. 405) being the geometrical, the arithmetical and the harmonical. (ibid).

But why does Plato call the earth God? Again he refers the reader to Proclus' "inestimable commentaries on this venerable dialogue." (p. 406). What follows seems to be an argument from the perfection of the intelligible and intellectual earth, "which is coordinated with heaven." That is the "true earth" being "an animal denuded with a divine soul and a divine body." (p. 406). On p. 407 we are told that earth is positioned in the centre of the universe.

On p. 411, Thomas Taylor reminds us that not only man is an ensouled animal, the stars and the spheres are in fact a longer living version and the more rational one. Also that our souls is bound "by a certain sympathy" "to the souls of brutes;" and that the river they are thrown into at birth is not confined to the body but to the whole generated world. On vision, Taylor has a three-way division of the mark or impression of the thing seen, the perfection of this in the "common composite life" and thirdly "the inherent reason of the soul." (p. 413). This is followed by a reminder that other "material images of things flow through the pores of bodies" (p. 413). By this, Taylor refers to other senses which some seem based on some sort of

corpuscular properties of material encountering the pores of bodily tissues or sense faculties.

On pp. 414-15 Taylor discusses matter, which seems to be the formless and quality- deprived prime matter of Aristotle, a kind of quantity "deprived of uniform reason." (p. 415). He also cites Plotinus calling matter a "non-entity" (Enneads 3) even a "true non-entity."

On Plato's mathematical composition of the elements, Taylor reminds the reader that these must have depth in order "to subsist as principles in natural effects." Taylor quotes Simplicius assigning to the Pythagoreans that the difference in figure of the primary elements are responsible for all the difference between the elements and for their mutations into each other. Thomas Taylor reminds us about a certain disagreement among the ancients over whether Plato should be taken literally on the elements. According to Simplicius, Iamblicus and other more ancient interpreters of Plato's thought, he should be taken symbolically, but Proclus holds the literal line and defends "these planes, against the objections of Aristotle." (p. 417). The difference from Democritus' atoms, suggests Taylor, could be said to be that planes are simpler than the atoms of Democritus, which were bodies. This seems to be an argument from reduction, more reduction is better, Plato wins over Democritus.

Here Thomas Taylor stops his comments on the *Timaeus*. He gives as one of his reasons that the commentaries of Proclus are incomplete. One can only wonder how much influence it has had on the output of commentaries from other commentators that Proclus stopped where he did. Could that be a part of the reason why commentary on the latter half of the *Timaeus* is so meagre?

Benjamin Jowett 1817-1893

He was a classicist and theologian and Master of Balliol College, Oxford. Jowett pays his dues of obligations generously and warmly to his students and to many scholars (e.g. Th. Martin on the *Timaeus),* even to those Jowett profoundly disagrees with, such as Schleiermacher "on arranging the dialogues of Plato in a harmonious

whole."[20] Jowett continues to declare his own position: "There is a common spirit in the writings of Plato, but not a unity of design in the whole, nor perhaps a perfect unity in any single dialogue."[21] Jowett further declares that:

> The aim of the Introductions in these volumes had been to represent Plato as the father of Idealism, who is not to be measured by the standard of utilitarianism or any other modern philosophical system. He is the poet or maker of ideas, satisfying the wants[22] of his own age, providing the instruments of thought for future generations.[23]

Jowett does not mention Thomas Taylor. His preface to the second and the third edition is longer, include a thought-provoking chapter on the task of translating in general and on the differences and different merits of the English language and Greek in particular. Jowett rejects[24] Dr Jackson's theory[25] that Plato's Theory of Ideas had profoundly changed after the *Republic* and the *Phaedo*. Jowett quotes Jackson on the outlines of the theory and I think it is relevant to repeat the quotation here, as it seems to me that the fundamental issue is a part of present day discussion about the *Timaeus*. The question is about the connection between ontology and scientific knowledge or more precisely, about the order of inference between the two. It bears on the difference between the teleology of Plato (or of early Plato, for those who believe him to have changed his tune.[26]) and the teleology of Aristotle. Jowett quotes Dr Jackson: "Whereas in the Republic and in the Phaedo he [Plato] had dreamt of passing through ontology to the sciences, he is now content to pass through the sciences to ontology."[27]

Jowett's introduction to the *Timaeus* is six and a half pages, but his *Analysis* then follows over 92 pages. Here we shall try only to gain some insight into his

---

[20] Jowett, p x preface to the first edition.
[21] Ibid.
[22] Here probably in the meaning of 'what they were missing' and therefore needed, rather than the more modern meaning of what they wanted. As in biblical language 'Thou shall not want'.
[23] Jowett, p xi, introduction to the first vol.
[24] Jowett, 1872, third e. vol. I, pp. xxix- xxxvii. Jowett places the *Timaeus* in volume III, after the *Republic*. This perhaps indicates that Jowett takes the reference to the *Republic* at *Tim.* 17b4-19b3 as a valid indicator of the merit of reading these works in succession. See, however, his own doubts on this at p. 343, vol. III: " We do not know how Plato would have arranged is own dialogues."
[25] See the Journal of Philology (1881-6); vol. x. 132-150, 253-293; xi. 287-331; xiii. I-40; xiv. 173-230. (from Jowett, p xxix, vol. I.
[26] See Sayre, K. M. (1983). *Plato's Late Ontology, A Riddle Resolved*. Princeton: Princeton University Press pp. 174-175 for a discussion on changes in Plato's late ontology.
[27] Jowett, (1872) p xxix, quoting Dr. Jackson in the Journal of Philology vol. xi, p. 320.

translation from the introduction, to guide our return to his *Analysis* where needed later.

For all his compassion and admiration for Plato, Jowett wrote in an intellectual environment where physical sciences were believed to be solely a matter of observation and experience and experimentation. There was a great belief in the progress of scientific knowledge, particularly the physical sciences, although, through the merger of mathematics and logic, these abstract disciplines prospered. The scientific current of Reduction ran contrary to Platonic teleology and contrary to any theory connecting mind and matter. There is little wonder that Jowett writes that: "Of all the writings of Plato the Timaeus is the most obscure and repulsive to the modern reader." Jowett describes teleology as the, or at least a part of the "spirit of the ancient physical philosopher"[28]. From a long list of blunders, it is clear that Jowett sees the mixing of realms as the main problem, indeed so profound that the ancient philosopher becomes almost a different animal, for:

> It is only by an effort that the modern thinker can breathe the atmosphere of the ancient philosopher, or understand how, under such unequal conditions,[29] he seems in many instances, by a sort of inspiration, to have anticipated the truth.[30]

Jowett traces some of the influence of the *Timaeus* to Neo-Platonism, which he wholeheartedly dismisses, adding that, "the genius of Plato and Greek element of thought and language overlaid and partly reduced to order the chaos of Orientalism"[31]. Jowett is more concerned with how the *Timaeus* affects what he considers to be the true legacy of Plato, i.e. his idealism, apparently seen by Jowett as incompatible with mature physical sciences. Jowett offers various hints and arguments to the effect that the part studying nature of man in the *Timaeus* was somehow un-Platonic, at least very un-Socratic, and that Plato's efforts were marked by a combination of an uneasy awareness of neglect in his spectrum of his

---

[28] Jowett, (1872), p. 341. If Jowett intended this description to be of Plato only, it makes more sense than if applied to all ancient philosophers of nature. In the context it is more likely that Jowett meant this as a sweeping description of ancient natural philosophy as infantile proto-science.
[29] Jowett has just mentioned the lack of instruments such as telescope or microscope. (p. 342)
[30] Ibid.
[31] Ibid, pp. 342-343. This comment sounds almost like Jowett, the theologian, had an ordering of theological Receptacle in mind.

intellectual explorations and at the same time of transgression of his serious commitment to being, politics and the soul. All of this means, by Jowett, that the *Timaeus* should not be considered as central to the Platonic corpus.

But, he remarks;

> The Timaeus is by no means confined to speculations on physics. The deeper foundations of the Platonic philosophy, such as the nature of God, the distinction of the sensible and the intellectual, the great original conception of time and space, also appear in it. They are found principally in the first half of the dialogue.[32]

Jowett takes Plato to be speaking of "uncertainty of his subject" in the latter part of the dialogue and by this to be marking that part of as a Pythagorean annex, that perhaps has little to do with the philosophy of Plato. Jowett even says that: "in the latter part he [Plato] treats in a bald and superficial manner of the function and diseases of the human frame."[33]

Jowett seems to disagree with both Archer-Hind and A.E. Taylor about the pre-Socratic element in the *Timaeus*. "Many, if not all the elements of the Pre-Socratic philosophy are included in the Timaeus."[34] Although Jowett has dismissed a grand design in Plato's writings and points to certain difference in subject and approach in the *Timaeus*, he claims that throughout his life Plato made no major changes to his philosophy. Plato emerges as the great dualist, the father of idealism and if anything, in his manner of exposition, slanted more towards theology and "creation as a work of design".[35]

Jowett ends his general introduction by a detailed section on style and plan. His analysis follows that of Plato's dabbling in the physical sciences. This seems like a rhetorical exercise of repetition, weakened by suggestions that Plato's expression is hampered by the novelty of his subject. Plato introduced quite a few novel thoughts with a language that is unsurpassed. It would be interesting to compare the language of the *Timaeus* to other dialogues, using recent computerized research into the

---

[32] Ibid.
[33] Ibid. I would argue that compared to the medical theory of his time, Plato did anything but what he is accused of here, nor did he treat of man by his frame alone. But Jowett allows of no mention of connection between matter and mind, only the latter of which he wants to hold Plato dear.
[34] Ibid, p. 345.
[35] Ibid, p. 346.

structure of syntax in Plato. Jowett explains Plato's clumsiness by the lack of knowledge by acquaintance.[36] A generous Jowett does not want to deprive Plato of scientific insights dismisses as such, calling them "glimpses of the truth" but a less generous Jowett excises them from his philosophy as "glimpses" rather "comprehensive or perfect vision", "isolated expressions about the nature of God which have wonderful depth and power."[37] It is interesting that Jowett's final words on this section seem to aim at distancing Plato from theology.

To sum up: Jowett does a good job at warning his readers about the pitfalls of other interpreters. He is clear and open about his own objectives, although in his introduction he assumes the philosophy of science of his own era to be a self-evident criteria for judging the validity and success of Plato's attempts. Jowett also seems to apply his considerable skill and command of language and expression to make the *Timaeus* fall into line with the philosophical works of Plato as first and foremost the foundation of Idealism of the kind that suited Jowett's own theology and views of science. To this end he plays down both Plato's commitment to and achievement in investigation into nature, emphasising Plato's continued commitment to dualism and idealism. Given Jowett's considerable influence, this could be a part of the explanation of subsequent lack of commentary on the latter half of the *Timaeus*. It is ironic that Jowett's motives are thus akin to the motives of the Neo-Platonists, for whom he has nothing but contempt.

R.D Archer-Hind 1849-1910

Archer-Hind's translation of 1888 was the first English translation of the *Timaeus* to be published on its own separate from the rest of the Platonic corpus. The first edition of Jowett's translation was published in 1871, but as a part of complete works of Plato. Prior to that, Thomas Taylor had published his translation of the complete works of Plato with extensive notes[38]. Archer-Hind mentions that "the only English

[36] Ibid, p. 347, "for the great master of language was speaking on a theme with which he was imperfectly acquainted." Plato's mastery of language was not least in his power to form and express innovative thinking. It seems to me that the great man of letters forgets his own warning against imposing on the ancients the later frames of thought.
[37] Ibid.
[38] The whole translations of Thomas Taylor were re-published in 1995, whereas the first edition was published in 1804. The publisher is *The Prometheus Trust* founded in 1986, "In order to help

translations with which I am acquainted are Thomas Taylor's and Prof. Jowett'."[39] The way Archer-Hind writes about Proclus could indicate a part of the explanation as to why there seems to be no further reference to Thomas Taylor: both were Neoplatonists, which does not seem to impress Archer-Hind, who talks of "the mist of Neoplatonic fantasy" in Proclus.[40] But why he neglects Jowett, as he seems to do, I have no explanation. Prior to that there had been a Latin translation by A.F. Lindau. Lindau's edition [available online] does not have an introductory essay, like that of Archer-Hind, but presents half a page of the Greek text followed by the Latin translation. It has 135 pages of commentary and two appendices, none of which Archer-Hind finds of great value (Preface, p.v). Archer-Hind, however, prefaces his translation with a 51-page introductory essay, starting with what he conceived as the relevant pre-Socratic challenge and legacy to Plato and then continuing to depict Plato's development in grappling with these issues and consequently his own theory, until he brings his idealism to a unified completion in the *Timaeus*. Archer-Hind's main concern is Plato's metaphysics, his main type or argument is posting a thesis, antithesis and a synthesis from the pre-Socratics and the Platonic corpus.

Archer-Hind starts his analysis of Plato's work by commenting on the pre-Socratic influence he sees in it. Pythagoras and Empedocles hardly count, and if so, then only in some secondary sense (see p. 3). Yet he mentions Thales, Anaximander, and Anaximenes as "The old Ionian physicists were all working their way to the conception of Becoming." But the philosophers Plato responds to are: "Herakleitos, Parmenides, Anaxagoras, these three"(p. 3). As these three "raised the problems which he [Plato] must address himself to solve, it is incumbent on us to determine as precisely as we can the nature of the contributions they severally supplied" (p. 3).

I will not retell Archer-Hind's analysis of Plato's relationship to the Pre-Socratics, except to mention here that he suggests that Plato managed in the *Sophist*

---

reintroduce the educational establishment those true First Principles which have been the basis of all the world's lasting civilisations." In the Preface, Taylor is hailed for not only having understood Plato's philosophy "but also revered his religion" (p. v). The line is drawn "from the earliest Orphic and Pythagorean mysteries through Plato and Aristotle's pure philosophy, and onwards to the later Platonists who were the final flowering of the Classical civilisation." (ibid)

[39] Archer-Hind, R. D. (1888). *The Timaeus of Plato*. London, New York, Macmillan and Co, preface p. vi.

[40] Ibid.

to postulate being and not being without gainsaying the contribution made by Parmenides' poem.

Of interest to us here is what Archer-Hind thought Plato had achieved in the *Timaeus*, how Plato achieved this and how Archer-Hind supports his conclusions. The Pre-Socratics are a difficult subject and it is perhaps in order to distinguish between how Plato might have conceived of their thought and what they themselves had in mind, although Plato was far closer to them in time than we are.[41] Therefore while Archer- Hind may come close to some of Plato's views on the matter, we should not read it as an account of their views, nor should we so readily accept Archer-Hind's dismissal of Empedoclean and Pythagorean influences on Plato. We need to look at Archer-Hind's views of the relationship between forms and causes, on the difference between causes and contributory causes, the nature of the demiurge, the relationship and difference between the accounts and on the unity of causes in Plato's explanations of natural phenomena. It seems to me that Archer-Hind applies Aristotle's classification of causes to describe Plato's causal discourse, which I find problematic, both because it seems slightly anachronistic and because of Aristotle's critique of key elements in Plato's approach. While Archer-Hind's introductory essay addresses key metaphysical issues, it has little to say on the minutiae of Plato's physiology, which are of primary concern here.

A.E. Taylor 1869-1945

Taylor's book, *A Commentary on Plato's Timaeus*, published by the Clarendon Press of Oxford in 1928, is a much-hailed and appreciated commentary but it does not contain a translation. Taylor's emphasises could hardly be more unlike those of Archer-Hind. Both take as their main previous edition T.H. Martin's *Études sur le Timée de Platon*. Taylor modestly offers to do his best to bring it up to date with "the present state of knowledge about early Greek science [and] to the present condition of textual scholarship"[42]. While Taylor may have achieved the latter aim, his

[41] See John Palmer, in Handbook of Ancient Philosophy [Ed. Curd and Graham] p. 549 and Frede, p. 529 same book.
[42] Taylor (1995), preface, first page.

suggestions on the first have met with much resistance[43] and little support. The most controversial claim is that the *Timaeus* is not the crown of Plato's authorship and indeed not by him at all, but an amalgam of fifth-century Pythagoreanism and Empedoclean biology.[44] This view is a part of what puts Taylor at odds with most commentators on a number of main questions concerning Plato's views in the *Timaeus*. Thus, Taylor writes (p. 11), "it is a mistake to look in the *Timaeus* for any revelation of the distinctively Platonic doctrines, the ίδια Πλάτωνος as Aristotle calls them." But even this cloud has a silver lining. Taylor writes: "If I am interpreting it [The *Timaeus*] on right lines, it is incomparably the most important document we possess for the history of the early Greek scientific thought."[45] It is a task for historians of philosophy[46] and of scientific thought to disentangle and lay bare the many threads that may have intertwined in Taylor's approach to the *Timaeus.* We shall shortly see what Cornford had to say on the matter. My own preliminary thought is that Taylor's approach is an attempt inspired by several factors which came together in philosophy of natural science in his days: First of all a strong belief in scientific progress, and secondly an equally strong belief that mathematics and sense-perception through rigorous experimentation would play a major part in revealing the mysteries of Nature. At the same time the intellectual and scientific ideal of ancient Greece was important but Platonic metaphysics were not quite as welcome.

On p. 2 of Taylor's *Prolegomena* to the commentary, he reminds us that: "in the 'Middle Ages' the chief source from which Platonism was known to the western world was a Latin version of the first two-thirds of the dialogue by Chalcidius". Taylor draws the attention to what this meant for Platonism of the thirteenth century.

---

[43] See Cornford, (1937). See also footnote 33 in Burnyeat's article where he hails Taylor's translation of φθόνος as "brilliant."
[44] Taylor (1995) pp. 10-11.
[45] Ibid.
[46] Bertrand Russell devotes four and a half page to the *Timaeus* under "Plato's Cosmogony" chapter XVII of his *History of Western Philosophy* first published in 1946. Russell quotes Cornford nine times and declares himself "most in agreement with Cornford's admirable book," (although he has less admiration for Cornford's *From Religion to Philosophy*) but Russell has no entry for Taylor. Russell emphasises the Pythagorean element but shows no doubt about Plato's authorship, nor what parts of the work he thinks one should take seriously and which not, yet emphasising its historical significance and the need to study it as a whole.

(pp. 2-3). I wonder whether the lack of the third part of the dialogue in Chalcidius' translation may also be a part of the explanation why there is so little commentary on its content.

R.G. Bury

Before I turn to Cornford I shall say a few words about the translations by R.G. Bury.[47] It was published 1929, only one year after Taylor's commentaries. It is not the place here to comment on the whole translations, relevant comparison will be made across translations regarding points as we address them. But some comments on Bury's introduction are in order, especially in what Bury sees as "calling attention to the most notable points of doctrine as here set forth."[48] Bury starts by reminding us of the *Phaedo* 96 a. Bury sums it up as Plato's critique of "the earlier philosophers for their failure to indicate the Cause of the physical processes"[49]. Bury is referring to the *Phaedo* 96a. Bury discusses causation, the Demiurge and the Receptacle. Bury seems to me to want to argue against extreme interpretations of Plato's *Timaeus.* He does not think it enables us to recognize Platonism as a "complete and coherent system of monistic idealism" (p. 13), probably having Archer-Hind in mind. Nor does he want to contribute it to other sources than Plato and the Academy, as A.E. Taylor did. Rather, Bury suggests Plato to have acted as a compiler and editor of work done in his Academy and should be given "a credit of making a brave effort, in the *Timaeus* to master and set down the best that was then known about the world of Nature and of Man."[50] (p. 13). Furthermore that "there is but little of metaphysic in the *Timaeus,*" and that "indeed we may fairly suppose that one of the main purpose of the *Timaeus* is to provide a permanent record of the discoveries of Plato's friends Theaetetus and Eudoxus in the field of mathematics and astronomy." (p. 13). The reason for Plato's own limited contribution, Bury sums up as follows: "Plato, in fact, was too much of an idealist and too much of a mathematician to be a good naturalist".[51]

---

[47] The Loeb Classical Library, Plato IX, Harvard University Press, first published 1929, here 2005 edition.
[48] Bury 2005, p. 5.
[49] Ibid.
[50] Bury, 2005 p. 15.
[51] Ibid, p. 15.

Francis M. Cornford 1874-1943

In 1937, Cornford published a translation with a preface, a short introduction and a running commentary.[52] Cornford does not declare that he aims for his translation to counter the "new Taylorian heresy."[53] But his professed aim to "render Plato's words as closely as I can"[54] ties in with the sense of importance expressed in the need he obviously sees to aid "students of theology and philosophy" in accessing "a document which has so deeply influenced mediaeval and modern speculation."[55] Cornford describes the Taylorian heresy as denying that the *Timaeus* "contains the mature doctrine of its author"[56] and that "Further on Professor Taylor describes Plato's plan in more detail. 'The formula for the physics and physiology of the dialogue is that it is an attempt to graft Empedoclean biology on the stock of Pythagorean mathematics' (p.18)"[57].

Cornford mentions several previous translators and commentators which he has used, among them Martin, Archer-Hind and Taylor, the last which he says has been by far the most useful, "the chief value" of Taylor's commentary lying "in the exhaustive summaries of these ancient opinions."[58]

Cornford expresses two worries about Taylor's translations; first that Taylor presents Plato or Timaeus as a monotheist or even close to being a Christian and secondly "the practice of translating Plato's words into terms of Professors Whitehead's philosophy," adding that "There is more of Plato in the *Adventures of Ideas*[59] than there is of Whitehead in the *Timaeus*."[60] I cannot here evaluate the grounds for Cornford's worries properly, as that would require closer reading of both Taylor and Whitehead. But Cornford's worries raise the interesting issue in the history of philosophy, of how much commentators and translators are influenced by

---

[52] In this study all references are to the 1997 reprint.
[53] On p vi Cornford writes, of A.E.Taylor: "He has launched in his volume a new Taylorian heresy."
[54] Ibid, preface p v.
[55] Ibid.
[56] Ibid, p vi
[57] Ibid, pp vi-vii.
[58] Ibid, preface viii.
[59] One of Whitehead's last books, published 1933.
[60] Cornford, 1997, preface x.

the leading opinions in their own days and what influence this could have on the study of ancient philosophy.

Donald J. Zeyl

Zeyl's translation first appeared in *Plato, Complete Works* 1997,[61] and then as a book with preface and introduction in 2000.[62] Zeyl opens his introduction by saying that "The *Timaeus* is a creation story"[63]. This allows him to introduce the dialogue in the context of modern cosmology, which, in spite of the strictures of physical sciences, caters for a broader spectrum of views than prevailed at the publications of our previous translations. This also invites Zeyl to re-address the relationship between the *Timaeus* and the "inquiry into nature" of Plato's predecessors and contemporaries.

Zeyl highlights the philosophical and stylistic curiosities and challenges of the *Timaeus*. He also gives, early on, a useful comparison of different views of two separate but much disputed aspects of the history of scholarship on the dialogue, namely its place in the supposed order of Plato's dialogues and whether its creation story is best taken literally or metaphorically. On the place of the *Timaeus* amongst Plato's dialogues Zeyl rejects Owen's early timing of the dialogues. If there are preferences in his otherwise balanced and clear account of the literal versus metaphorical debate, they are for an open mind regarding the literal reading.[64]

This is an interesting and difficult issue, made so not only by Plato's thought and way of writing but not least by our own challenge of disentangling our interpretation of Plato's thought from later or present views in logic, epistemology, and sciences. Burnyeat's 2005 article, ΕΙΚΩΣ ΜΥΘΟΣ, provides support for reading the dialogue literally without feeling a need to infer insanity on either the demiurge or Plato.

---

[61] Editor: John M. Cooper.
[62] Zeyl 2000. This is the text I use.
[63] Ibid, p xiii.
[64] Plato's use of the term εικώς μυθος or rather the history of its translation from Cicero onward has been a big part of debates of how to read the *Timaeus*. Burnyeat (2005) makes a strong case for taking Plato's theorizing about the sensible world seriously, although to do that we must set aside modern empiricist view to make space for Plato's theogony.

Zeyl divides the dialogue up, providing detailed comments and questions in form of synopsis of each segment. For the chapter on the Receptacle 49a6-50a4, Zeyl provides two side-by-side columns of different translations to highlight some of the problems of this difficult subject, rendering in italics the main differences between them. In the final words of the dialogue, Zeyl's translation reflects the emphasis he puts on the dialogue being a creation story, as he ends on a single sentence: "Our own heaven, indeed the only one of its kind has come to be."[65] None of the other authors does this, but translate rather as the account is completed for it has mentioned and contains all the necessary parts. Taylor is most direct on this, (p. 646, referring to it as lines 92c4) : "The formal declaration that our task of describing the structure of the αισθητός θεός, the visible creature which embraces all other visible ζώα, is completed". In all other instances of close comparison, I find Zeyl's translation to be most neutral in the sense of leaving a text open to interpretation, rather than taking a stand on every difficult issue. This ties in well with the lucid language of the translation. The risk of his approach is that it may smooth out or at least greatly simplify hints and difficulties expressed in Plato's creative, often ambiguous and sometimes provocative language.

[65] Zeyl, 2000, p. 88

Chapter II - On the Timaeus as a Whole

Introduction

In this chapter I state my views on Plato's approach and method in the *Timaeus*.[1] These views shape my main chapter on the text from 69a6 to the end of the dialogue at 92a9, on the causal theory of the mixed nature of man and care of man. In this culminating[2] last part of the *Timaeus*, Plato densely intertwines and interweaves all the preceding[3] parts of the discourse, in a bid to present a demonstration worthy, by kinship and likeness, of what it is aimed at demonstrating[4]. In my interpretation I follow Sedley's suggestion that Plato holds as "his principle that all causation is a matter of like causing like"[5]. Coupled with the special kind of polarity Plato depicts, this causal principle drives causal transmission and movement of causal agents between the opposite poles, and determines their right order, that is which should stand next to which.[6] Plato's causal theory is a teleological theory,[7] and as such, as Sedley writes, "from start to finish a matter of the good bringing about the good."[8]

---

[1] When I write *Timaeus* in italics I am referring to the dialogue, and when Timaeus, to the speaker Timaeus.

[2] At 69b1 this is called the final head of the discourse.

[3] Plato wrote part of a dialogue called the *Critias*, but did not finsih it, but did not even start anything by the name of *Hermocrates*, as far as we know. The heralded parts of the trilogy are the prospective speeches given by Critias and Hermocrates. I propose we can reasonably deduce their planned subject and nature from Critias´ description of the division of labour at *Tim*. 27a2-b6, where the role of Hermocrates can be deduced by elimination, as he is the only one not allotted anything at the point when what remains of the subject of the return-speeches is described. Socrates' reference to their discourse 'yesterday' 17a2-19b2 is another instance of a partial use of a discourse, in the sense that only the goal and the main conclusions are recalled but not the arguments for them. But the part recalled is accepted as a starting point for the ensuing speeches by Socrates' interlocutors so between them the arguments need not be repeated. Hence the first polarity is between the discourse given by Socrates, the day before and the return speeches. The latter are then subdivided, resulting in four speakers, Socrates, Timaeus, Critias and Hermocrates.

[4] In Timaeus' own introduction on method, which Socrates sanctions, the emphasis on the kindship between subject and the account of it is an emphasis on likeness, (29b1-d3). Therefore an account of a complete cosmos has to have at least an image of completion. This has many implications for the *Timaeus*, including the one that it must be readable as cosmogony, that which applies to the conditionally everlasting life of cosmos.

[5] David Sedley,1998, *Platonic Causes*, Phronesis XLIII/2, p.114. See also R.J. Hankinson, *Cause And Explanation In Ancient Greek Thought*, Oxford Clarendon Press, 1998, pp. 189, 208-9.

[6] The reasoning for the number and order of the elements at *Timaeus* 31b4-32c4, is firstly that duality is necessary to match the range of human sense-faculties, but then that it is necessary to have four elements because the world was to become solid (i.e. three-dimensional) in form and this required four elements so that between them there could be mathematical proportion preserving the same rule between all of them, which is here a representative of the likeness their friendship is derived. The

In order to unravel and understand some of the least celebrated parts of this last section, as well as the very beginning of the dialogue, I suggest that we look at the structure which Plato repeats across as well as within segments of the *Timaeus*, including in the plan presented for the supposedly ensuing two parts of a trilogy or all three parts of a return speech for Socrates.[9] It is a structure which governs every causal analysis, at every level of creation described in the *Timaeus*. By looking at this structure in a larger context and in a few and varied examples, it might become easier to recognize it, even in a guise we might, for various reasons least expect to hold it. Part of this analysis of the structure of the causal narrative also suggests how we can, indeed must, without any sacrifices or dismissals[10] of parts or whole of the text, continue from a linear reading of a cosmogony to include and embrace simultaneously a circular reading of cosmology of an (albeit conditionally) immortal and everlasting self-sufficient creation. These two ways of reading the dialogues are not absolute polar opposites mutually exclusive, but are indeed two poles in the kind of mutually beneficial and interdependent polarity, which is the structural backbone of the *Timaeus.*

Structure is a formal aspect and the structure I suggest that Plato applies can be described in quite abstract terms. These are terms of logic for rules of reasoning. Therefore it can also be applied to a wide variety of subjects, in my analysis to *all causal analysis* in the *Timaeus*, also to the cosmological aspect. This makes the creation process of all created things, in this sense then, the sense of logical structure, analogical. In this sense the creation of soul is analogical to the emergence of the

---

abstract form of this reasoning strongly suggests that it is a formula meant to be applicable to many or all subjects which constitute a whole, subject to division in the *Timaeus.*

[7] This is clearly stated by Socrates at the *Phaedo* 97c5-6: "When intelligence is doing the ordering it orders everything and assigns each thing in whatever way is best." Transl. Sedley and Long, 2011. This is repeated in Socrates' recollection at the *Timaeus* 17c10-d1, regarding assignment and at 19a1-5 regarding ordering in terms of their placement in society. The goal reached at the end and completion of the *Timaeus* is also as good as can be.

[8] Sedley, 1998, p126.

[9] Whether Plato really intended to write all three parts or the fact that he did not complete them, at least not under the headings, does not affect my interpretation that the plan introduced by Critias at 27a1-b6, follows the structure I am about to suggests permeates the *Timaeus*.

[10] On p. 20 Cornford writes that: "it has often been remarked that this introductory conversation, right down to Critias' last speech, might have been written for the *Critias* only, as if the task set by Socrates could have been completely fulfilled by the story of Atlantis." And A.E. Taylor, in his introduction suggests that the medical part might have been a later addition to the text, and implies that it is not an original part of Plato's design for the dialogue.

female sex and the diversification of fauna, as is the narrative of the creation of the bodies of the four elements. These examples are just three out of many analogies between subjects and processes of bewildering variation Plato suggests in the *Timaeus*. Plato also uses metaphors, sometimes in a way which seemingly eases the expression of a difficult thought by transposing it into a more familiar or acceptable environment and sometimes as a polar opposite to this, namely in a way which is prodding and provocative, perhaps meant to alert us to difficulties and the need to pay particularly close attention to the text at this point. While it seems quite acceptable to speak of a father and a mother to the living cosmos born in the discourse, it seems strange and bewildering to imagine the sexual soul and organ of each sex behaving like separate animals within the human individual body.[11] I will treat the second example in a specific subsection, as a part of how and why we must make the leap from linear reading of cosmogony to the circular reading of cosmology.

A note on using other texts

I agree[12] that the *Timaeus* can be read on its own, without using references to other works as *evidence* for some particular interpretation or other[13]. The *Timaeus* as a discourse on self-sufficient cosmos should, by its own admission, enable us to do this. At 28a4-5 Timaeus asserts: "that everything (or (the) all) which becomes *by* some cause, [also] becomes out of necessity."[14] At 29b3-b5, citing his previous use of likeness and paradigm, he adds that: "a rational account is like that which it is an

[11] See Sarah Brodie's complaint about this, on pp. 268-169, in here *Nature and Divinity in Plato's* Timaeus, Cambridge, Univ. Press, 2012. For the male- and female reproductive organs as 'animals' see *Tim.* 91a2-3; b6.

[12] Sarah Broadie, in her 2012 book, pp. 5-6 gives several reasons for not attempting to use other of Plato's texts as evidence for interpretation of the *Timaeus*.

[13] See Sarah Broadie, 2012, pp. 5-6 about the desirability of examining the *Timaeus* "solely from within" and the many difficulties of invoking or referring to other texts.

[14] This is my translation. This reading shows the duality or division between divine cause and that-without-which-not causation, which was made in the *Phaedo* and is clearly reiterated in the *Timaeus*. Plato's equivocal text here carries a different aspect of the dual meaning, almost a tautology that all becoming becomes by a cause, and that this is a tautological necessity of language and thought, but also, I suggest, that all causal conception and discourse is confined to and happens in language, made possible by its potentials and confined or limited by its limits. 'Necessity' is a word Plato uses for the second and secondary kind of cause and causation, and nothing prevents him for using it like this in these lines.

exegesis of."[15] Taken together, Plato's causal theory of a self-sufficient and self-sustaining world should be presented in a self-sufficient and self-sustaining text. I believe it can be read this way. However, this does not preclude seeking and presenting relevant, similar and perhaps preparatory arguments presented in other works by Plato. Interpreting the *Timaeus* does not depend on this, but can be helped by it, and in many places we seem to have been in dire need of help. When I quote other works by Plato in this thesis, I do it to help clarify a point, which although it is made in the *Timaeus*, may be presented in a cryptic and difficult way there.

The logical structure and its conceptual building blocks

Polarity is the fundamental conceptual structure on which Plato builds his discursive logic. For many reasons it is a particular polarity. It is a polarity of duality, of two polar opposites. And it is applied to itself, making the exercise circular. The conception of infinity applied in both directions of firstly the infinitely collected and complete and secondly in the other direction of the infinitely divided gives, introduces and contains duality and polarity to the concept itself. Infinite approximation is an approximation of something never reached in either direction. Therefore in a polarity where there is an infinite approximation in both direction of a polar opposites[16] there is the pair of polar opposites which provide direction and there are the polar opposites within all that is between them, even infinitely close to the direction giving but external opposites, external in the sense that what is between them never reaches either of them, and therefore neither of the external ones is ever subject to change. Change and movement, however, apply to everything which can be placed on the spectrum of approximation in both directions. Let me reiterate: applying the concept of infinity and infinite approximation to the idea of polarity creates a duality or two kinds of polarity, absolute unchangeable polarity and the polarity of change, never absolute but always of a mixture and limited by infinite approximation.

---

[15] My translation.

[16] H.L. Resnikoff and R.O. Wells Jr, in *Mathematics In Civilization*, 1973, p. 250 claim that the procedure known as "the method of exhaustion" which is "the basic idea in *integration theory*, or *integral calculus*," was "first used by Eudoxus and greatly amplified by Archimedes." Eudoxus was a member of Plato's Academy in Plato's own time.

Now the latter admits of inner segmentations, and recognition of cut-off points in the process of change. These cut-off points are mathematical and are of two kinds, and in a cyclical change between approximations of two polar opposites, and there are four of them. These points mark two polarities, firstly between the direction of change towards either pole, and secondly a point of equal magnitude between the variables associated with each polar opposite. This is the mathematical basis of the division into four parts of every causal process in the *Timaeus.* If viewed as the segmentation of a line, each segment between the cut-off points is a segment of polarity, and contains within it a replica or image of this polarity. To this we must add that since, if we view the spectrum of change as never reaching definite end-points, none of the cut-off points can mark an end of this line but must be on it. Or in other words, the line of infinite approximation does not and cannot have definite end points. On the image of a straight line the four cut-off points will therefore give a picture of three completed sections or sections having a cut-off point at each end and two (outer) intervals which have only one cut-off point as their beginning and seemingly infinity, limiting them at the other (non-existing) end.[17]

Now add the thought that this picture is to apply to cyclical reciprocal changes, or the sort we observe in nature and which is the subject under discursive investigation. This means that the changes in either direction only reach a certain limit, upon which the direction of change takes a turn toward the opposite of what it has been approaching. If we, for the sake of figurative representation, bend our segmented line into a circle, we combine the two seemingly open intervals into a fourth one which now receives its own duality or polarity and becomes 'like' the other three intervals previously drawn on the straight line. Each such interval therefore has not only two end points in polar opposition, but also the infinitely divisible spectrum between them, each has a beginning, an middle and an end, and

[17] The two examples from the structure of the *Timaeus* as a whole are Socrates' recollection of the conclusions *without* recalling the arguments for them, and at the other end is the emergence of the female sex and the further diversification of fauna. They are a thematic unity because they both address the problem of proper replenishment, but they also form a polarity because they address the issue from opposite perspectives of society as a whole and of the individual human being as a part of that whole, in in the process of sexual propagation as only a partial contributor as each sex has only half of the polar organ-pair need.

furthermore, because change between polar opposites has a direction this causal story, the teleological story or the chain of events leading towards one goal or the other can be told in two directions, which is the basis for Plato's use of formula like 'according to nature', of that which goes in the right direction with regard to where in the over-all cycle it is, and its polar opposite or negation, that is 'contra nature' for that which moves against the direction of the whole of which it is a part.[18] The circular representation fits the cyclicality and repetition of natural observable processes and their sequential order. It is a story which can be begun anywhere, and which can be told in parts or wholes. This is, I submit, the logical structure of the *Timaeus*. Plato applies it to every subject including the structure of the text itself. In this subsection I have presented only the bare bones of it. In the next subsection I give a very brief comparison with some relevant versions of polarity in other authors. But in speaking of divisions and subsections we must remember that Plato's revolutionary theory of de-composition and re-composition of elemental bodies based on the basic form of the triangles allows a flow of powers *across* the formal cut-of points and this is in accord with the minority reading of the Divided Line of the *Republic* 509 as dynamic.[19]

Polarity and analogy in Heraclitus, Xenophon and Regimen

G.E.R. Lloyd[20] discusses Heraclitus' "apprehension of analogy between different examples of opposition" (p. 96) mentioning as an example "the doctrine that opposites are 'one' and 'the same'" and how "widely" Heraclitus applies it, that is over how many seemingly different examples and from different viewpoints. Lloyd also mentions examples of continuous processes and reciprocal interactions. Lloyd points to the key common point all the seemingly widely different fragments he refers to share; "that is they all refer to *pairs of opposites* of some sort and they all

[18] This is a major explanatory element in the nosology, (the general formulation laid out at 81e6-b7), reiterated with reference to the direction of change in nature at 82c1-2, where the correct direction of construction or creation has been described, the combination of right direction and right ratio of magnitude are then said to constitute health but the reverse disease.

[19] See D. Sider, (1976) 'The structure of Plato, Republic VI,' Rivista di Studi Classici 24 (1976) pp.336-348.

[20] G.E.R.Lloyd, *Polarity and Analogy, two types of Argumentation in Early Greek Thought*, Cambridge University. Press, 1966, pp. 96-99.

point to *some* connection between them, and it is this that seems to provide the link between these strangely assorted utterances." Lloyd also points to the "*inter*dependence of opposites" as well as "the constant war or strife between them." (p. 99). All the above applies to the reading of the *Timaeus* I have suggested. It is impossible in this thesis and in this chapter to examine further the debt Plato owns to Heraclitus or indeed any of the other predecessors. But Lloyd addresses polarity and analogy as elements of emerging logic and in particular as apparent in Plato's "method of Dialectic".[21] This, I take it, is the form or method of argumentation supposedly encompassing collection and division. In my previous subsection on the structure, directionality of change and cyclical change of the approach to polar opposites accommodate processes as collection going toward increased unity and division going towards increased division. Lloyd's point that in Heraclitus there seemed to be interdependence between the opposites and further that they are and form a whole, certainly applies to the *Timaeus*, as the diversification of fauna, for instance, is necessary for the unity and completion of cosmos[22].

The two other examples I shall mention of polarity used as an element of causal argumentation are, on the one hand from Xenophon's defence for Socrates in his *Memorabilia* IV.III. 8 -9, and on the other from the medical texts *Regimen*, book I chapter III. Both these cases are of changes in opposite directions between polar opposites, but within limits and going in a cyclical way of continuing until a maximum is reached in one direction upon which the tide turns, so to speak. Both instances are depicted as beneficial causal analysis. Each of these examples embraces only one of the approaches the *Timaeus* supposedly unites; that of divine causation, in the case of Xenophon and of natural causation in *Regimen.* The author of *Regimen* states how things are: "Now all animals, including man, are composed of two things, different in power but working together in their use, namely fire and water. (*Regimen* I.III. 1-4). These are elemental polar opposites, and in these lines a kind of unity or cooperation is indicated with regard to the powers involved. This turns out to be interdependency, firstly between these polar opposite elements and then of

[21] Ibid, p. 1.
[22] See *Timaeus* 41a6-d3, for the division of labour or agency between the demiurge and the lesser gods, necessary to collect the whole of lifeforms to serve in different regions of cosmos and thereby bring it to the wholeness and completion of having life everywhere in it.

everything else, as "Both together these are sufficient for each other and for everything else, but each by itself suffices neither for itself nor for anything else" (ibid, lines 4-7). There are great similarities between this description and the theory of sexual propagation in the *Timaeus*, and these continue as the author proceeds to explain the interdependence and the cyclical changes by likening the relationship with nourishment, as if the opposite forces took turns in feeding off each other, in a way that had self-imposed limits upon their progression. There is a circular reasoning given as to why this conclusion should be drawn. Apparently these changes, this reciprocal mastery and subjugation are what we see, or as the author writes: "But things being as they are, the same things will always exist, and neither singly nor all together will the elements fail" (ibid, 23-25). This is a kind of cosmology, a story of how things are and therefore must always have been and will always be. There is neither cosmogony nor a goal nor aim that might have led a process of creation, and in the cosmology there is no obvious room for change in any direction, or indication of what might inform a choice should anyone ever have a choice. On the other hand Xenophon's version poses a divine causation, at least in name. Xenophon's example is the two polar opposites in the nearness of the sun to the earth and what this means for the survival and well-being of man and all of nature, which apparently serves him. In short, Xenophon's version is part of an attempted argument against the philosophy of nature and the thought that man could try to lend a hand in running the world of which he is a part. In Xenophon's version, god or gods were tirelessly doing this in the service of man, who in turn should leave them to it as a token of his gratitude and devotion. There is no cosmogony in Xenophon's version, nor is there an apparent aim or goal except the thrift of man, attended to by busy gods.

Now, contrast these with Plato's account in the *Timaeus*. The example in which all the causal steps from the demiurge's construction of the rational soul to the role of man individually and as a community are employed, is the plight of the promiscuous man at 86b1-87b9. This example contains the whole spectrum of causal kinds, the cosmic elemental causality of the elements as such, including the quality of his soul, the individuals luck in what share he got of these at birth, first as his

rational soul was initially made by the demiurge[23], how well arranged and finally into what kind of society he is born, from what parents and to what level of nurture (See 86e-87b). Even the remedies, what man can and should himself do in order to improve his own condition individually and collectively, are included in Timaeus' account. It contains cosmogony as a construction and arrangement of parts destined to make a perfect self-sufficient whole and a cosmology, or the science of how to run this self-sufficient whole in the best possible way by a chain of agents of which one kind is mankind. Mankind also holds within itself a polarity, divisible into a spectrum of four subgroups[24]. Within each of these there is also the same polarity and so on down to the individual which has both the polarity of rational and irrational individual soul and the polarity of his own individual (and limited) share of reason and a dependency on other individuals of his own kind and community. The teleology, a casual narrative which has a beginning and a goal starts with the introduction of the most powerful and good agent having visual access to the most beautiful paradigm of which to arrange or create a likeness in or from less stable pre-existing material with potential, but also naturally limited durability of complex structures which is why a mechanism of self-sustainability requires the renewal and maintenance of both kinds of causation at every level of their mixture.

Limit, division, Socrates and the demiurge

There is a strong sense of limit and limitation in the *Timaeus*. But also on what a logical application of the idea of infinity invites us to think about polarity, mixture and change. These conceptions come together in the process of the division into four

[23] There seems to be a factor of luck or randomness in the sense of what kind of quality of each ingredient; that is first, second or third goes into each individual soul, perhaps as an explanation for cause of initial individual differences. See *Tim*. 41d4-7.

[24] I suggest that the theory of the transmigration of the human soul into three other animal kinds, each corresponding to an elemental sphere, is a metaphor for the four subgroups of humans, according to the ratio of strength between rational and irrational psychic powers. Humans, birds, land animals and water animals are then all the groups into which mortal animals populating Cosmos are divided. Plato, I suggest, identifies humanity most strongly with reason, hence the truly human animal is one of four animal kinds in cosmos, 'birds' (91d6-e1), 'land' animals (91e2-92a7) and 'water' animals (92a7-c1), which are clearly said to be the *fourth* kind (92a7-b1). Further, the initial division of the human animal kind into male and female (90e3-91d6) is a metaphor for the division of those capable of partaking in philosophical discussion into givers and receivers, much in accord with Socrates' comparison between conception of ideas in the minds of the young, from the seed of the ideas of older thinkers in the *Theaetetus* 149a1-151b1.

'kinds'. The idea of infinity, and moving along an infinite scale in two directions, towards the infinitely big and the infinitely small, includes and makes it possible to manipulate and demonstrate everything *between*[25] unreachable polar opposites. The exercise of inviting human thought to look to powerful ideals, as it were, to something we, that no one of our kind can ever reach nor can ever manipulate, and yet to use this vision in order to arrange tangible things at hand and in need of sorting out, has its own polarity, and suggests a further division of the human kind as a multitude of mixed or varied likeness and kinship to the polar opposites 'groups' of those human individuals who are 'nearly all thought and nearly completely hands off' to those who are 'nearly no thought but hands very firmly on'[26]. This polarity, and in Socrates' case the self-realised and self-imposed limits, are well known topics from Plato's ethical discourses. They are firmly mixed with provoking use of polarity in Socrates' famous and (apparently contra) dictum that he knows well that he knows nothing. In the *Apology* 23b the apparent contradiction is removed or at least qualified by suggesting a polarity between human and somehow real knowledge, and making human wisdom relative, so that it is the closest a human individual can come to wisdom, compared to other individuals of the same kind. This wisdom includes the self-knowledge that this human wisdom, however more complete than in other human individuals is still not and can never be real in any absolute sense. In order to do that it has to include a 'vision', some kind of 'glimpse' of what is out of reach, the absolute. In the *Apology* at 40a1-c4, Socrates suggest that he has a reasonable suggestion in taking the silence of his inner divine voice at the day of his trial and sentencing as a sign that he did nothing wrong that day. In the context of the *Phaedo* 99a7-b4, where Socrates contrasts first his act of choosing what is best as an act caused by intelligence, to that without which his intelligence caused choice would never become a cause of an act, the interpretation in the *Apology* amounts to an

[25] I put '*between'* in italics to emphasise that the line representing that which is between the un-reachable absolute polar opposites never touched the opposites but only approaches them infinitely. If the absolute polar opposites were represented as *x* and *y* axes on a graph, the line representing the function of infinite approximation would never reach them and hence no end-point could be marked on this line where it crosses the axes.

[26] For such grouping in other texts of Plato, see for instance the distinction made in the *Sophist* at 246a-c between "gods and giants" or the 'friends of the Forms' (248a) and the ones who break up being into little verbal bits about the process of becoming, paraphrased from N.P. White's translation in Cooper, ed. 1997.

achieved likeness in the thought of Socrates and that which the divine voice sanctioned by not opposing it. But as the divine voice never confirms directly but only objects, Socrates has a choice and indeed must interpret the silence no less than the oracle's response that no man was wiser than Socrates, imposed on him by Caerephon's impulsive question to the oracle at Delphi.[27] Both interpretations are human conjectures, human interpretations, human thought about non-human thought, or at least to a way of thinking which unmixed does not apply to the human condition.

The thought of vision of things beyond the visible, holds its own paradoxical indication that it, or its application, is in need of qualification. In the *Timaeus* this qualification comes in the form of the acceptance of Socrates' interlocutors, both reportedly of the speech given the day before (17b) and reaffirmed both by asking for Socrates' recollection of its main conclusions, (17b7-c6) their ascent to its content point-for-point (17 c8, 18a3, 8, 11, b8,c5d6, etc.) and the interlocutors' statements that they will build their own speeches on these conclusions as starting points and foundations in a descending order of likeness to them. Socrates' qualification as to the foundation of his own discourse is only indirectly and partly present in his name in the *Timaeus*, but are perhaps better discernible in Timaeus' (the speaker) recasting of the kind of agent Socrates is in the guise of the demiurge. The demiurge is a mixed being and because the overwhelming reign of good *in* him, he desired to make 'everything' as good as it can possibly be. The work of the demiurge is to mix or rather to construct an order applicable to a world of movement and change, but as the demiurge sees it before his intervention, this world is in a chaotic movement most akin to cardiac arrhythmia. In a linear narrative of the intervention, the demiurge first mixes or constructs a version of all the major concepts of being, same and different. This new mixed version of each holds the polarity of uniqueness or singularity and also its polar opposite of multitude. It neither holds the absolutely unique or its absolute opposite, the absolutely divided. In other words, the demiurge does not handle or manipulate Forms. He just looks at them and makes an imitation which allows the co-inhabitation of opposites within designated limits or enclosures. This is

[27] See the *Apology* 21.

akin to the mixed participation in Forms, by virtue of placing an imitation or part of the power of Forms into human bodies in the comparison of height between Socrates, Phaedo and Simmias in the *Phaedo* 102b-103a.

Socrates' own admission and practical consequence of his own limits in the *Timaeus* comes at 19c2-d3, and is recalled as a well-known fact, something 'everyone knows'. The practical implications are that he is not the man to give the kind of speech which his own previous speech has caused in him a desire to hear.[28] That kind of speech is a discourse which would be a causal account of movement confirming there to be life in the formal picture or 'statue' that is the 'animal-body' Socrates has produced[29]. No less importantly, the movement and life depicted in such a follow-up speech should show itself to be governed and enabled by the form Socrates has given this 'body'. It should, in its movements, exhibit beauty befitting the beauty it has as a formal body or paradigm, which is the beauty that affects Socrates and makes him expect it to be a start of something viable, if not already alive but just standing still.[30] The limit of Socrates' ability in the opposite direction, the direction of increased formal construction, is not discussed in the *Timaeus*, but it is given in two relevant guises in the *Theaetetus*; firstly at 183c8-184b1, where the reasons are given for Socrates to restrict himself to his "midwife's art" (184b1, transl. M.J. Levett), and secondly in the previously given description of that art at 149a1-151b1. At *Theaetetus* 183e3-184b1 Socrates refuses to attempt to discuss theories about the universe as "one and unmoved" (183e2-4), and Socrates feels particularly incompetent and unwilling to attempt to involve the legacy of Parmenides in their present discussion about knowledge. He makes a distinction and a hierarchic difference between what Parmenides says, his *legomena*, and "his real thought", (184a2-3, transl. Levett). This, I suggest, is an example of the distinction between *body* and *content*, between form and power, in the way speech is said to be 'the best and most noble of streams, when it is ministering to reasons', to paraphrase

---

[28] At the *Timaeus* 26e6-27a1, Socrates says that since he 'drove' or moved forward the discourse yesterday he will now listen to the speech given in return to it.
[29] See 19b4-c1.
[30] Perhaps Plato's depiction of Socrates, standing still while thinking by himself in the *Symposium* 175a6-b3, is a an instance of a still standing thing or a body with rich and beautiful inner life of thought, which could justify Socrates' suggestion that there already might be life in the figure or body created by and in the previous speech.

Cornford's translation of *Timaeus* 75c7-e2. At any rate; the two aspect of Socrates' 'mid-wife's art' most relevant to a discussion about limit, are that Socrates' limits in the *Theaetetus* are firstly the polar opposites to the limits to moving in the opposite direction, the direction of division and unlimited movement, which Theodorus has represented on behalf of Protagoras (see 183c). Secondly, it is the match-making function or 'procuring', for after rejecting both limitless division and irregular movement and the unassailable unity of Parmenides, Socrates in the *Theaetetus* restarts the discussion about knowledge by returning to the topic of human sense-perception, the very thing which Timaeus claims is according to his arguments, the origin of all human knowledge and science, (47a1-b2).

To sum up this subsection on limit, division, Socrates and the demiurge; I have suggested similarities between Socrates and the demiurge, concerning their abilities, their limits and the nature of their contribution. Both bring an ability to see beyond that which is tangible by the senses and to suggest ways in which aspects of it could be represented in in enclosures or bodies, that is in sense-perceptible phenomena, without losing posture, stability or durability. Such stabilization, durability or commitment[31] would in turn allow a construction of more complex but proportional and orderly bodies, even to the extent of making the whole world an ordered living whole. In their founding work they suggest a violation, based on the exposure of human limit. The violation is justified by the suggestion that man as a society and the individual as a member of society gains by admitting his limits and accepting that by division of labour in an ordered way, the life of all, individually and communally is good and the best it can be. The desire for such an outcome should lead to cooperation. Socrates on this account seeks to suggest the logic, the kind of discourse which might be promising enough to enough people to start a movement based on it. The demiurge similarly, and as a conventional representation of higher authority, is a logician in disguise, using geometry and mathematics based

[31] Without commitment to the logical rules applied in a discourse it cannot be brought to its potential fruition of a persuasion and rightly strong but qualified conviction. There is not room to discuss this important aspect here, but the *Gorgias* towards the end holds a demonstration of a discourse which continues formally to a conclusion without affecting Callicles, because although Callicles keeps to the formal exchange of questions and answers, he is clearly not committing himself emotionally to the content of the discourse any longer.

on the practical application of the concept of infinity, to construe and present the logic applicable to natural philosophy, especially to the science of man.

A closer look at the sexual soul

Above I have discussed the role of Socrates, the open-ended section at the beginning of the linear narrative. In this section, I look at its counterpart, the sexual soul, a challenging depiction of polarity, both within its guise of reproductive anatomy and in its role as a counterpart to the midwife function of Socrates in terms of maintenance of the rational life of man, and of internal life of the cosmos. I discuss the particular problem of the sexual soul, not only because it is a counterpart to Socrates' contribution and place in the dialogue but also in order to demonstrate that it is crucial, not only to identify opposites as opposites, but to unite them as a functional pair, by realising in what cavity or 'vehicle' they are properly placed, in order for the rules of construction to hold, at every level and on both the linear and the circular readings.

Is the sexual soul a part of the nutritive soul or are there four souls in man and then the cosmic soul the fifth soul, as it were? Is the sexual soul in man incomplete and hence the account of human physiology and psychology in the *Timaeus* a failure? No, neither. In order to answer both questions we need to look beyond the level of the individual human being and to humankind. Then we will see firstly that the nutritive soul of the individual human harbours the sexual function as a nutritive function, and conversely the nutritive function in an individual, although it is not directly sexual[32]caters for maintenance and continued life. What we are used to seeing as purely the nutritive function and associating with food intake and digestion in the abdomen of a human individual serves the function of preserving the individual throughout his natural lifespan. Secondly, we will see how the sexual soul or aspect of the third soul in man, served by an organ in the pelvic bowl, each individual having only one half of the needed pair, has a nutritive function for the

[32] These two aspects can be brought together by references to other places in Plato's authorship. In the *Theaetetus* thinking and learning from predecessors is clad in a guise of biology, of sexual reproduction, and in the *Protagoras* Socrates compares the 'consumption' or acceptance of other thinkers' ideas to eating or physical nourishment, except it is nutrition for the mind or the rational soul.

kind, the city and ultimately for the internal life of the cosmos. At the level of the individual this aspect is *alogous* (69d4) it does not admit of language and reasoning[33], for it is divided from its polar counterpart, both in the biological and philosophical logical sense. In each individual human being (and other animals which propagate by sexual intercourse) there is only either the male or the female organ and function. Their function can only be completed; it can only fulfil its natural goal by the coming together of the two, in this sense, different individuals of humankind which in their intercourse are affecting and being affected by each other in a manner analogous to the relationship between the encounters between the rational and the emotive soul and in a qualified sense[34] between Socrates and his three interlocutors. This is at the level of man as a kind and the rational management of this is not located in the individual but in the social mind which is in the social body, in the laws and institutions of society[35], which is, after all the body that sexual propagation really serves. So the answer to the question of how many souls there are is four; the rational, of which the cosmic soul and the human soul share in reason, are two of a kind and interact; the emotive soul at one end of its dynamic spectrum capable of listening to discourse and being motivated by it, at the other end of the same spectrum capable of using exclusively the persuasive measures of carrot and

---

[33]At 69d4-5 this refers to a-rational sense-perception and the kind of love which reaches to grab (for intercourse) whatever is at hand. My translation of , αἰσθήσει δὲ ἀλόγῳ καὶ ἐπιχειρητῇ παντὸς ἔρωτι συγκερασάμενοι. The animal 'kind' representative of the lowest kind lives in water and without light (of reason) and air (with which the stream of speech could be issued). See 92a7-c1, my suggestion for connection to the elements at work in human physiology in the brackets. The point of the indiscriminately seeking kind of love is that it is a driving force without any limits or limitation attached to it, also drives in only one direction. But I will argue that it has this limitlessness only in the individual, taking slightly different forms in male as compared with female, for they seek each other, but provided with the necessary limits or containment by reason at the level of society.

[34] According to Plato's Socrates, he is 'barren' and does not provide or impregnate anyone with his own ideas. He nevertheless in other dialogues frequently reminds his interlocutors of what other influential thinkers have suggested, inviting his interlocutors to interpret these to make them their own beliefs and subject them as such to examination by Socrates' way of investigation. In the *Timaeus* Socrates recalls the conclusions of such a dialogue, and in no way violates the condition of not presenting his own beliefs, provided the discourse he is referring to is preceded by his normal procedure, which we are not given any particular reason to doubt.

[35] A poignant example of these two locations and two levels of human mind is the speech of the laws, in *Crito* 50a6-51c4. In this text Plato also suggests a hierarchy of ever growing collection, contrasting the individual with the unity of father and mother, of which he is the offspring, mentioning the match-makers, the nurture, education and training, and finally the 'fatherland' and its laws, (51a2-3). Note the dual specification of both the location and the content, which I suggest corresponds to body and soul, in this case the constitution as the rational soul in the body of the city or 'land'.

stick in its interaction with the third or nutritive soul, which at the sexual end of its dynamic function, has its duality split and located in different 'places'; with regard to the physical organs divided between the male and female sexes, with regard to reasons and emotional drive or power, between the human as an individual, having *alogous* emotional or desire, and society, in the form of institutions and administrators thinking only of the good and best for society, (ideally) free from private pride or agenda, as the rational management of regeneration necessary for maintenance of society. This looks like a segmentation of division where only three divisions are presented. Again, they become four on the circular reading which is necessary when the account read is about a world which is a mixture at every level and in every aspect. Each of the three described above mixes, or merges with the one adjacent to it on the linear reading.

Now, notice the incompleteness of the 'end-links'; the human rational soul is *open* towards the heavens as if it had its roots there (90a6-7). The sexual function of the nutritive soul needs the level of kind and society for ensuring rational management of its contribution to living well and best. The reason represented and 'located' in society is akin to and a part of rational function, of the rational soul and in its rational management of the sexual desire these two open extremes forge a link, which closes the chain in a circular way, which is the only way to manage or ensure the conditioned immortality of a being which has mortal inner parts. Cosmos is that kind of a mixed generated being (47e5-48a2).

The risk we run if we do not apply both the linear and the circular way of reading the text is represented in a recent interpretation by an eminent scholar. Both Socrates' recollection of the rejuvenation of the city and the text on human sexual propagation at the end of the dialogue are 'biological' in the double sense of 'nutrition' and 'reproduction' that I just suggested. The first refers more to the life of the city as a body made of and maintained by its citizens, and the latter to the individual and, more importantly, the two different roles in sexual propagation held

within humankind[36], and the 'bodily' and 'psychological' differences this calls for between the two sexes. Commentators have struggled with interpreting these parts of the text and largely dismissed them, even, as Sarah Broadie does, using aspects of the latter to reject the whole of the *Timaeus* as a "comprehensive cosmology," because of Plato's "conspicuous failure" to show how the "reproductive activity is theoretically possible."[37] Seeing that Plato's depiction of this is not the kind of human anatomy and physiology, which confines itself to the individual and only at the level of specimen individuation, but applies to the kind at its social level of kind, without which, Socrates has argued, man cannot live[38], and which the demiurge has said cosmos would not be completed more than renders Broadie's conclusion as mistaken.

Structural completion of an 'enclosure' as a condition for it holding its content

In the *Timaeus*, Plato demonstrates the importance of completing an enclosing form. My suggestion is that if, and only if, a form is completed as an enclosure, a form can limit and make manageable a content which is a mixture of some sort. In this sense a geometrical two-dimensional figure is a form or enclosure, around the area it demarcates. A geometrical solid is a three-dimensional body. Plato's elements have a three-dimensional body constructed out of two-dimensional forms. The triangle form as an enclosure, a limiter which although it has a general form (here of a right-angle

[36] At *Timaeus* 18c1-5, Socrates clearly recalls an assertion, which Timaeus confirms, that women should hold human nature as males do, as they must have almost the same configuration. My reading of these lines differs from Cornford's.

[37] Sarah Broadie; 2012, p. 267. Broadie praises Plato for his "account of the other major other biological processes." But this is to underscore how miserably he fails on sexual propagation. The short answer is that sexual propagation is a biological activity which has a goal at the level of kind, aimed at preserving the life of the kind, whereas the other major biological processes are common to both the male and the female body and aimed at maintaining them as such. Sexual propagation is a biological activity in the body of cosmos, and is played out only partly in each type of the human body, which each represents only on of an organ-pair in the body of cosmos, where every becoming is from the coming together of opposites and is a mixture of them. The other psychological functions, each located in a place or cavity of the body has an organ-pair, heart-lung, liver-spleen and I would argue the ring of the same and the band of the different, the two parts of the rational human soul placed in the head are such a pair.

[38] See the *Republic* 369b-d for a definition of the city as a community based on interdependence between people of different kinds of skills and abilities serving complex human needs which all of them have to some extent.

triangle, notwithstanding the isosceles version), is capable of expressing infinite individual diversity because it represents and contains mixture and it is also a picture which represents the outcome of this mixture as a function of the ratio of the two polar opposite ingredients in the mixture. It is an expression of an equation and can be treated mathematically as such. Its size and shape tell us about the relationship between the things (the shorter sides) out of which it is made. But to do so the triangle must be completed, it must become a thing. I follow David Sedley when he writes that "the aim of a causal inquiry is to identify the thing responsible, no matter under what description." [39] The nature and importance of the mathematically expressed formal aspect of logical discourse emphasises the structure of the argument as if it were a 'thing', which must have a certain structural configuration and be completed to count as a cause or as being a part of constructing a thing properly able to cause a conviction or persuasion.

In what follows I argue that the 'bodily' structure, the kind of enclosure which has debt and contains composite cause of any kind, also and for the same reason has to be structurally completed before it can have or hold its *power*, in the sense fire holds heat and soul holds motion. The construction of the rational soul seems to be an obvious case, as is the placement of its individual human share in the cranium when humans are formed[40]. I propose that this is an important issue because I believe that the *Timaeus* is meant to demonstrate a logical theory of language and propositional argumentation which holds the equivalent of what we now call truth tables[41], conditions which determine when an argument has been completely pursued to its full formal limits, after which the persuasive power of the exercise really rests with the individuals' willingness to accept the premises initially given. The initial acceptance of the conclusion of the previous argument or 'creation' step as premise or starting point for a new argument of creation is emphasised at every 'take-over

[39]David Sedley, 1998, *Platonic Causes*, p. 122.
[40] *Tim.* 69c5-6. See also Sisko, 2006, for the possible origin of the idea for why the head must be clobular.
[41] I stress that this is a suggestion which I cannot work out in details in this theses. But to further connect the idea to Socratic discourse, the fire element seems to me a good candidate for the *elenchus*, the kind of logical refutation which can always be used to lead to an *aporetic* conclusion, once all logical combinations have been pursued.

point' that is at every point in the *Timaeus* where new speakers or agents take over from a previous one.[42]

Referring to the construction of the rational soul from the demiurge's manipulation of being, same and different, I suggest as a premise for my argument that the right-angled triangle represents a sentence, making a statement of the being of a thing, with reference to both what it has of being and not-being, as a mixed thing. Secondly, the right-angle isosceles triangle is a back-to back combination of two such statements which cancel each other out, as a means of determining the being of the thing, although by the same argument, neither can refute the other. This is therefore the condition of neutrality, not neutrality with regard to the existence of the thing but with regard to *what* it is, for it is equally much *a* and *not-a*, or neither more this than that.

There are several possible ways to argue for this and these cannot be pursued in full here. There is the argument from analogy, that is, if we accept my analogy; the philosophically astute man, like Simmias in the *Phaedo* 107, will not make up his mind, not reach a conclusion and be persuaded until all logical possibilities[43] have been examined. As I will suggest, the analogy of a truth-table is applicable to each of the facets of the geometrical structures. Contra Mueller[44], I propose that each face of an elemental body is made up of many triangles, at least six, as is the case with Plato's elemental body of fire. This is because the number of sentences which one can construe from being, same and different and the negation of each, is six. This is, to the best of my knowledge, a new suggestion of an explanation of this part of the *Timaeus*, where none fully worked out has previously been offered.[45] It underlines

---

[42] The heralded trilogy is to build on Socrates' previous speech, Timaeus takes over from Socrates, even re-casting the principle into a the guise of semi-conventional theology, although it is a rational theology more in line with Xenophanes and Heraclitus, than the Olympian one. Lesser gods take over from the demiurge and eventually man takes over the running of the completed cosmos, now that he understands his nature as an internal part of it and destined to serving it.

[43] For a statement and its negation, this gives six lines for a statement about being, same and different and their negation. This is why the face of the smallest element body, fire-element has six triangles and not one.

[44] Ian Mueller, *The Triangles in Plato's* Timaeus, *Mathesis* 12 (1996) 286-333.

[45] I am fully aware that my suggestion here does not sit well with the official story about the invention of truth-tables. But neither does the view that Plato's arguments could have been modelled on the precursor of modern calculus, the latter of which seems to me vindicated by the text of Resnikoff and Wells. See also Lloyd 1966, p. 1, on logic in Plato and the questionable tendency to identify the beginning of logic with Aristotle's introduction of using symbols in logic.

and emphasises the importance of the most radical and new aspect Plato's *Timaeus* introduced to elemental theories, namely a formal explanation of transformation of elements, which for the element earth is only a deconstruction and a reconstruction as earth but for the other three there can be inter-transformation, an aspect analogous to the social mobility of children described in Socrates' recollection, at 18c6-d6, where the novelty of the suggestions is also highlighted by Socrates (18c6-7).

This leaves the formation of a solid, for according to Timaeus, "All that which comes to be must be bodily, and so visible and tangible"[46], and the body of cosmos, and all bodies in it for it is 'the all' and the origin of all other bodies by imitation, has to have depth (*bathos*, 32a7). In order to form a solid, we need to have all the sides, and there are at least four sides to each of the four elemental solids[47]. Lastly, the textual evidence in the *Timaeus* is hard to interpret unless one keeps in mind what Socrates says in the *Phaedo* about the development of his application of the Theory of Forms in scientific inquiry. Within the *Timaeus* though, there is a possible analogical argument, if one accepts some mirror imagery, which I think is justified, namely the explanation of the death (as we know it) that the rational, immortal soul leaves the composite body when the structure of the bone tissue which forms the cranium[48] disintegrates too much and becomes leaky. Lastly, we look at a short version of an interpretation of *Timaeus* 49e in context with its kindred text in the *Phaedo* 103b.

---

[46] *Tim.* 32b4-5, transl. Cornford.

[47] On this interpretation each surface of an elemental structure is a completed truth-table with regard to each of the elemental kinds, and must be completed to justify a conclusion about which of the kinds the particular thing under investigation must belong to. I stress that this is a preliminary suggestion, but in its simplest form it does apply to the fire-element.

[48] There is an interesting discussion of the sutures of the cranium at *Timaeus* 76a4-b1. The number and shape of the sutures, that is the lines seen connecting the growth plates of the cranium (if it is a reference to those, which I suggest it is) is said to be a result of the number of revolutions and the amount of nutriment and vary greatly between individuals, being more in those who had many revolutions and less in those with fewer. Now if the revolutions referred to are thinking, which is in accord with the description in the *Timaeus*, and thinking is an activity which is sustained by nutrition, then the thinkers have a higher number of 'cranial plates' than the simpletons. The image harks back to the fifth possible structure, the dodecahedron, as made out of many small flat 'faces' and depicts the head of the hard working accomplished thinker as a nearly a micro-cosmic image of the body of the universe. Such a micro-cosmic structure would also be able to accommodate within it all the 'elemental structures' that is, analogosly to the ethical discussions, whatever virtue was being sought understood, conception of it or claims about it had to be examined against all the other virtues, for all of them participated in the Form virtue. See also my discussion on pp. 61-63

In 49e, Timaeus firstly reminds us that due to constant transformation and inter-transformation of the four elements we cannot really speak about them as this or that. Secondly, Timaeus affirms that in giving or assigning names, like 'fire' to anything it must be based on quality or that which we consistently feel in the cyclical transformations, that is the *power* that we feel through and by our senses. At the *Phaedo* 103b5-c1 Socrates reminds Cebes that things are called by the Forms of which power they can hold or have a share of. This is possible in 'thing' even though these shares are of opposite powers. Such sharing or co-inhabitation of opposite powers in one space or thing is not possible in the Forms themselves because a Form can never admit of or hold opposite powers. Using examples of natural phenomena like snow and of abstract or semi-abstract concepts like numbers, Socrates then argues for kinds, for classes of things which always bring a specific power to the meeting and mixture with other things in this mixed and changing world. The conclusion is presented at the *Phaedo* 105c, as a safe and not simplistic answer, like the one from which Socrates started at 100c, namely simply to state a participation in the relevant Form as the cause for anything having the power it has or affecting us in a particular way. It is in this new way Timaeus uses kinds by reference to power at 49e. Or rather referring to the consistency between kind and power, which Socrates theorises in the *Phaedo*, Timaeus speaking of powers is speaking of kinds, on the condition that the theory of Forms is being accepted and applied[49]. It is this that

[49] By this I mean that the theory of Forms is accepted by the interlocutors involved as their starting point, in a way kindred to the acceptance of using it this way by Socrates´ interlocutors in the *Phaedo* 100b1-c2, and similarly the demiurge's conditioning of the everlastingness of cosmos by his own continued being, both temporarily and in the sense of being without grudge, at 41a7-8. These lines and the controversy around the text as preserved and how to translate it are quite interesting and a subject for a study by itself. A.E. Taylor (p248-251 has the most helpful comments. Yet I disagree with his conclusion that the text must be corrupt. Taylor is slightly inconsistent in translating first in the plural or "gods who have gods for their worshipers" and then in singular "a king whose subjects are themselves *basileas*, a king over king." Taylor finds it simply ridiculous that the demiurge, as the kind of deity Taylor assumes the demiurge is, namely "the Creator himself", would "bestow such an appellation on his own creature",. To this I retort that first of all the demiurge is not a monotheistic creator god like the Jewish and Christian one. Secondly, and notwithstanding the plural for the creating deity, the genitive of origin stands perfectly, for the lesser gods are the creation of the demiurge, and as I have suggested, the demiurge is a representative of a kind, just as Socrates in the *Apology* is a representative of a kind. So the lesser gods are a product of the divine level of the demiurge, and therefore gods made of gods and also gods who worship gods, since the demigods answer to the demiurgic level of divinity, as sons to fathers in the speech of the Laws in the *Crito*. The other interesting part of this sentence, I suggest, is the distinction between the making of the gods, and their powers. This, I submit, is the distinction between the *formal* or *structural* features and the *power*

Timaeus reminds us of in 49e. Timaeus there reminds us under what conditions we can use terms like 'this' or 'that', namely *in* or *within* that in which they are always reoccurring. The analogy is with the receptacle, and I suggest that the real receptacle[50] that Plato has in mind is human language. I take this passage to be a reminder that we can use terms like the names for the kinds of elements in a good and proper way if and only if we keep in mind the limits of language and do not overstep the limits that the logical possibilities inherent in it give us.[51] To conclude this last part of the preliminary argument for why I think Plato suggested no elemental structure and in fact no structure contains its elemental power unless being completed as a structure, I suggest that we can imagine the use of language, perhaps even the majority of the use of language, along the lines of the pre-cosmic, (equivalent to pre- or not-formal structural) conditions in the receptacle. On this interpretation, when we use language as in the 'pre-cosmic' conditions of the receptacle, nothing ever holds its form sufficiently long for anything to be formed to completion on it as a structural part, then language does not serve reason.[52] What we say using language in this way does not express or hold a belief or persuasion *which can be tested on the basis of the structure it is built on or contained in*. Even if there may seem to be a structure to speech, if there is not a commitment to the limits its formal features pose on its possible stages and outcomes, in terms of justifiable

---

, for the power of the lesser gods is an imitation or projection of the power in the demiurge, which we can see from the clear emphasis on their working by *imitating* the works or rather the workings or ways of working of the demiurge; first as a direct order from the demiurge to the demigods at 41c5;"imitating my working (*dynamin*) and repeated at 69c5, when they have taken over as agents "but they, imitating [him]."

[50] Dana Miller, (2003). *The Third Kind in Plato's Timaeus*. Göttingen, presents some of the interpretations (p 9) offered of this puzzling entity, and suggests interpreting Plato on the Receptacle as three-fold discussion, metaphysical, material and on the notion of place. See also Johansen (2004), especially chapters 5 and 6. See also Driscoll, J. (1979). 'The Platonic Ancestry of Primary Substance', *Phronesis* 24: 253-269.

[51] Perhaps a supporting argument might be made from the description of time at *Timaeus* 37d5-7, that it is 'an everlasting likeness moving according to number, [being a likeness] of eternity that abides in unity' (Re-arranged translation from Cornford). Each unit of time, as a fraction of eternity if eternity is perceived of as infinitely long, is both infinitely short *and* infinitely long. But if infinity is demonstrated in circular movement, then cut-off points or markers for a cycle and further divisions into periods can be seen and conceived, but that will be within the body of a year, and in terms of years and their further divisions into months or further collections into decades and life-spans, for instance.

[52] No formal conclusion can be a motivator to behaviour if one does not commit to the structure or formal side of a full investigative discourse leading to it.

belief, such speech is not contributing to the examined life.[53] In 'post-cosmic' conditions, an individual would commit to holding on to his words long enough and in a fashion which made him commit to the logical conclusion of his premises, and conversely to have to dismiss something if they did not comply with the agreed logical rules. Let us now compare this suggestion of a logical build up to a philosophically persuasive argument and the construction of the body of the elements of fire, air water and earth.

This part of the 'creation aspect' of the elemental theory starts (see above) with the triangles[54] and ends with the four elemental structures of fire[55], air, water and earth, in which each, when fully formed, holds its respective elemental power (see above). The analogical chain of construction for harnessing the rational potential of language starts with a sentence formed from the concepts of being, same and different[56] and ends in a formally completed logical structure, which, as with the powers felt through sense-perception, can cause persuasion in the minds sensitive to such an exercise of reason, aimed at forming the best belief possible about what is right, just and the thing to do accordingly, both at the individual level and at the level of society, first at city and then at the global or cosmic stage.

Above I describe the stages in constructing the elemental body as a choice of triangle, in the sense of choosing the geometrical figure of a triangle and which of

---

[53] At the *Apology* 38a1-7 Socrates declares the unexamined life is not worth living for a man, having described the examined life as the life as that of examining himself and others every day about virtue and those other matters he routinely discusses (Paraphrased from Grube's translation in Cooper, 1997). A speech not examining life is, I suggest, a speech not 'administering to intelligence', as Cornford translates at *Tim.* 75e4. The condition of committing to the argument is brought out by the differences Socrates expresses to hold between the sophists and men like Timaeus, at 19e; the sophists are good at making speeches but "have no settled home [city] of their own." (Transl. Cornford) But Timaeus is *both* a philosopher and a statesman, both a thinker and a man committed to a constitution of a real city of which he is a citizen. This means that both the formal, structural or abstract conditions and the emotional condition of committing to the argument are found in Timaeus and not in the sophists.

[54] The more fundamental principles mentioned at 53d are not a part of Timaeus' logical build up. They belong to the kind of philosophy he is not actively involved in, but presumably the kind Socrates is. My suggestion is that the mathematical representatives for such concepts are point and line, which in Euclid's first three axioms are just spoken of as assumed to be or exist.

[55] I will not pursue the thought here, but it is entirely plausible that the different elemental kinds are meant to correspond to certain types of arguments or features of arguments. In the text on elemental transformation and on digestion, it is made clear that fire cuts through all and divides all. It is entirely plausible that this refers to the nature and role of the *elenchus* in Socratic or *aporetic* argumentation.

[56] And their negations, as I will argue.

the two there are two related but different ones, available. I propose that the corresponding step in the use of language is a sentence, constructed by using being, same and different, the ingredients mixed together to form the rational soul, but as this is *within language*, all of these words or names are used in the way qualified by the mixture and mixed participation possible in things but not possible in Forms, from which things get their names. Giving a name to a thing is an act of concluding and announcing that it is more *this* than *that* and therefore falls into the kind which is named after it. If *this* and *that* are the powers hot and cold, then a thing which is more hot than cold is fire, although it has cold in it.

Let us at this point substitute *this* and *that* by the polar opposites of reason and emotion[57], the polar opposites in the mixture of man, and look at a cycle of gradual and reciprocal approximation and moving away from each pole resulting in the waxing and waning power relative to its opposite. In a conceptual system of nature, where reasons is caused by abstraction aimed at collection and unity, but emotion, moving away from reason, increases in strength or aims at division and disparity, then a thing which has more reason than emotion in it is rational, although it also has emotion in it. I stress that such a conception of the polarity between reason and emotion is characteristic only of a 'pre-cosmic' condition. It is not the goal of reason to obliterate emotion, (the demiurge is driven by emotion, (29e1-2)), but to create a hierarchy of emotions from grudgeless love down to self-love, which nevertheless can be harnessed by reason. When reason has the upper hand in the mixture that a human is, it does not mean that a rational man has less emotion, but that his emotions are more akin to the emotional side of the demiurge, the rational man has more of the kind of love which is universal and selfless than the kind which is irrational and without any constraints or limits placed directly on the individual human. The stronger rational ratio there is in the emotive soul, the more likely an individual is to adhere to and obey the reason embedded in the soul of humankind at

[57] A list of pairs of polar opposites and how they 'beget an offspring' which is a function of the magnitude of each polar opposite in each case, used in the *Timaeus* could be drawn up. Plato follows the logic Alcmaeon suggested determined the sex of an embryo, namely that both parents contributed to the embryo and that the sex was determined by which parent contributed more. See Table 1, p. 54 in Longrigg, 1993.

the level of society, governing sexual behaviour for the best possible outcome of sexual propagation.

Let us now return to triangles as propositional sentences. I suggest that a right-angled triangle is a statement and expresses a judgement about the difference in ratio between polar opposites in a thing. An isosceles triangle represents neutrality and a suspension of judgement as to by which of the ingredients mixed in that thing it should be called. I suggest that the image of an isosceles triangle is of two right-angled triangles of equal proportions but opposite conclusion, cancelling each other out. A human mind in this condition, and indeed a discourse at this stage, is like the receptacle as described at 50a4-c6 as 'never parting from its own character' in spite of being ever 'receiving all bodies'.[58] There are strong parallels between the description of this aspect of the receptacle and Socrates' philosophical way of discourse, both as described in the ethical dialogues, as himself not knowing anything worth teaching, in the midwife depiction in the *Theaetetus* as being barren (149c), and that midwives, had to be barren[59], and lastly his own admission that he was obviously not qualified to make a speech on natural philosophy in the *Timaeus* (19d1-2). It is a further aspect of the 'midwife-description' that the midwife, although reluctantly, practises match-making, Gr. *proagogia* (150a2). One aspect of this is demonstrated in the *Theaetetus* and in two directions, as Theodorus brings Theaetetus to Socrates for 'training' but Socrates says that in some cases he sends those who do not manage to progress through discourse with him on to teachers in other fields of study, as to Prodicus in rhetoric (150b). But Socrates asks Theaetetus for what he has learned from his other teachers, such as Theodorus, and reminds him of other thinkers, in which Socrates even poses a distinction between Parmenides on the one hand, and Protagoras, Heraclitus, Empedocles and others (152e1-6). Theaetetus proves to have indeed been receptive of the seed of their thought which

[58] Paraphrasing Cornford's translation.

[59] Although, interestingly, they should have had the experience of giving birth, which tallies both with the story told in the *Phaedo* of attempts of young Socrates to pursue natural philosophy, and the statement in the *Timaeus* 46e7-47b2, that all human knowledge originates in sensory experience. Socrates in the *Timaeus* has as the young Socrates experienced the pains of labour, but is now the barren midwife assisting Timaeus. This image does to a degree endorse the view that philosophy proper has a limited role to play in science in the sense of being only one of unmissable poles for a mutually beneficial and fertile pair of polar opposites.

requires and demonstrates a degree of neutrality and a desire to beget and give birth to understanding, which must be of his own, but which he needs help to deliver, to examine and to raise. The emphasis laid on regimen[60], both in terms of 'nutrition' and 'exercise' for each aspect of the mixed, his mind and his body, is an extension of the medical theory in *Regimen*[61], but now developed and applied to both aspects of man, his mind and his body. There is little doubt that in Plato's mind, discourse and education was the way to nourish and to train the soul, making language the stream that carried it between source and receiver in a way which could be observed and examined by qualified and well-disposed lovers of rational discourse. The discourse, at least Socratic or *aporetic* discourse has to end in *aporia* in order to have its educating and improving effect on the participants, either the effect that they will in future conceive of better theories or if not conceiving, then at least be "gentler and less tiresome" to their companions, "modest and not think you know what you don't know," to quote and paraphrase *Theaetetus* 210b11-c4. It is a formal, logical feature of the *aporia* that the proposed answers Socrates' interlocutor has managed to generate have been thoroughly examined from every possible angle. In the new formal side to the elemental theory, presented in the *Timaeus*, Plato gives a mathematical presentation of what this means.

Summary and conclusion

I have presented and argued for my views on Plato's aim, approach and method in the *Timaeus*, particularly on how he applies analogy and metaphor as logical devices in his teleological theory of the causal nature of man as a mixed being. The concepts

---

[60] *Tim*. 88d6-89a1can easily be read as a description of a Socratic or aporetic discourse, where "internal and external motion" which we would then read as the individual emotion and the external testing of the logic, are kept in balance by shaking in moderation as the receptacle does, holding the elemental regions in line and order to ensure that like is next to like and friendship prevails throughout. For the internal motion and the external motion to hold each other in natural balance there must be a likeness between them according to the principle that like affects like. Therefore, and also by the principle that everything in motion is mixed, the internal motion of more emotion than reason still has a part of reason and the external motion of logic still has an emotion akin to reason, that is the unifying friendship or self-less love.

[61] *Regimen* I.II.18-20: "Even when all this is know the care of man is not complete, because eating alone will not keep a man well; he must also take exercise." Loeb, vol. IV; Hippocrates and Heraclitus. Translation by W.H.S. Jones. For the question of whether and then to what extent there is medical theory in the *Timaeus* Ayache, L. 1997.

of polarity, infinity, mixture and place, applied to the formal or logical aspect of human thought, are Plato's crucial ingredients in the *Timaeus*, and he applies these to a bewildering array of guises or subject matters, in a complex but consistent way throughout the whole text. From these, Plato makes a logical structure for causal argumentation, which applies to every aspect of cosmos. It is a demonstration of dialectic, in the sense that it is to show how collection and division in a mixed and moving world can be ordered for the good and the best, throughout, for each part as well as the whole they form. The logical potentials of language, of the basic sentence structure of subject, verb and object and of negation allow us to formulate and to address to a formal completion all the questions which we can address with such a sentence structure. The questions of how to live well and best, reflect the mixed nature of man, a nature of reason and of desire. In questions about how to live it seems both reasonable and desirable to avail oneself of such a possibility and to suspend judgement until such discourse has been carried to a conclusion. Since the conclusion is nevertheless also based on accepting basic premises at the beginning, such as that unity is good and that interdependence between opposites is a part of the nature of man, the formal procedure and its outcome applies strictly only to one who has willingly accepted these premises. But if so then the combination will or ought to bring about persuasion, which will direct the acts of this individual and therefore also determine his causal influence as an individual agent or cause in human society.

The most basic of the many *mixtures* is seen in the use as the polarity between limit and un-limit and between place and movement. The concept of 'place' in the *Timaeus* is that of a formal, structural enclosure, be that logical, geometrical or 'material', the last ('material') seen in such topics as tissues in the animal body. The logical function of the concept of 'place' is to provide a demarcation of a structural or formal completion for a section and sections of an infinitely divisible spectrum between poles of a polarity of *powers*. This spectrum is dynamic and conducts or propagates *power*, through itself and as a part of a chain of other 'places' reaching between the polar ends. The demarcation or sectioning, although it can with

reference to form be 'punctual'[62], can therefore with reference to what flows not be closed and rigid but must allow *flow* or *streaming* of something along the entire length of the linear spectrum. Each section or 'place' contains a kind, a collection of markedly like or similar individuals. Yet within each collection there is a polarity, for there is individual diversity and the polarity of the whole chain is also represented within a 'space' or 'kind.' The power that *flows, streams* or is *propagated* along the spectrum of 'places' can flow because of Plato's unique contribution to use of elemental theory in causal reasoning, namely his theory of deconstruction and re-construction of the formal aspect of the elements and inter-transformation between three of them. This, I suggest, is analogous to using propositional sentences in investigative discourse, in the process of re-examining beliefs and in realising both the potential but also the limits of human thought and one's own individual ability at each point. It would represent self-knowledge about present 'position', as well as an indication of both the potential and the limits of one's choice, all of which would be a part of seeing oneself in relation to others, which, because humans are, as individuals, reciprocally dependent on the collection of humans into the body of their society. Not seeing this polarity between individual and society is to miss half of what constitutes human self-knowledge and to be deprived of knowing how best to orient one's share of rational agency in a coordinated and directed way with regard to these two inseparable aspects of human being.

In a model of the gradually changing ratio of the power, or presence of power, from two polar opposites, the waning presence of the one signifies the rising power of the other. At this point the concept of infinity comes to the fore. There is, of course, a polarity in how it is applied; firstly there is the paradoxical polarity of infinity and movement, for it seems equally incomprehensible to get to the end of infinity as it seems to be to define the infinitely small point or part of it one initially departs from. To this problem the idea of an enclosure is also applied. It is applied as a circle in two-dimensional context and as a sphere in three-dimensional context. As long as one goes in the same direction along the trajectory of a circle, one is simultaneously

[62] By 'punctual' here I am referring to the kind of formal precision as is exemplified in solstices and equinoxes on the cycle of the year.

beginning and ending a circumnavigation at all 'points', and all the area that one encircles is contained at all times. The same holds true for the sphere.

Circularity is our human way of mirroring infinity. In terms of understanding the nature of the world, our world or rather the world of which we are serving inner organs, the account must certainly be started from somewhere, must have a beginning continue to middle and have an end. But that end is also the starting point for the next round of telling the same story. This is why the *Timaeus* is simultaneously a cosmogony and a cosmology, an account of creation of the world as well as a manual about how to care for it at all levels of agency.

My emphasis has been on the formal side of the causal theory of the nature of man. I have move toward the construction of the sides or faces of the elemental solids as being a kind of truth-table formed with regard to one elemental kind, and the completed three-dimensional structure, having depth to a truth-table, with regard to all four elemental kinds, comparable to a discussion of an individual virtue with respect to the four cardinal virtues, suggesting that justice is a level higher, as the right balance between the three other cardinal virtues in an individual or society.

Plato's choice of triangles and of the mathematics of triangular geometry holds a dynamic polarity between forms, as well as collection and division. For just as circularity is the only way to envision eternity, so a sphere is the only way to envision evenly distributed, and divisible final space. The polarity between, on the one hand, a circular and spherical form and the form of the triangle (and square) cannot be completely overcome, but only infinitely reduced, by what amounts to the two directions of using infinity known in calculus, as integration and differentiation, both functions having an early representative in Plato's Academy in the works of Eudoxus[63] and partly based on Theaetetus. I have not pursued the mathematical aspect further in this study, but point out the potential, as a part of my argument for the unity and completion of the *Timaeus*. In emphasising the formal aspect I follow

[63] H.L. Resnikoff and R.O. Wells Jr, in *Mathematics In Civilization*, 1973, p. 250

the suggestion made by G.E.R. Lloyd[64], that Plato had a lot more to do with the emergence of logic than he has been credited for, which is in line with the words of David Sedley that "Plato's formal causes have received a largely bad press."[65] I follow Sedley in looking at "causes as things"[66] and suggest that the elemental triangles and bodies are three-dimensional things as are souls, which when completed can hold and propagate the power stemming from and kindred to rational persuasion, that is as long as the direction of propagation is right and the line-up of propagating things or conductors is *amicable* in the sense that most like is next to most like, reflecting the causal principle that like causes like.[67]

Concerning the structure of the *Timaeus* I have paid special attention to explaining how the role of Socrates at the beginning and the problem of sexual propagation and diversification of fauna near the finish, each provide one half of polarity in what becomes a fully formed and functional conducting link on a circular reading, which in turn represents cosmology or the way in which man can and should robustly and ceaselessly take care of himself and serve cosmos in a good and best way. It is a part of my interpretation that both the linear and the circular readings are proper and indeed necessary to the work, for insofar as the inner life of cosmos, of which humans are a part, has us as mortal agents, needs constant regeneration, cosmogonic guidelines must be accessible, for all human agency is by imitation, but as perhaps the most important parts of this regeneration are to be overseen by the collective reason represented by and preserved in the conventions and institutes of society cosmology as the paradigm and guidelines for this part must also be in place and in view. In Timaeus' causal theory of man, the part on regimen, and on the causal role of begetters and nurturers[68] corresponds to cosmology in this sense. Here Socrates and others likes him in the role of the midwife[69] comes to the fore.

---

[64] G.E.R. Lloyd, 1966, p I: "But before Aristotle the dialogues of Plato deal with many problems which may reasonably be considered problems of logic, particularly in connection with the method of Dialectic."
[65] Sedley 1998, p. 127.
[66] Ibid, p. 114.
[67] Ibid.
[68] See *Timaeus* 86d6-87b9 for the gist or introduction of a discussion suggested to be completed later (87b8-9, for a mention of another occasion).
[69] See the *Apology* 30c7-8: "if you kill the *sort* of man I say I am." And at 30e1-2: "If you kill me you will not easily find *another like me*." Transl. Grube, in Cooper ed. Italics are mine for emphasis.

Chapter III - Anatomy

The actors are the lesser gods, the method is mimesis or imitation, the material is twofold, the rational human soul, which is the archetype soul and the ordered elements. The task is to make mortal animal and start the vivification of the elemental regions. This means getting soul into the elemental regions. The demigods aim for an animal which moves about on earth, namely man, as their prototype animal. The first generation of mankind is all male. Further division, first into the two sexes and then to further animal kinds, is performance related on an individual basis. It is also related to the elemental region each division inhabits on the principle that like seeks like. At the more obviously human level of discussion, it is acknowledged that social factors play a part in the performance of the individual and hence his natural lot in life. However this discussion is postponed in order to concentrate on the individual as leading a happy and naturally good life, according to his own abilities, through self-knowledge. Postponing politics and education is also in accord with the trilogy, apparently heralded at the beginning of the work (27a2-b6). However, given Plato's emphasis on the importance of approaching the individual at the intellectual and emotional level each had[1], it is likely that the theory of the nature of man presented here is meant to be the basics that the sciences on which both of politics and of education, should be based. Critias describes at (27a7-b1) how he will begin his intended contribution in a way which is parallel with that of the lesser gods in our main section; namely, he will take over from Timaeus the account for the nature of man and from Socrates the description of the most supremely educated among them. The lesser gods take over rational human soul and structured elements. At risk of sounding circular, I propose that Critias' description here supports and confirms the role that I maintain Socrates has in the beginning part of the dialogue. As a philosopher, aiming at increased unity of thought, he has suggested the metaphysical part, which can, like mathematics be used as hypothesis in the sciences which deal with the world of movement, change and diversity. The fact that Socrates describes his own previous suggestions regarding the procreation

[1] This, I submit, is why in his dialogues Plato so often has several interlocutors discussing with Socrates, one being active at a time in an ascending order of difficulty.

of children, by saying that their novelty might make them easy to remember, is perhaps a warning to the reader to expect some pretty unusual ideas in what follows. The fact that they follow never the less does suggest that they have a role to play and that the reader is being asked to keep an open mind and not be derailed by appearances. As we shall see, at least equally odd suggestion will follow, not least on sexual propagation of life, and these have puzzled commentators. My approach is to seek what sense might be gained from reading the text on such occasions as analogy or metaphor, rather than dismissing it as musings or a half-hearted flight of fancy. My suggestion is that given the wide range of application over the sciences of man that this part of the trilogy may have been planned to serve, we would do better not trying to read any part of the *Timaeus* with the stricture of later division of subjects and methods of any sciences or philosophy of science, including (perhaps especially) Aristotle's.

From Astral to Human Body

The lesser gods imitate their father in what is relevant to their task. The demiurge had placed human rational soul into celestial globes including the earth and the moon (42d4-5), as a half-way house on the way from divine construction and education to being emerged in the lower elemental regions. From the description of the clash between the circular movement of the rational soul and the irregular elemental movement, both inside and from outside[2] the body at 43a6-c5, we know why, on taking the rational human soul, the lesser gods make it a priority to encase the immortal rational soul in something suitably formed and protective. Being a land-animal, man needs legs and in fact a whole body to carry and sustain the head. This body needs to be managed and it needs to be able to be under the control of the head, if the head is to be in charge of its movements. Such control is psychic function or functions. It requires soul or souls. In the first generation of mankind, which is all-

[2] See about the need for the guardians to be able to deal with threat arising external to their city as well as those arising internally. Vivian Nutton, 2004, pp. 115-116 points out that Plato follows Philistion of Locri in identifying both internal and external causes of disease, but that Plato does not discuss injuries. These fall under violent, unnatural death, as Timaeus says at 81e3 *kata traumaton*. But as the emphasis is more on health care and self-care of man than of treatment of specific conditions, Timaeus does not address this further.

male, three souls are described as being placed in the human body, the rational, immortal soul and the two mortal souls. Only after the division of mankind into the sexes, male and female, does the fourth soul emerge; the soul that serves sexual propagation. I argue that Plato depicts this as a yet another organ pair in the body of the cosmos. The description of the sexual organs as inhabited by what can only be described as a soul-like principle,[3] ends in a mixed metaphor from agriculture, using both plant and animal sowing, growing and delivering. Here the fulfilment of a natural aim or purpose, only achievable through cooperation or union, is a prerequisite for happiness. I will argue that the 'cowardice' and 'wrongdoing' Cornford translates at 9e7 should be read in accordance with the Socratic dictum that no one willingly commits a bad act. Thus I suggest that the defining features are those of strength to lead oneself in a manner which manages to avoid wrongdoing. The underlying ethical and epistemic message is the idea of the distribution of tasks according to ability. Certainly, the male is described as a channel for the divine element, of reason in the head, packed into the marrow called seed (91b1), and the uterus as a 'ploughland'. I agree with Cornford, that as biology and human physiology this is a "fantastic'[4] description, in the meaning of that English word at the time of Cornford's writing, namely unreal, unbelievable, and fanciful. It is a teleological causal description of how animal life is prolonged by regeneration, in the process of which one part is clearly giving and the other receiving, in terms of higher principles and even elemental hierarchy. Does this clash with Plato's radical standpoint on the equality of the sexes and consequently in the teleological context equal opportunity for the sexes, clearly made at *Timaeus* 18c1-5? I suspect that it did not, in his view. However, to explore this issue sufficiently is beyond the scope of this thesis. Nevertheless I will address a few points in the text which could contribute to a more coherent reading or interpretation of these apparently conflicting aspects.

[3] See 91a2-3: "Fashioning one creature instinct with life in us, another in women." Transl. Cornford.
[4] Cornford, footnote 1 "I should not suggest this if the whole passage were not so fantastic, especially the latter part where the womb is called 'a living creature desirous of child-bearing."

Reason Reaches Earth

It seems to me that the immortal principle, or original soul, serves as a paradigm for the lesser gods in their own making of the mortal soul. The mortal soul does not have circular movement, but its functions are described more in terms of the elements mostly characteristic of the 'place' or bodily part in which they reside. Each soul is organised in pairs of driving elements or parts which are opposite affections or emotions for or against action toward their particular subjects. The vocabulary holds both epistemological and emotional aspects; δεινὰ καὶ ἀναγκαῖα, and ἡδονήν and λύπας and θάρρος καὶ φόβον, θυμὸν and ἐλπίδα and lastly ἐπιχειρητῇ παντὸς ἔρωτι.

Having described each pair in terms of its own opposites there is a closing statement of this first round, which I take to have all the parts that have gone before as the subject "these" (69d5 *tauta*). All 'these' were then compounded or mixed "with irrational sense and desire that shrinks from no venture," (Cornford 69d4). This particular 'sense and desire' is erotic love, and Cornford's translation[5] brings out the combination of epistemological component and desire, which has to be in every soul. Sexual propagation, which must carry everything over to the next generation, depends on a sexual differentiation between male and female. According to Timaeus this differentiation happens by a change at the next incarnation of immortal souls which had, in the first all-male generation, belonged to men who "were cowardly and spent their life in wrongdoing."(90e7)[6]. It is worth emphasising the transfer in causality and responsibility, depicted here. The lesser gods create the all-male first generation of mortal mankind. That was a step down from the demiurge's part in cosmogony which could not include anything mortal as its product (41c1-3). The lesser-gods, who are celestial beings, establish and are responsible for only good things in the mortal race of man. Those men who wish to "follow after righteousness and after you", as the demiurge says to the lesser-gods (41c7-8), meaning those who either through strong *thumos* soul or through study of the heavens, manage to be ruled by reason. Reason is the divine thing the demiurge himself made and educated to give to man. I use the *thumos* here, because it is strongly associated with courage

[5] In footnote 2, p 281 Cornford compares his translation with that of Taylor and that of Archer-Hind. I think his reference to Eros in the *Symposium* 203d is apt here.
[6] Transl. Cornford.

and manliness, the opposite of which, namely, "cowardice", is mentioned before it is said that they "spent their live in wrongdoing" (90e7). In the dynamic picture of adjacent but different powers in the *Timaeus*, the ratio determines the outcome. If at the juncture between the nutritive soul (the one below diaphragm but next to it) and the *thumos* soul on the other side of it, the strength of the nutritive soul turns out to be more, it is pleasure and pain, rather than any virtuous sentiments or virtues which are strengthened by reason, that hold sway. Going through life (*dielthein*) in this way, shows you to be at that level of causation, to be that kind of cause, and consequently you are born more akin to that elemental sphere, namely earth, becoming ploughland (91d2). How all the cosmological, ethical and epistemological and even political threads of this metaphoric imagery are supposed to come together is far beyond what can be fitted in here. The point I want to emphasise is that sexual differentiation is caused by human behaviour and is a human responsibility. Given the strong and radical views Socrates expresses at the beginning of the dialogue, I suggest at even though Plato here used the existence of male and female gender in order to separate into groups of receivers and givers, this was no more meant as a theory of the nature of women than the theory of breathing is meant as physiology proper. This is an analogous argument. The image is of a mixture and the ratio of its components as decisive regarding which way events turn out. This keeps open the possibility of a later change of the ratio, perhaps even requiring little to tilt the scales. What Socrates says about ongoing evaluation of children and possible relocation within society points to such aspects in Plato's thought.

Because mankind has not been divided into the sexes, the description of the erotic love soul here is general in the sense that it describes the whole of what will be divided later, between the anatomical and physiological make up of men and women. Two things strike the reader about this matter; firstly that the first generation is all male, secondly that females come about in a way which might seem to belittle that gender. Thirdly, I suggest, once the differentiation is established briefly and near the end, we fail to appreciate the unity of the two sexes as yet another organ-pair in the

body of the universe. So what is Plato up to? The late division[7] of human kind touches several very important ethical and causal points Plato is keen to make. The first one is that intelligently designed nature holds paradigms which rational man can copy or mimic in what he creates or runs. An example of this is Timaeus' advice at 88d6-89a1 to move or shake the body imitating the receptacle, shaking up its content in order to establish and maintain the right arrangement and thus what 'forces' stand next to each other for a smooth and friendly movement and change between them. The other example is on how to tune the intelligent part to its perfection by following the "thoughts and revolutions of the universe," for these are kindred. This is, according to Timaeus, 'bringing the intelligent [human] part "into likeness of that which intelligence concerns."[8]

The second is the point of equality of all individuals emerging at each step or level of creation or causal explanation. This point is made at 41e2-42a3, where the demiurge showing the newly made human rational souls the nature of the universe and explaining to them the laws of destiny, declares that: "There would be appointed the first incarnation one and the same for all , that none might suffer disadvantage at his hands" (41e3-4). The disadvantage referred to is mentioned at 34b10-c2:

> Now this soul, though it comes later in the account we are now attempting, was not made by the god younger than the body; for when joined together, he would not have suffered[9] the elder to be rule by the younger.

In the very first part of the *Timaeus*, where, I argue, some principles to be used as hypothesis in Timaeus' scientific account are laid down as a reviewed from Socrates' earlier speech. One of these is the nature of women, commented on at 18c1-5:

---

[7] It starts at 90e1 and is introduced as only a brief mention, added after the main objective of the generation of the universe and that of mankind has been accomplished. In what follows I shall attempt to interpret how an all-male first generation is meant to have made all the relevant points, and why the additional account is still given.

[8] *Timaeus* 90d4. Man is thus put in charge of tuning his intelligent part, and thereby his own leading part, into as close to resembling the demiurge's initial paradigm, the realm of the forms, and in this becoming like god.

[9] I read this as saying that the demiurge would not have inflicted this perverse and unnatural order upon the elder, and the Cornford's 'suffered' here is transitive form meaning made suffer, endure, accept or undergo. Cornford's discussion (p. 59) and reference to the *Laws* X and to the relevant meaning of primacy put this into the context of Plato fighting atheistic materialistic views claiming the world order to have risen 'from chance and necessity' and from "blind and lifeless powers of bodily elements."

> And then we spoke of women. We remarked that their natures should be formed from the same harmonious blend of qualities as those of men; and that they should be given a share in men's employments of every sort, in war as well as in their general mode of life.[10]

The reminder at 69c5 that the lesser gods are *imitating* their creator in his methods, as he indeed ordered them (41d1-3), reinforces the methodological and philosophical consistence in Timaeus' structure and in the causal argument. As Cornford reminds us[11] , "Timaeus' task was defined as ending with the birth of mankind." (See Critias' words at 27a5-6). Acknowledging this has prompted the question of how seriously or literally one can take anything which seems to come *after* this established goal seems to have been reached, or to be in addition to it. Remarking on the limits to the number of human souls emerging from pairing each with a star, Cornford warns that; "In all this section of the dialogue the veil of myth grows thicker again, and it is useless to discuss problems that would arise only if the statements were meant literally." The bigger or whole debate on whether or not Plato should always been taken literally, and what it could even mean to do so, is far beyond my remit here, but in the context of my thesis I would like to suggest the reply that it is not useless to discuss problems spotted by literal reading, if literal is taken literally, that is how Plato writes it out.

One such problem facing my own suggestions in the preceding paragraphs about the equality between all members of the human race is what says in lines 42a1-3 about human nature being twofold, and one called *aner* (man) as being *kreitton* (Cornford 'better'). There is, I suggest, a strong reason to question Cornford's explanation of the inferiority first of human soul compared to the world soul, and secondly of female souls to manly or male souls. Cornford writes[12]: "Human souls are inferior, because they can do wrong of their own wills. 'Second or third in degree of purity,' if it does not mean 'second or even worse', may refer to the superiority of man's soul over woman's (42a)". The rather obvious error is to claim that 'humans can do wrong on their own wills.' This view is strongly denied within the *Timaeus* text, at 86d7-e1: "For no one drives himself to being bad." Or "no one is bad on his

[10] Translation: Cornford, who also refers us to the *Republic* 456a, for similar claims. For lack of space, the comparison cannot be made here.
[11] Cornford, p. 141.
[12] Ibid, pp 142-143.

own accord." This second reading is in keeping with the countless expression of this view in Plato's authorship. That of Cornford is not. Secondly; *kreitton* means 'stronger' 'mightier' or 'more powerful' (L&S, intermed., p. 449) and has as such no reference to good or bad in any moral sense. In the *Timaeus* this is taken to a new level in the causal analysis embedded in the human biology. The dual nature of mankind, mentioned at 42a1-2 is not a 'warning' about the inevitable emergence of women, but a reminder of the dual nature of man with regard to being made of and harbouring opposites which fight inside him. The emergence is the differentiation or division due to the first test of strength of mind over matter, of rationality over less rational desires. It is a test akin to the winnowing of the receptacle and the various instances of sieving of elements through various structures of the body. Those who, in and after the first all-male generation, emerge as stronger in leading the life of reason continue to be called men, *aner*, for they exhibit more *andreia,* or courage, (see 90e7). This interpretation is further strengthened by the fact that in Socratic ethical discussion, doing the wrong thing is said to be an instance of *akrasia,* which literally means *incontinence*,[13] and refers to leaking and hence figuratively to a vessel and its contents. As we shall see, especially in the physiology part, the quality of the 'seams' or connections between the units which form 'tissues', from which, in turn 'organs' are made, is of major structural and functional importance, even a matter of life or death. A clear example of this kind of causal argument is at 86d3-5, where a single substance, the material aspect of a particular desire in a soul, gets out of bounds and floods the body. It does so because of the "porousness of the bones." (86d4). There is here, essentially, a material failure of a structure made to form a 'tissue' or a sheet, ultimately made from elements. At the lowest level, Timaeus is willing to discuss elements, the level of triangles[14]. We know that in even the smallest elements, fire, one side of the elemental structure is made up of six

[13] The term 'weakness of will' is a misnomer for this word in ancient discussion, because the problem of free will was invented later. In Plato it is always a question of which of mans' desires are strongest and hold strongest sway over his actions, the desires of the intellect or of other desire-holding parts of the composite being man.

[14] See *Timaeus* 53d4-7. In footnote 4, pp. 212-213 Cornford argues that Plato does not have to go beyond the surface in the *Timaeus* as a myth about the physical world. I think this is right and borne out by the fact that depicting the lowest or most dependent on others of epistemological involvement, in or on the liver, and below the language, Plato uses a two-dimensional receptor, a surface.

triangles.[15] The strength of connections depends on the density of 'seams' or rivets. Seams are of two different kinds: the "indissoluble bonds whereby" the lesser gods are bound together, and the "welding with multitude rivets too small to be seen and so making the body a unity of all its proportions." [16] We have therefore textual evidence allowing us to speak of what holds the material periphery of the material body together as 'rivets' or 'stitches' which bear all the visual imagery seen in cranial sutures, and we have evidence that even though these are in principle invisible, then at the 'tissue'-level, they can be visible, or as good as. We can therefore use a certain variation in bodily phenomena as a sign of how vigorous or not the activity inside it is.

This is shown indirectly but quite befittingly for our purpose in a comment which has puzzled commentators,[17] namely the comment at 76a6 –b1:

> The very varying form of the sutures came about through the power of the revolutions and of the nutriment, the more these fought each other the more numerous [the stiches, denser the sutures], the less strongly [they fought] the less stiches/density. 18

What does this mean? Timaeus moves from using the sutures as a part of the explanation why skin has not completely dried up on the head, which has little flesh as a source of water, to commenting on the individually varying number of lines

---

[15] 54e2-3. Cornford, p 217, comments that this "seemingly arbitrary feature" "has never been satisfactorily explained." He does suggest an explanation on p. 234 onward which is mathematical and which Zeyl in footnote 140, p. lxvx, in his introduction, calls an "educated guess". Not challenging Cornford's suggestion but adding another aspect, I suggest the following: each of the six triangles in a side represents a sentence built from *being*, *same* and *difference*, of which there are six possible, if generated by changing only one variable and including the negation. This suggestion is a part of a larger explanation, which I will not elaborate here. An additional and related feature of it is that the difference between the earth triangle and the other, being that the earth triangle has all sides of his triangles equal is that thereby it lacks the 'tension' or non-uniformity necessary to drive and participate in elemental interchange. It is 'neutral' where the other elements have an inner tension because of the disproportional length of their 'sides'.

[16] *Timaeus* 43a1-4: the subject is the lesser gods, who themselves are made by the demiurge and held together by perfect harmonies, that is mathematical and divine causation, whereas the work being performed by them in this text is the stitching or welding together of the various elemental kinds in order to compose the human body as the container and vehicle of the soul and life.It might be pointed out that here these rivets are said to be too small to be visible, but on a larger scale of "tissue" such as bone, that which is invisible on the elemental level can become visible as we see from the example of 'air bubbles "individually too small to be seen but becoming visible in the mass, as the froth so formed makes them appear white in colour." Transl. Cornford, *Tim.*83c7-d5.

[17] See discussion on the matter of relation between health and number of sutures in the head in Elisabeth M. Craik, *Hippocrates* Places in Man, Oxford 1998, p.121.

[18] My translation.

showing the connection between the bone-plates of the cranium and density of the zigzag pattern in these lines. These lines and the density of their stitching allegedly varied between individuals. Timaeus uses this as a sign of what goes on inside the body, the head in this case. Within the framework of his likely account, he can argue that the sutures have a certain function and that their varying number and form is a result of how vigorously or intensely the individual engages in the activity challenging this function. I suggest that the underpinning for this statement is not just in the description of the conflict between elemental movement and the circular movement of the circuits of the rational soul described in connection to birth at 43a, but that an important part is in the theory of care of man, both body and soul, later on in the text. At 87a7-b9, Timaeus acknowledges the importance of the part played by education and politics in the care of man but postpones that discussion and turns to the individual as a mixture of body and soul. After a short declaration about the connection between beauty, the good, and right proportion, Timaeus laments the fact that the vast majority of men cannot discern the ideal proportion between body and soul[19], although these are the most important. The importance is perhaps meant to indicate that without the right relation between body and soul, neither can be beautiful and good, just as when we look to the body alone, it cannot be beautiful unless its parts are rightly proportioned (87de). In short; through our sense-perception we know what the body needs; the right nutrition and the right exercise. If it gets this it will be well proportioned and beautiful. We conjecture that this is also true of soul. So, in order to achieve the right balance between beautiful body and beautiful soul, we must serve each part right. The soul desires wisdom (88b2) contrasted with the body's desire for food. In 88a, Timaeus describes in no uncertain terms how this affects the body; badly if the activity is disproportional. How to strike the right balance and achieve the right and temperate life is then described at 88c. In the sentences about exercising the soul, the only specific discipline mentioned is mathematics, although "other intellectual disciplines" (c1-2), in the case of the one preferring thinking and the arts (*musike*) and all kinds of philosophy (88c5) for the

[19] Cornford, footnote 1, p 350 refers to the *Republic* 402d, showing that what is seen in soul is on the level of ordinary sense-perception, which is was I take the point to be here, namely that most of us must look for sense-perceptible signs and infer the other aspects.

one otherwise more focused on the body.[20] The example of the man maddened by sexual desires (86c), explained by too much porosity of his bones letting through too much of a watery substance, is another example of the emphasis on weakness and literal incontinence rather than badness. Perhaps Plato thought that exercising the soul, which resides in the marrow, protected by the marrow bones, and consequently challenged by the vigour of its movements, would fine-tune the porosity of the bone-walls and strengthen the head as a container of the marrow. On such arguments the difference allegedly seen in the sutures of the cranium would be a good natural sign of the plausibility of this hypothesis. Or in a shorter analogical form: as meat and exercise for the wrestler show up in muscle-size and surface detail of his body[21] so will much thinking about difficult subjects show up in denser sutures in the cranial bone-plate sutures.

This has been a lengthy digression within a digression. However, I have tried to argue from the text that the division of mankind into male and female is not an unfolding of a division between better and worse humans, already packed in from the start, but the result of the trial of life of the first all-male generation, where strength in a certain capacity, namely courage, results in diversification and some re-shuffling in the next generation. A part of my attempted argument has been that it is weakness not badness. It is an incorrect ratio of types of desires which results in bad acts among humans, and as a part of this picture is the idea that this weakness can be countered by the right kind of nutrition and exercise. The desires which should be stronger and prevail are those of the 'higher' souls within the individual, the one in the chest or even the rational part. The right 'nutrition' and 'exercise' for these souls are education and the provision of the paradigm of a well-run human society. This is strongly connected to what I take to be the third, and what I believe to be a major point in the *Timaeus*; the emphasis of the inter-dependence of man, which here at the

[20] We will return to this in Chapter V on care of man. But it is clear that the different studies set out of either group are meant to serve as a means of gradual approach between the two extremes, similarly as the middle elements of water and air are placed between earth and fire.

[21] Details, particularly superficial veins, were increasingly showing up in Greek sculpture at this time. Kuriyama, S. (1999). *The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine*. New York, Zone Books, (in the chapter 'Muscularity and identity) however shows convincingly that the Greek sculptures would not have spoken about their surface detailed as 'muscles' or muscular, but would have used the language Plato uses, simply flesh.

individual level, is depicted in the relationship between body and soul, bridgeable by individual education of both body and soul. In the first part of the dialogue, similar sentiments are expressed by the emphasis on the equality of the sexes and the ongoing assessment, placement and replacement of individuals, both grown-ups and children based on their individual merits. As a result of human activity of the first generation, it is strongly linked to the thought of man as an agent and a cause for the quality of his own life, here individually but ultimately also at the social and cosmic level.

Places, Powers and Pairs

Backtracking to 69a2-5 reminds us why we must seek to understand nature and natural causation.

> We argue that without this [natural causation and understanding it] those other object of our serious study cannot by themselves be perceived or communicated, nor can we in any other way have part or lot in them.[22]

This is a reminder of what Broadie[23] calls the audience's "intra-mundanity" of which they/we must never lose sight. A further underpinning is at 31b4-8 where we are told that everything which comes to be, that is our perceptible cosmos, must be 'bodily' and hence visible and tangible, these two being the two extreme opposite kinds of perceptibility and perception. In other words, man being made up of elements and immersed in the realm of elements, must reach through this elemental enclosure, in order to study the Forms, referred to as "those other object of our serious study" (69a3-4). The two kinds of study, the one Socrates represents (in the introduction) and the kind the others stand for are inter-dependent and interlocked, according to this view. Our task is to see how, in constructing the vehicle of reason in the elemental world, the lesser gods have catered for this all-important cooperation to happen.

[22] Translation mostly Cornford, my slight changes in the first part for emphasis on natural causes as 'that without which not at all', when it comes to human inquiry.
[23] Broadie, (2012), p. 3.

A Place for the Pair of Divine Powers

Sisko[24] has argued convincingly, as has Peck[25], that the human rational soul consists of two circular and circularly moving things, corresponding to the circle of the stars as the circle of *Same* and the band of the planets, as the circle of *Different*, at the same slight angle as these phenomena exhibit in the skies. As such, the rational soul is a composite containing a pair of opposite or different elements. The similarity between them is their circular shape and movement; the difference is, figuratively speaking, that one is just a line, whereas the other has a two-dimensional surface, like a ribbon. It is only together that they occupy a three-dimensional space and only in this cooperation or co-construction that they accomplish their function. The band of the different, seen as the band of the planetary movement, is marked off by the outer limits to and from which the planets wander away from the path of the sun, which runs as a line through its middle, and was called by the Greeks "The circle through the middles of the signs."[26] It seems clear that to Plato this could be seen as a natural example of an un-harmful deviation from the middle. In Timaeus' nosology, changes from the perhaps optimal can take place to a certain extent without there being a disease or life-threatening damage to tissue or organs.

Unlike our speakers (here Timaeus), the lesser gods are not giving speeches but building structures. Yet like our speakers, the lesser gods have to start with a 'divine' part, corresponding, I argue, to an unproven theoretical assumption. The structural plan is the same regarding the number of levels, namely four. But the lesser gods do not (I have argued) directly create the fourth, which comes about as a result of diverging performance in the first all-male generation, a delay caused by the necessity of pairing causal power and responsibility, but which upon reading the text could conceal the structural integrity of the argument.

[24] Sisko (2006).
[25] Peck (1928)
[26] Evans, N. (2010). *Civic Rites: Democracy and Religion in Ancient Athens*. Berkeley, Los Angeles, London, University of California Press, p 76.

The lesser-gods (perhaps the divine counterparts of natural philosophers) work with the conception that movement causes change[27] and that therefore that which causes change is moving and that these movements are of two main kinds, namely circular and straight. The straight are not contained with regard to direction or how far they will move anything, unlike the circular movements, which are self-constraining in this respect. Therefore, the circular movements need only be sheltered from the effects of the different movements of the three kinds of power-wielding elements. However, since all knowledge is dependent on an origin in sense-perception and all sense-perception occurs through elemental powers and causation, the 'organ' of circular movement has to be able to absorb and to transfer the effects of linear movement onto a circular one. The absorption can only take place in the band of the different where a bit of irregular linear movement (the one marking the outlines of the signs), is contained within an overall movement, which is akin to the circular movement of the ring of the *Same*. The ring of the *Same*, on the other hand, though moving, comes through its pure form of movement, closest to those imperceptible paradigms, which are graspable only by mind, and only if applied differently than in natural philosophy. This part of the rational soul therefore is best suited to contemplate the immobile forms, through its closest kinship to it.

We must now recall the limits to linear movement in the band of the different and assume that whatever extent and in whatever way linear movement from the elemental movement of sense-perception enters this part of the rational soul, these liner movements must not be too strong. Our textual evidence is at 43a6-b2:

> These circuits, being so confined in a strong river, neither controlled it nor were controlled[28], but caused and suffered violent motions; for they

[27] Anaximenes was the first to suggest this, see fragment DK 13A10, Cicero, *On the Nature of the Gods*1.10.26. Translation from McKirahan, 2. ed. 2010, p 52: "Anaximenes determined that air is a god and that it comes to be and is without measure, infinite and always in motion."

[28] The point being that sense-perception cannot control rational thinking, only disturb its proper function, leading nowhere in terms of knowledge. That they were not controlled, must, I think refer to self-control, which can only come from the ring of the *Same* keeping its role as the closest to perfect paradigm of immobility, which it presumably holds by 'seeing' or contemplating the forms. The band of the *Different* is dependent of the ring of the *Same* for the circular movement, for the band has its own inner tensions and straying members.

> went forward and backward, and again to right and left, and up and down, straying every way in all six directions.[29]

The initial description of the work of the lesser god in making the human body sounds much as if the rational soul had been thrown into a sack, whether this is intended or not, perhaps in reference to the womb or to the bundle like form of new-borns. At least on the second round of describing the lesser-gods' work and now in more detail they use distancing in order to reduce the mechanical effects of the irregular linear motions of the elemental causation on the circular movements of reason. At the same time, while all of the body serves to house human reason in the sub-lunar realm of the elements, the first gross division of the body is into head housing circular movements and the rest of the body as its vehicle. This vehicle makes use of these linear motion to carry englobed reason around on the uneven and obstacle-strewn surface of earth, a task which requires all six motions, but also for the head to be above it all, with its ability to see 'ahead' and direct the journey.

Truncated; Souls Between Neck and Pelvis

The description of why we have necks between head and trunk[30] heralds a kind of cause or causal argument or inference that Timaeus will employ when explaining the physiology of breathing and digestion[31]. The kind of causality I have in mind is how *distance* between the origin[32] of movement or causal force moulds and modifies the effect of one movement upon another, or in other words the ratio between them.[33] In the *Timaeus* these ideas play a major part in explaining breathing and digestion and at 79e10-80c1 they are used in a digression to explain various other phenomena.

---

[29] Transl. Cornford.

[30] Anatomically a word for 'neck' is in Japanese also used for narrow connections between forearm and hand, 'hand-neck' and lower-leg and foot, 'foot-neck', and in Icelandic the word used for neck, can also mean an elongated low hill between bigger land-masses.

[31] A.E. Taylor (p 500) suggests that "The picture is that of a palace of court on an island, connected by a narrow isthmus with the mainland, where the general population of the city lives and its business is carried on." He adds that Plato may have been thinking of Syracuse. But apparently he takes his own suggestion to indicate that this is a fanciful description on Plato's part. How the circular explanation of Aristotle which Taylor cites, namely that the neck is there in order to protect the wind-pipe, which seems to me presumably would not need to be so long were it not a part of the neck] is beyond me.

[32] The distance can be either in space or in time of origin and then the discussion involves different speeds, as in the discussion about sound in 80ab.

[33] This problem and what it means for perception and evaluation, seemingly depending on closeness or distance, and hence independent of the actual 'size' or 'worth' of an alternative or value, than the relative, depending on relative placement, is much discussed in Plato's *Protagoras*.

While in the present part of the text (69c-72d), the lesser gods are still placing souls in the body, it is their relative placement, as well as elemental difference, which is of concern. This is so because souls as causes are something containing a force of desire and ability to recognise the objects of their desires. The directionality, aim or object of desire can create conflicts and the strength of these conflicts must be managed. The greater the difference; the stronger means of management are needed. This is perhaps why between the immortal, rational soul in the head and the mortal parts in the trunk there is a neck, but between the two mortal ones, the soul in the chest and the one in the belly, the diaphragm will do. Perhaps Plato just uses the fact of neck to emphasise that there is more difference between the rational immortal soul on the one hand, and the mortal soul on the other.

The rational immortal soul in the head desires immaterial, rational or intelligent objects. The souls on either side of the diaphragm[34] desire material things, either directly, (food and drink) or as signs or manifestation of worth (honour, obedience). The latter desires, particularly honour, can be achieved only in a social context and has an ethical emotional dimension, expressed as "anger at a message from reason that something wrong is taking place in the members."[35] Cornford seems to emphasise that the 'violent affections' come "from without."[36] This is true but not in a passive sense, since nutrition of the material kind is no less sought actively than the nutrition of the mental kind, which we are urged to seek in form of study of the heavens and all good achieved from studying this activity. In the case of the emotive soul in the chest, the affections which need responding to come no less from within the individual's body, which is why the guardians Socrates speaks of in the introduction must learn to deal justice mildly to those who assault the city from within and to show a stern face to those who assault it from without (17d3-18a2). In 18a Socrates recalls that they had said the soul of the guardians to be at the same time exceptionally spirited and exceptionally philosophically astute, so that they might, towards either (internal or external aggressors), be suitably mild or stern.

[34] The fourth soul in the body of mankind is the sexual soul, although its duality with regard to organs is divided between the sexes.
[35] *Timaeus* 70b3-5, transl. Cornford.
[36] See Cornford, top, p. 282.

This picture is complex, no matter in what context we try to put it to try and understand Plato's placement and nature of causes at work. Why should the guardians respond so differently to internal and external aggression and what does Plato's psychology displayed in city context import into his psychology in a biological medical context? What does philosophical astuteness accomplish and why should that be used on a 'friend' but a stern face turned to an aggressor from without? The answers, I suggest have to do with the same thing that prompts Socrates to dismiss the sophists as possible candidates for giving the speech he wants to hear; the lack of belonging to a place and with it the lack of the intra-mundane viewpoint that Broadie mentions, and thereby the lack of shared identity which underpins the ethical epistemological theory that no one willingly does bad. In the narrower context of philosophical investigation by questions and answers, where both the questioner and the respondent are committed to seeking the best possible answer, neither imperfect suggestions nor piercing questions can be signs of bad intention with respect to the joint goal. When this joint commitment is not manifest, when you are selling products rather than sitting down to a meal prepared with friends, the nature of the investigation is different.

Between the neck and the diaphragm the spirited soul resides. The difference between the *thumos* soul and the nutritive soul that I wish to emphasize is that of language, albeit in a limited capacity. The *thumos* soul stands between rational soul and nutritive soul in that the *thumos* soul can hear and understand reason deliberating, although it cannot participate. The nutritive soul does not have language in any form and reacts only to pleasure and pain, or rather to sweetness and bitterness. This is one more expression of causal influence across boundaries for active participation. The demiurge could look to and see the forms, and reproduce their image in the rational soul. The lesser gods can take the rational soul to use as an origin or fundamental principle of man, make for it a body and fashion other souls within that body, capable of being influenced by the rational one. Neither of the mortal souls can participate in its function and only one can be directly influenced by 'hearing' the deliberations in which it cannot participate, that is it can appreciate reason when it hears it or receives it, but not contribute to the discussion at the highest level. Souls are moving principles, which, like their counterpart the elements,

are given 'dwelling places', which are then lined up in a particular and significant sequence. This sequence is given for the world's body at 32b3-8:

> Accordingly the god set water and air between fire and earth, and made them, so far as was possible, proportional to one another, so that as fire is to air, so is air to water, and as air is to water, so is water to earth, and thus he bound together the frame of the world, visible and tangible.[37]

For our present purpose let us assume that this is the order we see all around us in the macro-cosmos, sun in the heaven, air between[38], rivers above earth and earth beneath. In the same phenomena we see changes, and if we think of them in the same elemental terms, the most obvious changes happen or are perceived at the 'borders of the 'surfaces' where the adjacent elemental masses or regions meet. In the macro-cosmic context the aspect of perceiving the 'powers' of the elements by our sense-perception is not problematic. In the micro-cosmic context of the human body, this is not as straightforward. However, this is what we need to do in the 'anatomy' and 'physiology' of the *Timaeus*, which thereby becomes a kind of meteorology. Because the human body is a micro-cosmos, made up of the same elements and elemental powers as the macro-cosmos in which the human body is and by which it is engulfed, the body must first of all be 'separated off' or insulated from the cosmic flow, and secondly it must establish its own micro-climate. Timaeus begins with the latter task, as he consistently 'creates' the human being from the inside out. Hence he first creates and describes the types of souls and then houses or places them in the order discussed above.

After the immortal soul is housed in the head, the sub-neck, mortal souls are created in order to reign over the necessary functions of the body, which is the vehicle of the cranium-housed rational soul. Keeping to the interpretation that at each level of the created world there is a duality, which allows for effects or influence not only within a sphere but also between them, and applying this to souls, the rational soul in the cranium has two 'organs', by which I mean the ring of the

---

[37] Transl. Cornford.

[38] There is of course air around the sun in the sense that there is air above as well as below it. The idea of air 'above' the sun and further away from water being less mixed with water is therefore not far-fetched, and this air gradually gets further divided into air and *aether*.

Same and the band of the *Different.*[39] The 'organ-pairs' of heart-lung and liver-spleen, and later male-female reproductive organs, all have the same function of maintaining movement and change, but within the limits the organism can accommodate, also at each level in each cavity, designed for a particular function. This local duality offers an explanation of limits which is different from that of Xenophon's anthropocentric theological teleology for the limits to which the sun keeps in its approach and distancing from earth.[40] In Xenophon's explanation, the sun as a god seems to have the judgement and the good intention which suffices to both apply heat sufficiently to burn only what befits man's interests and never to wander further away than man can endure. In Plato's version, the fire around the heart does not seem to be quite so self-constrained, but needs assistance to limit the extent of its 'boiling'. Likewise the liver has a binary own function; it can be 'bitter' and it can be 'sweet'. The causal function of the liver, and the heart, is like that of Socrates' knee in the *Phaedo* 98c-d, which can both be bent and straightened; it is a thing without-which-not, but not the thing because-of-which, in a sense of real reason, or a reason why. Both mortal souls can 'do' two things or be seemingly opposite kinds of causes, or they can cause two opposite effects when activated. As the knees can bend and straighten, the emotive soul can be harsh or gentle, and the liver is capable of emitting bitterness and sweetness. Reason in the head informs and orders the heart (70a) and 'influence proceeding from reason'[41] "make impressions of its thoughts upon the liver."[42] Epistemologically and ethically it is interesting to recall and to try to reconcile the seemingly dismissive description of a "tethered untamed beast" receiving "images and phantoms" (70e) and Socrates' safer method of studying sun's eclipse "in water or something of the kind."[43] For in the *Phaedo* Socrates insist that theories and arguments (*logoi*)[44] are an instance of such mirroring and that using them to look into the truth of things (remember Socrates is

[39] See Sisko and Peck
[40] Xenophon *Memorabilia* IV.III. 8-9.
[41] Paraphrasing Cornford's translation at 71b.
[42] *Timaeus* 71b3-4, transl. Cornford.
[43] *Phaedo* 99d-100a. Translation Long, in Sedley and Long (2011).
[44] See footnote 51 in Long's translation , p. 94, saying that in the plural the word can mean both theories and arguments. In an argument which tests or examines the theory we have the kind of duality, which we have in the biological or anatomical example in the *Timaeus*, not least if we, as in the Socratic dialogues have a certain division of labour between *two* participants.

speaking about inquiry into nature in the *Phaedo*) is no less factual or no less real than looking at them "in facts"[45]. The Greek word is *ergon*, which I suggest here means a palpable three-dimensional product of someone's making, a thing, like the cosmos. Timaeus certainly has to take the elemental theory down to a two-dimensional level of the triangles in order to reconstruct it, so that it can better explain both change and stability, through a theory of transformation and inter-transformation. He does that with the help of theories and arguments in a 'likely-account' *eikos mythos* (29b), which builds on language and thought and not on palpable, three-dimensional properties of things, or the apparent reality of completed processes.

However, although there is a division of labour and members of the taskforce must be kept at a distance, there is inter-dependency between the head and the lower parts, and between soul and elements so we must not dismiss one aspect although the discussion proceeds in the guise of the other. By this I am referring to Cornford's comment on p. 282 that: "The emphasis falls on the purpose they [the organs] serve as the seats of feelings and desires that contribute to moral conduct, " as opposed to be described "from a physiological standpoint." There could of course not be any "physiological standpoint": physiology and internal functional anatomy did not exist. Instead, Timaeus offers a kind of physics of the living material being, where the "feelings and desires" are the powers residing in a living being analogously to hot, cold , wet and dry being the powers residing in Plato's geometrical elements. The 'organs' therefore are not organs in the sense of being mechanical devices which manipulate matter[46]. Moreover, we should not limit the association of a kind or part of soul to only one organ in each cavity, but to the organ-pair, in each cavity. The picture is nuanced and easily confusing, for one organ in each pair has, as it were, the more active role connected to the causal-perceptual power of the elements most associated with the type of soul in question, e.g. emotional soul and fire. But each type of soul, as does the human soul as a whole, depends on polarity of opposites to drive its function but no less importantly to keep the application of its powers within

[45] Long.
[46] This has been particularly shown to be true of the heart, see Harris, C. R. S. (1973). *The Heart and the Vascular System in Ancient Greek Medicine from Alcmaeon to Galen*. Oxford.

limits of sustainability for its functional parts. The discussion of how far and how near the sun comes to the earth and why, given by Xenophon,[47] is an example of the problem of the vital limits to the changes observed in nature, is an example of the problem Timaeus addresses in his psychology and anatomy by placing a pair of organs in each bodily cavity, jointly serving the psychological and physiological function taking place therein. This construction and interpretation are in keeping with how the various authors placed the human intellect, according to Longrigg's table;[48] Alcmaeon and Hippon place it in a cavity, the head; Anaxagoras and Democritus, place it in the brain, without any further distinction between its parts. Here one should take into account that the brain is not visibly a pair or one of two organs in a cavity in the same way as heart and lungs are, or liver and spleen. Thirdly, Empedocles and Diogenes place it not in an organ but that which is around the organ, Empedocles the blood around the heart and Diogenes the air around the brain. In certain respect, one can say that Timaeus follows them most closely, in a way fully compatible with and extending the approach of Alcmaeon, Hippon and even Anaxagoras.

This is a biological version of intra-mundanity. Just as there were limits to the wanderings of the planets away from the path of the sun, the golden mean, so there must be limits and a return to calm and neutral conditions both for the heart and the liver, that is if the living being was to survive. Each organ, heart and liver, therefore had a paired organ, the heart had the lungs sharing the same cavity and the liver had the spleen sharing the abdominal cavity.

In the case of the heart and lungs the interplay between the elements of air, fire and water takes centre stage, as the arena where the interplay between reason and emotion as powers of motivation takes place. In the case of liver and spleen, the possibility and yet the coarseness of ruling well and beneficially through administering simple pleasures and pains, is at issue, I propose.

The interplay between heart and lungs is a miniature or analogy of the interplay between reason, which activated passion/emotion for something both share

---

[47] Xenophon, *Memorabilia* IV.III.8-9.
[48] James Longrigg, 1993, pp 54-57.

namely the love of justice and beauty. It is in this sense that the macro-cosmic elemental powers and the micro-cosmically placed portions of them are kindred. It is the ratio between the individual's share and the cosmic reservoir and the fact that man is a mirror image of the universe or perhaps a blend of the mirror image and a proper image of the universe that there is, as long as an individual lives, a rhythmic ebb and flow of fire and air, emotion and reason in every man. We shall look closer at this in Chapter IV on *being*, or more particularly physiology and there on breathing and digestion.

The section of the emotive and the appetitive soul ends at 72e. It is not the last word on the soul, but must do now as this is the prototype all-male generation which is being described. Unlike Cornford I think that, when reading this as cosmogony, we are indeed meant to take this seriously or literally.

The fact that the next section is about the further elemental construction of the body and the way it is done follows the established order of soul-body, top-bottom, innermost –outward, show the consistency in the whole structure of the text. In this context too, it is the powers we are mainly concerned with, at least to begin with. The powers of soul are desires and the ability (or the lack thereof) to discern the object of the desire. The pairs of organs Timaeus places within each sphere assume the role which in the *Regimen* was given to the pairing of supply and demand in the interaction between fire and water as food for each other. Here the lesser element is in a serving role of, near mechanically preventing the effects of the power to go too far for their own good.

Summary

We have seen the division of the soul reach from the rational part in the head, through the emotive soul in the chest, to the nutritional soul in the belly. The sexual soul is not yet discussed, although its properties are introduced at 69d4-5as "irrational sense and desire[49] that shrinks from no venture."[50] Each soul has its own

[49] It is necessary to mention both 'sense and desire'. If compared to 'elements' and the distinction I have argued is made between their formal geometrical features and the power each holds when fully formed, 'sense' here refers to sense-perception, which is explained from the formal features of a fully

cavity, within which there is a pair of organs, one leading, the other dampening or mitigating the effects of the leading organ. Hence the pairing represents a mixture and a dynamic gradient of powers so change within a 'cavity' or region and its kind is determined by the nature of the leading organ. In the case of the rational soul, the ring of the same would hardly be of much use or involvement in changing if it did not have, as its partner, the band of the different, which can accommodate limited straying movement. No elements are involved here, only degrees of irregularity in movement. In the mortal soul, elemental involvement and representation come to the fore. So does movement, as the emotive soul, the natural element of which is fire, is the greatest force for most moving and changing in the body as in the elemental realm generally (56a6-b2). Its paired organ, the lungs, are soft, and hence absorb movement and are filled with air and 'drink'[51], the former to cool and the latter to provide refreshments, both functions we will see these elements involved with in breathing and in digestion or replenishment. With the nutritive soul in the belly, the emphasis is on epistemological function as a mirror, which the spleen cleans to restore its mirroring function. As with the heart, it is clear that the nutritive soul is not *in* the liver, anymore that the spirited soul is *in* the heart. Visible images *on the surface* of the liver can "strike terror into the appetitive part" (71b5-6), and lead to conditions which would affect the surface and texture of the liver itself. This system

---

formed element. The 'desire' is the psychological equivalent of elemental 'power'. This reading is accord with the *Phaedo* 105c8-10, where soul is said to be that which upon coming to be in any body makes it alive. It may seem, and would be worth exploring, whether Timaeus is depicting the sexual desire as beyond the rational control an individual can exercise from his own ability for deliberative thought, and must depend on guiding rules and restriction of his society. Socrates' words about marriage and procreation of children, at the start of the dialogue (18c-19b) and the purely physical explanation of promiscuity, at 86b1-d7. The physical cause seems to be a part of the individuals lot at birth, over which he has no control, so the failure to contain the behavioural consequences, are seemingly laid at the doors of begetters and nurturers, (see 87b4-6). This reading, could be a part or even the at the core of an answer to the problem which seems to arise about the number of souls in Timaeus' human cosmological psychology. This is the problem that if human rational soul is seen as being only four-divided, but its function to have to do with five souls, for it interacts with the world soul, through observation, the numbers do not add up. Is Plato vague on this point? I suggest that Plato is not vague here, if one accepts a dynamic reading of something like the Divided Line. In order to create four intervals, we need five 'end-points' or dividers. If the sexual soul is something which will only be contained or managed by social control, then its outer limits or limiters lie outside the individuals realm, so to speak. Same is true of the world soul, for although man has access to it through vision, it is certainly outside, both the individual body and the 'body' of the polis or society.

[50] Transl. Cornford.

[51] In this Plato follows the author of *On the heart,* (see also notes from the article in French) much to the dismay of Galen, see footnote 1 in Cornford, p 284.

of souls, including their relative placement shows a gradient of opposites analogous to the rational and elemental order in macro-cosmos and in Timaeus' argument for why the elements must be four and in the order they are presented.

Collecting the Triangles; From Elements to Marrow and Beyond

After discussing the souls, the leading principles and establishing their administrative division, Timaeus takes up bones, fleshes and "things of such nature". The task is to collect into levels of cohesion, from the invisible triangles to the full-fleshed animal body, the domain of the administrating souls, by which life and reason can penetrate to all elemental regions. In the process of organizing elemental matter no less than the soul there is a hierarchy with regard to the material at hand. There is a causal chain of declining perfection, and there is a two-way division into the 'immortal' (or conditionally immortal) and the construction limited to a life-cycle. There is a tension in the text here, which neither A.E Taylor nor Cornford comments on. At the most profound level of material division addressed in the *Timaeus*, the level of triangles, there is a varying quality reminiscent of, and used as, the reported variety in the quality of what rational immortal soul is mixed of; the world soul is mixed of the best, the human immortal soul of second and third quality, (41d4-7). When the "god set apart" (73b8-c1) the most exact triangles, from which the most exact elements could be made, he is selecting or making a collection at a level (the triangles) which is not broken down further and so is lasting with regard to the account, and he is creating or collecting what is the origin, not only for the most noble tissue, but the semen, which prolongs the life of the kind beyond the natural life span of any individual. Could the god at 73b8 then be the demiurge? Probably not, and for the following reasons: at 41c6-d1the demiurge limits his own contribution to the mortals to the seed for that something in mortals which is called both divine and ruling in those who either follow philosophy, natural philosophy or the code of honourable conduct. The emphasis on the sexual love as being a kind of desire acting on perception unperturbed and unhindered by reasons excludes it from a demiurgic and divine origin. Its everlastingness is rather akin to that of the receptacle and its contents, also after it has assented to getting organized or structured. The selective origin of the marrow, as the most perfect origin of elements

and tissues, does not endanger the causal hierarchy because it is saved by the four-fold ontology.

The marrow then is a starting point for bones, 'fleshes' and 'sinews'. Let us, with Solmsen, call these natures 'tissue'. To start speaking of tissue now having discussed placement of souls in the body is a mirror image of starting to speak of the world-soul at 34a, having discussed the body of the universe. From the point of view of time and temporal order, having to seemingly start the story again is less of a problem in the works of the lesser-gods, than the demiurge, since there are more of them, although this is not mentioned. What matters now is the order of the narrative with regard to the 'tissues' appearing on the scene. At 73b5 we have a sentence about marrow which seems peculiar: αὐτὸς δὲ ὁ μυελὸς γέγονεν ἐξ ἄλλων. Cornford translates: "The marrow itself is formed from other things." I suggest that this simply means that the marrow is a starting point for the other tissues and not for itself. It has come about by other means, from other sources or in another way, which is consequently described as at least semi-divinely sorting out of the best of the triangles, a kind of filtering, although not mechanical, as in the winnowing of the receptacle or filtering of water through bone to irrigate the marrow. The next thing to be made, and therefore the closest to marrow, is the seed. In this Timaeus/Plato is close to Alcmaeon and Hippon, (See Longrigg table 1). This has a double meaning: as seed of divinity, reason and life in human rational soul, from which Socrates in the famous lines of the *Theaetetus* … delivered young men of thoughts, they were pregnant with. And it will link up with the 'biology' of sexual propagation, in due course.

Addressing the material aspect, we need for several reasons to go back to the very beginning; that is as far as to the triangles.[52] Why or how Plato depicts the vulnerability of the physical system ultimately as having to do with the triangles is a fascinating subject. I have suggested that the triangles represent nuclear statements, from which logical investigations of concepts and perhaps beliefs can be woven. Timaeus will state that the triangles in each living body are subject to wear and tear

[52] See 53d4-7 on what seems to be the cut-off point, although more remote principles could be known "to heaven and to such men as Heaven favours." Cornford, p. 212.

[53]with the ongoing collisions encountered in the never-ending movement and change of the elemental world, and that they have a set lifespan. Of the tissues, the marrow is the 'finest', best protected and succumbing last, upon which its most precious captive, the immortal soul, is released from the union of body and soul, (81c6-d3). At 89c1-4 we are reminded that the triangles "are from the outset put together with the power to hold out for a certain time, beyond which life cannot be prolonged."

> τὰ γὰρ τρίγωνα εὐθὺς κατ' ἀρχὰς ἑκάστου δύναμιν ἔχοντα συνίσταται μέχρι τινὸς χρόνου δυνατὰ ἐξαρκεῖν, οὗ βίον οὐκ ἄν ποτέ τις εἰς τὸ πέραν ἔτι βιώη.

What is put together here? What falls apart? Is it the triangles or the elemental sides made from at least 6 triangles, or is it the elemental structure? It cannot be the last, for this happens all the time in natural transformation. It can hardly be the first, for the analysis Timaeus does not proceed beyond the triangles. So it must be the elemental sides, which means that elemental structures cannot be formed and tissues fall apart. This is also compatible with the idea that it is the form of the triangles and the sharpness of their sides which determines how well they can be 'sewn' or riveted together; one could imagine trying to make a ball from dry, hard and irregular pieces of leather or welding together irregular and wrapped plates of metal. This is also in agreement with the emphasis on sharp edges and smooth and plane surfaces of the primary triangles (73b6). This reading is furthermore in agreement with A.E. Taylor's translation[54], with which Cornford agrees, although he objects, I think rightly, to where and how far Taylor takes this metaphorically. As I have argued above it is sufficient that this refers to the interlocking or binding together of the number of triangles necessary to form a plane and thus a side of an elemental body. If that falls apart, so does the elemental body. Again, if a triangle is seen as a sentence about *being*, *sameness* and *difference*, and if human search for knowledge

---

[53] See also 89b on the natural lifespan of diseases, said to be somewhat similar as the allotted lifespan of species, and of individual, and specifically as this is at 89c1-4said to be because the triangles "are from the outset put together with the power to hold out for a certain time, beyond which life cannot be prolonged." Cornford.

[54] A.E. Taylor, pp. 585-586: Commenting on *Timaeus* 81c6-d4, Taylor, objects to Archer-Hind's translation of *chalāi* as blunted, and to T.H. Martin's "angular point". Cornford translates the word as "loosened". Taylor suggests Martin, taking *tōn trigonōn* as defining genitive, could have meant "the roots formed by the triangles", which is what I argue is the right reading.

and understanding proceeds by examining such sentences and the conceptual networks formed by using them, then thinking about abstract ideas, using being, same and difference are our roots in heaven. The abstraction of mathematical thought, turned to logic of a basic sentence, would then be envisioned in the form of a triangle. The demigods place the most perfect of them, as close as possible to the rational soul and reason, which they serve. At this closest of encounters of rational soul and the most perfect of elemental triangles it becomes difficult to keep the narrative lines clearly apart. Cornford[55] points out that the marrow is not a starting point for bone and flesh in the sense that it is itself an ingredient in them. A.E. Taylor has a lengthy and informative comment, but it revolves around the anatomy of the central nervous system and the different importance attached to it in antiquity. Neither explains the reasons Timaeus gives for calling the formation of marrow the starting point for all tissues or 'fleshes.' Cornford translates 73b3-5: "for the bonds of life, so long as the soul is bound up with the body, were made fast in it as the roots of the mortal creature."

> οἱ γὰρ τοῦ βίου δεσμοί, τῆς ψυχῆς τῷ σώματι συνδουμένης, ἐν τούτῳ διαδούμενοι κατερρίζουν τὸ θνητὸν γένος

What could Timaeus possibly mean? I suggest the following: The *bonds* are ratios, but ratios of what? What does Timaeus mean when he says "so long as soul is bound up with body?" The minimal 'body' is a fire elemental body. All such bodies are made up of triangles. These triangles are of various degrees of perfection, but here (73b5-c1) it is specified that the marrow is made of the most perfect of these, mixed in due proportion. The world soul and the rational human soul are made up of three 'things'; *Being*, *Same* and *Different*. I have previously said that these are symbolized in the three sides of a triangle. The triangle forming the earth element has equal sides and could therefore be argued to lack the different, but this is countered by it being made up itself of two triangles, each with unequal sides. A triangle is therefore, I suggest, here used as a mathematical picture of a logical device, a sentence of the form that says that something *is*, that it is *same* as it self and that it is *different* from other. This is not the place to argue for this suggestion with references to other texts

[55] Cornford, footnote 1, p. 293.

by Plato. All that comes to be, must be of a form which allows it to be grasped by sense-perception. Logic must be made visible therefore, at the very least. Concepts are not visible but pictures can be drawn. The most perfect picture or instances of perceptually graspable representations are most akin to that imperceptible paradigm of which they are images. The soul is essentially the bringer of reason and with it the power of life, when it enters the body. What binds the soul together is represented in the triangles. Because this representation is a kind of kinship, the rational soul can, while it is bound in the body, dwell in the marrow, according to the rule that friends can sit by friends.

Tissue and Structure

The formation of 'tissue', in the sense of specific blends of elements, subjected to powers in processes which resemble human skills such as making of pottery, is a huge subject, the story of which I cannot pursue here. My focus is on the coherence and consistency in the causal account of the *Timaeus*. If we were to look outside the text of the *Timaeus* for clues, it would be to the medical writers before and contemporary to Plato, rather than to authors interpreting Plato's text from a philosophical standpoint which is openly and radically different to it. The authors and thinkers Plato has to reckon with, in offering his kind of theory, are first and foremost Alcmaeon, who allegedly took up the discussion of semen, and after him Hippon, Empedocles, Anaxagoras, Diogenes of Apollonia, Diocles of Caystus and the atomists, in particularly Democritus. The questions concerning the nature of semen, here called seed, are what kind of substance it is, where it fits into the elemental spectrum. Hippon held it to be moist, and Diogenes linked it to his preferred air, by making it 'foam of the blood', perhaps in some kinship to Empedocles, for whom it was a form of blood, (Longrigg). In the context of sexual propagation of life, how was semen or seed related to the body, what was presumed to be the nature of the body and how it could 'forward' or cause reproduction, not least as the offspring was not necessarily an exact copy, and if sexual propagation calls for both sexes to be involved? This last problem, the question of what determines the sex of the offspring is reproduced and answered in a particular way in

the *Timaeus.* Making the first generation all-male can, perhaps, be seen to provide a situation analogous to inseminating a womb. Plato would, along these lines, seemingly be close to the opinion of Hippon (Aetus V 7,3 and Censorinus, 6,1 in D.K. 38A15, Longrigg, p. 54-55[56]), who thought that the sex of the embryo was "determined by the quality of the semen." (Longrigg). Or he could possibly be said to follow Alcmaeon, who, according to Censorinus (See Longrigg) thought that the sex of the embryo depended on which of the parent contributed the most of the semen. In terms of souls, desires or virtues, these accounts perhaps come close to each other. It is the relative strength or amount of manliness compared between the all-male individuals of the first generation which determines their sex in the next incarnation. Making gender completely dependent on the performance of the individual (immortal soul) in previous incarnation renders the question of the sex of the embryo as a reproduction of its male and female parents obsolete, since neither of them is a complete being in the cosmic sense, but rather they are an organ pair in the body of cosmos. However, Cosmos is of mixed origin and has a mother in the receptacle. The demiurge put the forms in the soul and the soul in body, while the lesser gods put the most perfect of the two kinds of triangles in the marrow (73b-c). They put the most perfect triangles and make from them the most perfect examples of the elemental bodies, because in the fullness of time these elemental bodies are to flow in semen to carry the bonds of life over to the next generation. Tissue or the tissues are mentioned here first in the construction of the body, therefore all have their origin in the non-tissue marrow, which is a view contrary to that of Democritus, who held that semen was derived from the whole body.

I have argued that in this account the marrow is not a tissue; or more precisely it is not a thing of the same nature as bone, flesh and sinews are in Timaeus' account. It is a special collection for sure, but a collection of primary geometrical 'forms' implanted in 'ploughland'. It is a crucial question what "these" of 73b8 refers to. Does it refer to primary elements or the most perfect triangles of both kinds? I suggest it is the latter, that is the two kinds of triangles from which all

[56] Longrigg, J. (1993). *Greek Rational Medicine, Philosophy and Medicine from Alcmaeon to the Alexandrians.* London/New York, Routledge

the other elements could be constructed and everything else from the elements, according to the rules of transformation and inter-transformation, (see particularly 54b-c). The part of these rules, which I think are most relevant here, is that the triangles 'freed' by the break-down of an earth-element, can only be used in reconstructing another earth-element (56d), whereas the triangles from the other three elements can be used interchangeably between them (56d-e). This is because the basic triangles of the earth-element are equilateral and the other elemental bodies are formed from half-equilateral triangles. Here I propose to look at this as a graphic representation of one of the most important axioms in the *Timaeus*. This axiom is given at 57e6-58a1 and in line 58a1 its causal component is stated: "Accordingly we must always presume rest in the state of homogeneity and attribute motion to a condition that is heterogeneous. Further, inequality is a cause of heterogeneity;" Although this rule is certainly meant to apply across levels of analysis, including the mixture of elements, as a fundamental rule it must be established by Reason, and for the elements this happens when the demiurge persuades the traces to take on the more stable geometrical forms, of which the triangles were the fundamental level of analysis. Because Timaeus' speech is to be based on reference to sense-perceptible qualities, if imaginatively, the elemental bodies, having depth are a better reference that the two-dimensional triangles. The emphasis on the earth-element being the "most immobile and most plastic of the bodies," (55e1-2, transl. Cornford) is related to its cubic form, which is a result of its square sides, which again result from each side being made up of four equilateral triangles.

Let me take stock: We began this digression by asking what the marrow was made of. The answer I propose is from the two kinds of triangles. My main reason was that this is the most fundamental level of 'material' analysis undertaken in the *Timaeus*, and therefore it is the right starting point in the account for the elemental nature and building of the human body. The two main aspects of the living human body under investigation are stability of structure, in the face of constant changes, so both relative rest and relative change are governed and made possible by rational design. The connection between reason and elements are established by the step of the pre-cosmic unstable traces in the receptacle are persuaded to take on a more stable geometrical form, built from the two types of triangles. The same cause, that is

the demiurge made the world or rational soul and persuaded the traces. The most fundamental units from which he made the world-soul were *Being*, *Same* and *Different*, which he partly forced into a structure. Keeping within the *Timaeus*, I cannot go into investigating Plato's relevant logical works, but I can nevertheless suggest the following about the logic at work, and which connects the construction of the rational soul and the construction of the elemental bodies. Constructing all possible sentences with the three variables of *Being*, *Same* and *Different* and their negation yields six. This corresponds to and is a part[57] of the reason why there are six triangles on one side of the fire particle, but this has not been completely explained before[58]. The equilateral triangle lacks *Different*, and hence has only *Being* and *Same*, yielding only four possible sentences. This makes up a quadrant not a pyramid, and in the three-dimensional construction, a cube. It is only in this analysis that the most fundamental formal aspects of the construction both of the rational soul and of organized elements come together and it is only in this analysis that both are subjects to the axiom about the relationship between movement, change, life and inequality. The *Timaeus* is about the created world. Cornford is wrong in his footnote 1 p. 240 that the soul cannot be the mover because its higher order precludes it from being compared to the moved. First of all; both bits of the rational soul move, one even includes the *Different*. It is not an unmoved mover, but a part of it is the most regularly moving thing. Nowhere in the *Timaeus* does Plato suggest that the movements of the heavenly bodies nudge or poke the structures of the human rational soul into better conformity or more perfect movements. The human rational soul looks to the skies and imitates, as the lesser gods look to the demiurge and imitate him in their works. The real causes, or reason or intelligence function as paradigms, not as workmen. The causes of the type "without-which-not", also often called auxiliary causes, are depicted as deforming and disturbing the circular movement of the soul, both at birth (43a6-b5) and in mental disease caused by bodily vapours (probably epilepsy at 85a5-6). In the construction of the human body, the marrow is the most fundamental level, the origin of all tissue and structure. Its

[57] The part of my theory which suggests answers to why an element must be three-dimensional or have 'depth' and how this is a prerequisite for it to have its characteristic power, cannot be a part of my suggestion here. But these are issues I believe are very much at work in the *Timaeus*.
[58] See Zeyl on Cornford's mathematical explanation, as an educated guess.

constituents must be at the same level of analysis as the rational soul mixed into it. For the elemental structures this is not circular movement, but the logical and or geometrical structure of triangles , the sides of which correspond to *Being*, *Same* and *Different*, for the half-equilateral triangles, which form the three inter-changing elements of fire, air and water, and beings and same for the isosceles triangles of earth.

When addressing the tissues proper (bone, flesh, sinews, skin, hair, nails) Timaeus mixes his metaphors. The marrow is the origin of organised matter and the souls implanted in it 'wear' it, analogous to how flesh is later likened to cloth on the bones (74b 8-c1). Because the description here must contain every eventuality which will follow at later stages, although these have not yet come into effect, it is hard to see what is placed where from a quick reading of the text. What does Timaeus mean by "a mixture of seed of every sort for every mortal kind" (73c1-2)? A similar problem arises at 73d2-3 regarding "the remaining mortal kind of soul", and in fact also regarding the plural "shapes" [*skemata*] for the elongated marrow at 73d4. Starting with the last-mentioned, this could, as Cornford suggests, be referring to all marrow bones, which are, in addition to the spinal column, the major tubular bones of the body. This might be consistent with looking at the limbs, in which these are central, as somewhat independent creatures, perhaps a nod to Empedocles' peculiar theory of a multitude of body parts roaming the earth before the final formation of the human body as we now know it. Or Timaeus might be addressing the plurality of bones (vertebrae) *in* the spinal column. This latter possibility I find more likely,[59] because it is consistent with the spinal column as a part of the path of the seed or semen, and as housing a part of the mortal soul or the mortal part of the part of the human soul which has *logos*, that is which uses and can benefit from reasoning and, I suggest, therefore shares in being able to benefit from the marrow, as perhaps a logical reservoir.

Let me reiterate. In the division of soul, at 69c the mortal soul is first introduced; at 70a we learn of the spirited part and that it is sufficiently close to the

[59] See also 74a4-5: "Thus, to protect *all* the seed, he fenced it in a stony enclosure," Translation Cornford, italics are mine for emphasis.

rational part to hear its discourse, and at 71a we learn that the appetitive soul in the abdominal cavity "would not understand the discourse of reason." If the "bonds" fastening all soul (73d5-6) are ratios or other logical or mathematical, rather than anatomical entities, as is much more likely since the *Timaeus* is full of mathematics and short on neuro-anatomy, then the effects of these "bonds" are transmitted via the emotive soul. This reading, that it is the marrow in the cranium and in the spinal column to which Timaeus refers by "this thing" [*touto*] (73d6) is maintained by Cornford, who objects to A.E. Taylor's translation of it as referring to the soul. Cornford points to what he sees as inconsistency in Taylor on this issue, as Taylor had, in his note on p. 523, had the same reading as Cornford. If, however, Timaeus is referring to the part of the human soul which has logos, and in addition, this part is housed only in the cranium and the spinal column, then the reference is, in fact, the same in both places in Taylor, although in one instance it is referred to as this particular part of the human soul and in the other as that in which it resides. Furthermore, this reading is consistent with the primacy of the movement of the soul, the rational soul as forming spherical movement and needing a sphere in which to be sheltered, and of the band of the *Different* perhaps being a part of, or connected, to the mortal soul, maybe only the one which could listen to reason, the emotive soul in the chest.

There remains the problem of interpreting 73c1-2 "a mixture of seed of every sort for every mortal kind." Cornford discusses the translations of Taylor and Rivaud at some length. I cannot see how Cornford concludes that Taylor's translation, (and indeed of most editors) limits this to the human and indeed male soul to the exclusion of everything which will follow later in the diversification of fauna, foreseen by the demiurge and needed for the perfection of cosmos (41b7-8). The inclusion of all these, says Cornford, is suggested in Rivaud's translation. I suggest that there is full agreement between Taylor's and Rivaud's rendering and that this can be appreciated by analogy to the condition of the pre-cosmic traces of elements *after* the demiurges' persuading them to become geometrized. The receptacle at that point contains all the triangles for making all the elements, from which everything in the universe takes its material guise. The brain as a ploughland is analogous with the receptacle as the receiver and storage of both 'mage' (the triangles) and of eternal motion (that of the

rational soul). No wonder then it is hard to disentangle the text, as doing this at the cosmic level is called "apprehending without the senses without the senses by a sort of bastard reasoning" (52b2-3) and "looking at it as in a dream"(52b3). Can we compare this to the triple ontology of father, mother and child at 50c7-d4? Not without strain, as Timaeus admits.[60] But some similarities may be drawn;

The mother is the ploughland in which rational soul is sown. There are other plots of ploughland, but into them a different seed will be sown, namely the mortal soul and by the lesser gods. Nevertheless, as the ploughland of perfect triangles is made by the demiurge, dividing it up and forming the shapes it will have to have in order to accommodate the movements of the various souls, is also a work the demiurge must complete, before the lesser gods can make the first all-male generation. So he does, (73c5-6: τὸν μυελὸν αὐτὸν τοσαῦτα καὶ τοιαῦτα διῃρεῖτο σχήματα εὐθὺς ἐν τῇ διανομῇ τῇ κατ' ἀρχάς). Agriculturally this may not be so difficult to comprehend; prime seed is sown into prime land for prime yield of the best stuff. Second best is sown into second best and so forth. In that sense, the procedure is similar to that of the demiurge[61] when making the world soul and then the human rational soul(s)[62]. Both rational souls will be sown into bodies, but the world soul into the heavenly bodies that are far less imperfect than the human one will be. However, at 73d1-2 we are reminded that the part of the marrow receiving rational human soul is the ἐγκέφαλος, "that in the head" the part of the human body, that was to be its vessel or receptacle, ἀγγεῖον , in which its rational soul would be preserved "should be" the κεφαλος, the head. Implied in Timaeus language here is that man should be led by his reason.

Going back to the metaphor of father, mother and child, we must, I suggest, look closer at the different views on the contribution of either sex to reproduction, in order to accommodate the presence and placement of both perfect triangles and rational soul in the most perfect ploughland in the head. Of the authors named in

[60] We may find ourselves in a similar situation to the demiurge, who had to use some force to get the *Same* and the *Different* into the same strand and structure.
[61] See at 41d4-7, particularly 7 for "only no longer so pure as before, but second or third in degree of purity." Transl. Cornford.
[62] The human rational soul is one in kind but made specifically for each individual as it seems, hence the plural in parenthesis.

Longrigg's table[63] only Anaxagoras and Diogenes limited seed production to the male. The wording is different; in the case of Alcmaeon, Hippon, and Empedocles, Longrigg writes that "both parents *contribute* seed, and in the case of Democritus that both *produce* seed. For our purposes here this difference in wording is not crucial. The crucial point is that the lesser gods at the start of their work receive both male and female seed, i.e. both rational soul (male seed) and mathematically structured or classed elements (female seed). A further point is that the making of man is a mirror image of the making of the cosmos. At 36d8-e1we learn that it is first when the fabric of the world soul had been completed, the demiurge began to fashion within it all that was bodily. In the work of the lesser gods, the two aspects of the receptacle, as a container 'surrounding' its content, (as the cranium does), and as receiving as fertile soil, (the marrow), are both present. The latter will be taken over by the womb in sexual propagation from the second generation onward. This feminine function of the mind or intelligence is not abandoned by the onset of sexual propagation, ensuing with the second generation of mankind. That is a step to ensure the continuity of a necessary life form within the body of the cosmos. Plato's famous depiction of Socrates as a mental midwife[64] maintains the metaphor of the mind as a womb pregnant with divine ideas. In the *Timaeus* too, at 41e1-42a3 a quite substantial universal education is 'shown' to the human rational souls before they are stored in the celestial bodies, awaiting incarnation into human bodies at the hands of the lesser gods.

This already divinely sown ploughland now needs protection in order for its movements to be unperturbed and the seed implanted in it to grow to fruition. Because of its being inside the cosmos, submerged in and subject to the transformation and movement of its elements, it will also need structures for acquisition, processing and distributing elemental replenishment.

[63] Longrigg (1993), p. 54. Italics are mine for emphasis.
[64] *Theaetetus* 149a1-150d2.

Cladding for the Soul, Constructing the Vehicle

The order in which parts of the body were thought to develop was one of the physiological queries Alcmaeon allegedly raised first but which became a stock question[65]. Comparing Timaeus' account to other authors reported in Longrigg's table is admittedly made less straightforward by the fact that Timaeus tells a two-fold story about this mixture becoming; a story of mind and a story of matter, of intellectual causation and elemental causation. He also gives overviews before taking up the thread again and going into more details.

In making the prototype man, Timaeus' narrative follows Alcmaeon, and Hippon, in first making the head (69c5-6). Yet when it comes to the tissue or material side of matters, it is the brain, as in Anaxagoras, (see Longrigg, p 55). This is not in contradiction, but rather a question of emphasis, as in 69c6 it is natural to think first of the cranium but at 73b-c the brain and spinal cord come to mind, which corresponds with Anaxagoras' view, as reported by Censorinus, (6,1. DK 59A108). Although the heart precedes the tissues, it comes second to the head in the soul account, so Plato departs from Empedocles on this, although I will argue that in his physiology, the level of heart may be said to pull the wagon. This last point brings up the question about intellect and the relationship between where it is and how it leads through reasoning. All the authors mentioned, with the exception of Empedocles, who places it in the blood around the heart, make the head the seat of intellect, Anaxagoras and Democritus reportedly specifying it as the brain, and Diogenes (according to Theophrastus) as the air around the brain. The distinction Democritus, according to Aëtius, made between the seat of the intellect and where reasoning takes place, is interesting and relevant, for it is at least partly reflected in the relationship between the rational soul in the head and the emotive soul in the chest, on Timaeus' account. It may also link to Aëtius' statement that Diogenes held the heart to be the seat of the intellect.[66] Either way, head and heart, or rather chest or the area around the heart, are so closely linked that is should not come as a surprise when we get an account of the interplay poised in reciprocal ebb and flow of their elements and

[65] Here I come close to paraphrasing Longrigg (1993), p. 54, introducing his table over these quires, which I now use.
[66] See in Galen, *De anatomis administrationibus* 7, 10 (II.621K) [From Longrigg (1993), p 247]

elemental powers in the physiology of breathing and of digestion. Before we get to this, however, we must allow Timaeus to build both the arenas and the avenues on which this unfolds. Hence we return to building the body.

Diogenes is the only one in Longrigg's table who begins with other bodily parts, namely flesh, bones, sinews and then other parts. The order of the generation of the tissues in the *Timaeus* is different; bone, flesh sinew, which is consistent with the primacy of soul and of protecting it (see 73d7-e1), and with the supportive role and status of the rest of the body as a vehicle for rational, immortal soul, carrying life and with it reason into all 'regions' of the world.

Chapter IV - Physiology

Foreword or elementary comments

The text from 77c6- 81e5 is a bewildering account of several processes concerned with what we might see as 'being'[1] in the present continuous sense, that is with maintaining the life of or in the human body once established. This is carried right through and to the end of embodied life including a unique theory of death. The life of an individual is a mixture of immortal life and mortal life. On the one hand, man's rational soul is immortal, and through sexual propagation man can regenerate embodied life in his image. On the other hand, each human life has a beginning and an end. The immortality of the human rational soul is, of course, a part of the immortality of the cosmos and an important part in the life and the perfection of the cosmos. Rational human souls are, like the elements, used in temporary material structures, both finite and re-cycled. There is no depiction of an afterlife of an individual soul in the *Timaeus,* as there is in the *Phaedo,* but rather on the quality of the present embodied life and the form of the next incarnated one. Past, present and future lives of a mortal being or an immortal soul reincarnated into a mortal being are lived inside cosmos and are governed by its self-sustaining immortal and unique way of life and being. Irregular movement and change is a necessary part of cosmos. Its cause or explanation is in the mixed origin and more precisely in the heritage from its 'mother,' the receptacle, namely the incessant reciprocal shaking of receptacle and its content. The importance of this heritage is emphasised in the exhortation to simulate it in the ideal way of self-care exercised by mankind, at 88d6-89a1. This shaking would, on the individual body level as on the cosmic scale, create the same natural order of the elements and their powers, which "wander according to their affinities around the body" (88e2-3, transl. Cornford). Given the physics and the geometrical structure of the elements, which explain the rule of their transformation and partial division into 'regions,' we may seem to have a mechanical causal explanation, and in part, that is exactly what we have. However, it does stop short of explaining the part

[1] In the *Phaedo* 96a8-9, Socrates has expanded what he wanted to know the causes for, from the opposites of coming-to be and ceasing-to-be at 95e10, into "why each one comes to be, why it perishes and why it is." Transl. Long, in Sedley and Long.

of the ongoing movement which comes from the receptacle itself. The short if somewhat cryptic answer I suggest, is to recall that the *Timaeus* is a contribution to an ongoing discussion, hardly intended or expected by Plato to be the final and all-calming word on the subject, on any subject it touched or might be touching upon. I am implying that at least in some sense, in some context, the receptacle could be the philosophical inquiry carried out by discussions. I also suggest that we do not dismiss from the interpretation of difficult passages in the *Timaeus*, the points made in its very beginning. After all, this segment is a part of the *Timaeus* and therefore the points made there, although not argued for there, should be a part of explaining or interpreting the dialogue. A part of the reason why this section has been ignored or explained away, is that if the arguments behind the points reiterated there were to be included (and one may want to do that), we have to take on a re-examination and a digression into other dialogues by Plato, most obviously the *Republic.* That rightly seems too much. Yet if we accept the points reviewed in the first part as hypothetical points, that is, as metaphysical beliefs on which Timaeus builds his speech, then no convincing arguments are needed for them. It suffices that Timaeus is persuaded by these and consistent in his own division or distinction between metaphysics and sciences or natural philosophy. On this reasoning I would bring up two points from the introductory section. They are firstly the question of "what sort of men" would compose the ideal society. This is the start of a discussion of how to separate individuals of into four distinct classes, between which there must nevertheless be social mobility based on merit. Secondly, Socrates wishes, at 19c4-5, to see his city go to war and negotiate with other cities. If taken literally, this is about politics at an inter-city level. If taken metaphorically it can be a lot of things, two of which could be the causal theory offered in the *Timaeus*, in which case Socrates wants to see the hypothetical application of his metaphysics in the sphere of the sciences.
Alternatively it could be that the human body as an organized living thing emerged in the larger context of the same kind of structures and forces of which it is itself made, and in a reciprocal or inter-dependent relationship to. Why bring up different possible threads of interpretation? First of all, they are there. Secondly, pulling them slightly apart while avoiding disentangling any one of them from the bundle might give us a somewhat clearer view of the complicated web of which they form a part.

Thirdly, we are warned that ascribing to the metaphysics is optional, which means that we should not judge the science part on how well we can prove or disprove matters such as the existence and nature of the demiurge or decide on the Theory of Forms. Plato is quite adamant that sciences do not prove hypotheses of this sort, but only use them.

Timaeus' Science Between his Predecessors and the Present

Cornford rightly warns us that the description of bodily structure and processes does not sit well with modern anatomy or physiology and in that sense my heading for the chapter is a misnomer. As we shall see, this was the view of influential figures very early on, not least about Plato's theory of breathing. Aristotle[2] did not like it one bit. On the reasonable suggestion that in his theory Plato is looking at a bigger picture than just the breathing of animals with lungs, we look to Anaxagoras, whom Socrates of the *Phaedo,* mentions for having a promising suggestion regarding cosmic causation.

Sedley[3] argues that Plato rightly recognised in Anaxagoras the first thinker to subject the idea of divine causation to philosophical argument, although he found the execution lacking. On this matter we may recall Socrates' words at the *Phaedo* 97c for the hopes and at 98bc for the disappointment. It is impossible to examine Anaxagoras' thought in any detail here, but it is arguably quite relevant to Plato's natural philosophy, at least if we see the *Timaeus* as continuing the philosophical discussion about divine and natural causation begun in the *Phaedo*. The first point is that perceptible opposites or powers, like hot-cold, sharp-blunt, wet-dry, heavy-light and their mixtures and ratios are what we can discern and argue about. The second point is Sedley's comment about aether and air in Anaxagoras, where Sedley disagrees with Aristotle's interpretation of the meaning of these terms. Namely that

---

[2] Aristotle's main critique of the theory of breathing in the *Timaeus* is in *On Youth, Old Age, Life and Death, and Respiration*, 11(5) 472b6-473a2. Aristotle views the *Timaeus* text from the point of view of his own physiology and biology and finds it contradictory.

[3] David Sedley, 2007, paperback 2009, pp. 8-9 argues that Anaxagoras was a revolutionary thinker in that he was the first to subject the idea of divine causation to philosophical argumentation, and that this was recognized by Plato, although he "found his actual use of the concept to be in the event disappointing."

> By 'aether' Anaxagoras means, not fire as Aristotle thought, but the particularly dry and refined atmosphere of the heavens [for Sedley's references see the whole footnote 29, p. 9] , while his 'air' is the familiar atmosphere we inhabit.

The latter point of the similarity, I suggest, between Anaxagoras as interpreted by Sedley and our text in the *Timaeus*, is relevant for the peculiar part of the disputed theory of breathing, that we take both air and drink into our lungs in breathing, and secondly that the discerning movement or rotation of the rational soul in the head, and indeed the other souls as well, can be affected by vapours rising from various phlegms and humours 86e3-87a7.

Sedley's point that the opposites in Anaxagoras' cosmology are the pairs of perceptible opposites is at least quite true of Plato's theory in the *Timaeus*; that we see from the emphasis laid on this at 31b4-6, that everything that becomes is bodily and subject to sense-perception ranging from vision to touch; that "without vision no word of our present discourse about the universe could ever have been spoken," at 47a2-3, and finally the description of the completed living cosmos as a perceptible god, a visible image of the intelligible, at 92c4-9. Furthermore, the emphasis is on the visual sense as most related to perceiving of the divine and at the same time on air which is the least 'tangible' element or as Sedley puts it on air and aether[4] "as the two major component stuffs still evident in the cosmos that are least distinguishable by discernible visual, tactile etc. properties."[5]

Just as circular movement in place is closest to no motion at all and closest to no change, so air is closest to immateriality. Similarly a two-dimensional geometrical figure is more an object of vision than of other senses, the triangle is the simplest figure, from which three-dimensional objects can be made, and a pyramid is the solid with the fewest sides.[6] Why not lines, or even dots? I have made the suggestion[7] that this is related to the fact that the rational soul, the apparatus of discernment, is based on a trio consisting of *being*, *same* and *different*, which I relate to a propositional sentence as the basic unit of discourse. At 48bc, Timaeus invokes the analogy of

---

[4] At *Timaeus* 58c5 we are told that "we must observe that there are several varieties of fire," and at 58d1-2 that the same applies to air, "the brightest and clearest kind called aether." Transl. Cornford.
[5] Ibid.
[6] See p. 39, for a previous discussion of this.
[7] See p. 46.

language in his critique (thought to be aimed at Empedocles) at those who pose the properties of the elements as elemental letters of the universe, when they should not even be compared to syllables. As a syllable can at most be a word, as opposed to a sentence, this is far removed from a collection of sentences exhausting the logical possibilities of being, sameness and difference, which I have suggested suffices only to make up one side in an elemental structure that needs the other sides as well before it can encapsulated the power associated with it or held by it.[8]

It is at least true of the *Timaeus* that no regular cycles of transformation and inter-transformation could start until the pre-cosmic traces in the receptacle accepted four types of geometrical solids as the only forms they could take on and which all (and most did) of the persuaded (another reference to verbal communication) would assume. Although the order of the narrative is not always indicative of the order in which events must, for some reason, happen, it seems pretty clear in the making of man that the structures must be in place, safe for the sexual organs of the first generation before the physiological function can begin or be described.

What is less clear is what starts the physiological process, particularly breathing[9]. I suggest we could take our clue from another example of interaction between elements flowing from their cosmic region and from the human body. Timaeus' description of the mechanism of vision, at 45b2-d7 is a description of how cosmic fire, in the form of the daylight of each day surrounds us, and our own similar kind[10] of fire, filtered out through fine texture in our eyes, comes together to form a visual stream, by which we can through our body have a sensation we call seeing in our soul, (45d2-3). Nothing in this description calls for a special account for which started vision, the cosmic light of each day or the man looking at something. It is a

---

[8] The argument for this is a work in progress. The basic idea is that in the ethical dialogues where Socrates pursues question of the type 'what is X?', where X is a virtue, the definition inevitably involves other virtues and shows up interdependence between their definitions such that they are never fully separable and hence the virtue under investigation cannot be completely isolated and made to stand independent. Yet the investigation seems to have brought both increased clarity and motivational power to the virtue discussed and to the method of investigation used.

[9] What was the start of breathing and how triggered, is one of the main points in Aristotle's critique of the *Timaeus* theory of breathing. See Aristotle *On Respiration* 472b20-23.

[10] Each elemental kind has many varieties, and at 45b4-7, Timaeus specifies in the following manner, (transl. Cornford): "Such fire as has the property, not of burning, but of yielding a gentle light, they contrived should become the proper body of each day. For the pure fire within us is akin to this, and they caused it to flow through the eyes,"

description of two conditions or things which have to be in place for vision to take place. Unlike the light of day, the cosmic air is always around us and the fire around the hearth is also always active. There are other properties of fire relevant in the description of breathing, namely that it is hot, the opposite of which, cold, is characteristic of air. This kind of bodily held fire, as it flows out towards its cosmic kin, does not meet cosmic fire but the surrounding air, and instead of coalescing with it to form a body it engages in a struggle, where some of the elemental capsules break down and other elements are formed from their triangles, and some keep their kind but move, either back or forth, like on a battlefield. The resulting oscillation has the nature of mixing and stirring by movement and I propose the following interpretation of it as a metaphor or analogy of the interplay between private and more passionate attitude and the wider or cosmic and calmer more rational view[11]. Recall from the review the very beginning of the *Timaeus* at 18a4-7, that the guardians of the city were said to need to have a certain temperament, "at once spirited and philosophic, to an exceptional degree".[12] This is an example of a mixture. The spirited part, if we associate that with the fire, the most agile and penetrating element is known to pose some danger of 'overheating', wherefore the lungs, filled mostly with air but also water, are placed around the heart, to absorb both the mechanical pounding and the excess heat from the heart. If, instead of looking at the body's internal physiology, we think analogously of the effect an 'overheated' guardian could have in his society, where he is explicitly also said to have to react differently to friend and foe (17d3-18a2), which involves judgement, then we can see in the story of breathing, the coming together of the individual condition and wider consensus of the society he belongs to. As a 'physiology' the description applies to all breathing rational beings. It is described in relation to the guardians because in their case the factors involved are exceptional in magnitude and therefore more easily observed. This reading would explain why breathing starts and continues as long as the life of the individual does. As the reading applies to every rational living being, it can be used as a metaphor or analogy for the dangers

[11] Such high status of air as representative of rational forces is in line with Diogenes' of Apollonia revival of the idea that air was the basic substance.
[12] Translation Cornford. The emphasis in 'to exceptional degree' or 'outstanding' is to mark this of as the characteristics of the guardians, telling them apart from other classes.

involved in being driven by emotion, dependent on hearing the discourse of reason, for its own welfare and of that which these emotions or the mixture of emotion and reason is to guard. As Timaeus makes clear, although it is not discussed, the individual needs a good society to prosper.

From Cosmogony to Cosmology

The construction of man as a physical structure ends at 77e6, and from then on we have an account of how the system is run. This is where the micro-cosmogony of man ends and the cosmology takes over. It is important to observe that the cosmology embarked upon here, although it has man at its centre, it is not limited to man in the same way or to the same extent as building him, that is, his cosmogony as a micro-cosmos, has been. It is also important to remember and to observe that the micro-cosmos *man* is a part, more precisely an internal part, of macro-cosmos, that is, a world already ordered by a good demiurge, to the effect that it has its own revolving movement for rational discernment and its elemental content is ordered into four classes. This is done in a way which allows for change through transformation, which has a level of disintegration where the powers of the dismantled elemental structures are at least temporarily indeterminate, although rules apply as to what elemental reconstruction and power profile can follow.

In the text just previous to 77c6, from 76e7, plants were introduced as a source for replenishment to counter depletion caused by fire and air (77a1) surrounding the mortal creature. Firstly, this reminds us of the elemental theory which is involved in everything which is grasped by sense-perception. Based on that principle we should keep elemental transformation at the front of our mind when dealing with the subject of depletion and replenishment or repletion of the human body. Secondly, of the four elements Timaeus mentions only fire and air as the cause of depletion. In macro-cosmic meteorology one would expect water and even earth to be mentioned as well. The short explanation for this is that they may already have been mentioned indirectly in the guise of plants, which can and must provide both solid food and drink, as when Socrates in the *Republic* 372ab describes the frugal and virtuous way of life of the citizens in the ideal community; wine made from grapes, is their drink. This is all that is needed, for both fire and air can be reassembled from

breaking down the element of water, according to the rules of transformation and inter-transformation of the triangles of the elemental bodies. The fire particle is the smallest and the air particle is the second smallest, (56b). The powers which drive the changes are hot and cold, in the sense that hot, the power of fire, can cut everything (61e1-62a2) and the opposite, which limits its impact, is cold. This power is not the one residing in or being the element of air, but in or of the element of water. [13] This is of interest and possibly challenging, because the ongoing cyclical interchange which drives the human body seems to be self-sustaining waves of a reciprocal power-struggle between fire and air. The answer might lie in that when air fights fire in order to cool, water is a necessary by-product, (56e). This might also be why Timaeus, at 70c7 (see also 91a4-5) subscribes to the peculiar theory of the author of *On Heart* that a bit of fluid enters the lungs along with the air inhaled[14]. But as Sedley pointed out, the air we breathe is (in *Anaxagoras* and as we saw also in the *Timaeus*) more mixed with 'water' than the aether in which the heavenly bodies, the material image of the universal soul, resides. If the air which cools the heart is able to do this because it has been inhaled along with air, in which our head, unlike that of fishes and water creatures, is stuck, then air as an elemental region has a part in cooling the emotions as well as being that which we can look at in order to tune our rational soul to its maximal natural function.

Irrigation and Respiration

Trying to comprehend the text on irrigation and respiration, we would do well to review Timaeus' warning to Socrates at 29c4-7, not to get bewildered although the account will not be entirely consistent and exact on all points. The crucial methodological question is how we interpret the next few sentences, because it should give away the criteria Timaeus accepts for evaluation of his contribution. Timaeus says:

[13] At the *Timaeus* 70c7 the lungs are said to hold both "breath and drink." (Transl. Cornford.) Timaeus gives a seemingly common or joint goal to bot, namely to cool the heart, but as he also mentions the two functions of providing refreshment and ease of burning, it is not clear whether there is a clear distinction between which element most cooling.
[14] On water in the lungs see Cornford's footnote 1, p. 284.

> If then, Socrates, in many respects concerning many things-the gods and the generation of the universe- we prove unable to render an account at all points entirely consistent with itself and exact, you must not be surprised.[15]

The warning, as I read it, is that Timaeus' account will not be entirely consistent with itself, it is the internal consistency and accuracy of a unified theory of the universe and of man that will not be perfect. But what is there to be content about if it is no weaker than other accounts? The comparison is with other theories by other humans. Not to admit that Timaeus shares human intellectual weakness would be arrogance bordering on blasphemy. The catch in this account, although subject to the human disadvantage of being a part of the subject under its own investigation, is its ambition of combing the two kinds of causes, the divine and the natural, into a unified account. If that can be done with no fewer glitches than accounts which are far less ambitious with regard to a unified causal theory, Socrates will be well reimbursed for his previous contribution.

On this reading of 29b, we should be looking first and foremost for consistency between the explanations given for the subject under discussion, namely preserving man throughout his lifespan, and the causal interplay between the 'divine' and the 'natural' in these processes. I have put the two kinds of causes in inverted commas, because the two kinds of 'timber' from which the lesser gods build man are both already prepared by the demiurge. Furthermore, man is an internal part of a cosmic body, a body made of the same elements as man and self-regulating by the same kind of rational machinery, the world soul, although more perfect and neither subject to any external nor incoming elemental bombardment, or in any way dependent on it. We, as readers, should therefore be looking for internal consistency in Timaeus' account. We should not be looking at how well it matches or improves on anatomical theories contemporary to it, and certainly not later medical or biological sciences.

However, because of the text on other phenomena explained by circular thrust (79a-80c), where the list of phenomena discussed includes medical cupping, swallowing, continued movement of projectiles after release, and harmony or

[15] Translation Cornford.

disharmony of sounds of different pitch and produced at different moments, there is clearly a principle at stake, a principle which is as relevant to animate as to inanimate things, and therefore not dependent on the involvement of individual soul. The cosmic factor under investigation must therefore have to do with Timaeus' unique elemental theory. Void, at an elemental level may (and not least because of the inanimate examples), be seen as mechanical problem, as Cornford does with his emphasis on hydraulics. However, in the bigger frame of comparison between causal theories comprised of both 'divine' and 'natural' causation, the problem of 'hydraulics' tests Timaeus' theory on the innovative parts, which are, or have, metaphysical underpinnings in the 'divine' causation part of the unified theory. Regarding the elemental theory, this is the geometrical form of the elemental bodies, their assigned powers and the rules of transformation of elements, particularly the inter-transformation of air, fire and water.

Yet the context is complicated by the fact that the human body is an internal part of the universe, and we are addressing two processes, the interplay of fire and air and the acquisition and distribution of nourishment. The first fact, man being an internal part of the universe, suggests looking at theories of how the embryo is nourished, as this topic was set on the medical agenda by Alcmaeon[16]. We shall get back to this after first looking more closely at the latter part; breathing. The latter suggests looking at breathing as an elemental demonstration of how individualised mankind is served by being engulfed by a rational universe, which means that the small 'regions' or 'masses' of elements in the individual man are surrounded by much greater 'masses' of cosmic elements, air and fire being chief among them. This also links the process of breathing to the peculiar theory that the veins are also channels of perception and communication. The human body as micro-cosmos seemingly has its centre connected to the periphery in all directions. This we see at 70a7-b3, where the heart is said to be "the knot of veins and the fountain of blood which moves impetuously round through all the members."[17] The text of 70b is quite dense, but it seems to me that Cornford is right in that we should not assume the

[16] See Longrigg (1993) p. 56
[17] Transl. Cornford. I take the 'members' to be the parts or even 'places' of the body.

blood to be warm, or at least not confuse the potential warmth of blood with the boiling of the spirit with anger upon a message from reason of wrongdoing somewhere[18], brought about from desires within or from outside. This is consistent with the soul or souls being responsible for all levels of mental awareness; reason contacts the spirited soul, which reprimands the nutritive and sexual soul. This applies to the 'wrongdoing' which originates inside and is clearly linked to desire in the text. The wrongdoing originating from outside should have a correspondence in the nosology of the *Timaeus*, and it may do so. I suggest that the otherwise 'unconnected[19]' paragraph 86a2-8 of how excess of each element gives rise to fevers classified by the length of duration is Timaeus' list of conditions of imbalance due to errors in consumption. Cornford has half the connection, namely to "diseases, attributed above (82A) to excess of defect of one of the four primary bodies." However, Cornford does not connect it to the intake of food, which I suggest. This is a more direct connection to the doctrine in *Regimen II*, that to treat correctly the human regimen one must know both the nature of man and further the "powers possessed severally by all the foods and drinks of our regimen."[20] Timaeus translates the 'powers' into his own elemental theory. Because this disturbance comes from outside, it is placed here in the text to distinguish it from other kinds of desires causing troubles, namely those arising internally, which are to be responded to differently, as perhaps the mild approach to sexual overindulgence (86c3-e3), is an example of. I will look at this in more detail in Chapter V on diseases and care of man.

On the first point, that of nourishment of man inside the universe as somewhat comparable to mode of nourishment of embryo, it is of interest that Alcmaeon's theory (see references in Longrigg (1993), p. 56) is of nourishment

---

[18] A.E. Taylor comments on the reference in 70b4-5 and concludes that this is to the parts. He does not discuss what could be meant by 'parts' but moves on to discuss the two different origins of what causes of wrongdoing and the two appropriately different reactions of the spirited soul. Taylor refers to chapter iv of the *Republic*. But we need not go outside the *Timaeus*, for Socrates reiterates the point at *Timaeus*17c10-18a2, where the guardians of the city are supposed to guard it against the assault of any that would injure her, whether from *within* or from *without*," Transl. Cornford. Italics mine for emphasis.

[19] See Cornford, p. 343: "The last paragraph on fevers has no connection with the previous description of diseases due to bile."

[20] *Regimen* I.II, transl. W.H.S. Jones, in Loeb.

through the whole body. This is relevant, I suggest, if we look at breathing and air as elemental representatives of reason. Why might we want to explore that thought? Inside the human body, we have not only the bewildering structure likened to the fisherman's weel (78b), starting with two main conduits in the head and branching out around the trunk, but also another structure, beginning by two main vessels in the trunk and ending in anastomose-like plaiting on the head. There is an undeniable similarity between this and the description of man as a plant with its roots not in earth, but in heaven, and therefore standing upright to keep his head away from earth and closest to our celestial affinity, at 90a.

The structure of the third system, that of marrow and seed, is central and single-tracked, although the structure in the female reproductive part is different. It represents the receptacle, which is also necessary in terms of its movement. The restlessness in absence of pregnancy could be likened to the habit of forming a bad opinion rather than none at all, which is also reflected in the dictum that there is no void. Reaching outside the text of the *Timaeus*, Socrates' famous description of himself as a midwife in the *Theaetetus* is relevant, and within the *Timaeus*, the examination and re-examination of children in the prelude or first part, allow the thought regarding this text.

Irrigation

Irrigation is the metaphor for the import and internal distribution of nutrition in the body. Timaeus continues to work from the inside out, describing first main figures and then further division and refinement in the system. Hence he first describes two conduits/veins in the garden/body, (77cd). These extend as main structures in the trunk and neck but are divided and plaited on the head, (77e). Here we get a bewildering collection of causal roles given to one structure as the veins, in addition to irrigating, help the skin connect to the body, acting as sinews, (the sinews in turn seem to transport stuff as well[21]), as because of the scarcity of flesh on the head there are no sinews there, (77e4-5). The veins are also said to unify sense-perception

[21] *Timaeus* 84a2-3.

coming from either side of the body into information of the body as a whole (77e5-6).

At 77e7, Timaeus starts a causal account explaining how the demigods provide for the 'irrigating water' to be driven or moved around in the vessels. At this stage (to 78b2), this is just a review of the part of the elemental theory which had to do with the relative size of the four elemental bodies, with emphasis on fire being the smallest and most able to penetrate the other three elements but impervious to them. Having just envisioned something as structural as garden conduits and veins, we are now asked to jump into a sea of elemental movement, armed only with a part of the theory, the relative size of the kinds.

We then return to the coarser structures, the belly as the part of the irrigation system where foodstuff is divided into its elemental components to be driven out into the system for distribution and selective replenishing retention, (see 82b2-5). The joint conclusion is a picture of food coming down the oesophagus into the belly, where it is held and contained because it is mostly in the form of earth and water, or even water mixed with everything else. The reminder is that although 'water' is retained by the belly, air and fire penetrate the belly and its content. This leads to the structuring of this elemental penetration, described in the disputed analogy of fisherman's weel. It needs a structure if only to be graspable by the mind's eye in a way which allows for an analogy to the 'physiology' of cosmos, which contains the same powers but none of the internal anatomy which mankind needs for material replenishment. As it turns out, the description incorporates coarser parts, which can be taken to be anatomical parts, i.e. the oesophagus and the upper respiratory tract, but also an invisible network of channels. This kind of blending of the visible and the invisible also occurs in the nosology, where white phlegm is explained as an accumulation of a product from the decomposition of young flesh but inflated by air so "as to form bubbles, individually too small to be seen but becoming visible in the mass, as the froth so formed makes them appear white in colour."[22]

[22] *Timaeus* 83d2-5, translation Cornford.

Nutrition moved by air and fire

After introducing the overall image of a woven network with roughly the shape of the fisherman's weel, Timaeus, as in the description of the irrigation system, starts with the coarser, and as mentioned above, 'visible' parts, comparable to the trachea and the upper airways through the mouth and nose, then adding the contrasting finer invisible details of the interlaced basket of air and fire. From early on, the image Plato uses here has not fared too well. Cornford argues that Galen missed the point and Aristotle[23] rejected Timaeus' theory of breathing.

Recalling the significance of the relative size of the elemental kinds, it should not surprise us that, of a two-layer complex made of air and fire which is to penetrate a receptacle of water and earth,(the belly), the inner layer of the complex is made of fire and the outer of air. We should also recall that the region of fire in the body is in the thorax, below the head, which indicates that fire is that main consecutive power in the mixed being that man is, but is not its most sovereign part, in terms of reason. Or put differently; the emotive or *thumos* soul, in the chest is established with each individual and perishes at the end of his life. It is therefore strongly linked to that particular life-cycle. The virtues associated with it are courage and honour (70a3). In terms of epistemological access to divine reason, this is secondary both in kind and in reference, since it exists through hearing the discourse of human reason or rational soul as opposed to seeing or observing the movements of the world soul. Recall that human rational soul was mixed from a second or third degree of purity of the ingredients (41d4-7) and in "somewhat the same way" (transl. Cornford.). "Sound and hearing" (47c4) are given to man seemingly to enable him to reflect upon and affect his rational soul from secondary sources relative to the world soul, namely listening to the discourse of the human soul whether internal (70a4-5) or outspoken (75e3-5), and being affected by mathematically expressible ratios in tonal scales and in rhythms (47de). What I am suggesting is that Timaeus' peculiar device is a reflection or expression of Plato's psychology and particularly of the aspect of individual versus global, whether one takes the bigger framework to refer to cosmos,

[23] Aristotle *On Respiration*, in Barnes' edition under *On Youth, Old Age, Life and Death and Respiration*, 11(5) 472b6-437a2.

to mankind or to society, either a city or to cities. The picture is of fire as standing at the core of an individual, whereas air surrounds him. That interpretation figures with the formulation in 78e3-4: "All this that our body does and has done to it," (Transl. Cornford.). The movement of air and fire is interplayed between the body and its surroundings. This is an interplay started by design, firstly by configuring the elements into four structures, which cause or explain their transformation and secondly by constructing the two-layered structure, but kept going ever after, seemingly, by the powers in play. We shall soon come to the purpose or aim by which this serves. Let us first ask whether there is a wider context to this air, a context we should keep in mind here?

The framework or mandate Timaeus was given is, according to Critias at 27a5-6, "the birth of the world and nature of man." This is only a partial fulfilment of, or response to, Socrates' wish-list at 19c. This is reiterated at 87a7-b9 where the effects or failure of care in cities with bad politics and bad education is acknowledged but the reader/hearer is reminded that these topics belong not to the *Timaeus* but to another discussion. So air, in the theory of breathing, is the cosmic air surrounding man; it is a part of the cosmic 'region' of air, albeit the lower and less pure air compared to the aether in which the heavenly bodies revolve. One of the most intriguing and disputed parts of the theory of this interplay between external air and internal fire is how it all starts. Aristotle objected to what he described to the start of breathing by exhalation, (for ref. see above). Yet at the end of the day this is what seems to have happened, if by exhalation one means a flow of air out through the upper respiratory tracts. An inward flow of air is the first movement mentioned, at 78d2-3, although this could be insignificant as it is just the first part of a contrast or 'at one moment in at the other moment out.' However, as it is specifically said that "the rays of fire stretched through inside *follow*[24] the movement of air in either direction," (78d6-7) we may assume that the inflow of air through the pores, and outflow through the 'funnels' of the nose and mouth is the start. At 70c7 we are told that the structure of the lungs is full of cavities like a sponge so that it might receive breath and drink in order to cool and refresh the heart. Nowhere in the account of

[24] Italics mine for emphasis.

breathing is there a mention of muscular activity, nor of lungs in any way functioning in the sense we now envision. The problem of how breathing starts is therefore a problem of accepting the idea of pores all over the body. On this point, A.E. Taylor has a helpful comment where Cornford's translation is misleading. Cornford (p. 313) translates: "The rest, the main vessel of the weel, he attached round all the hollow part of the body" (78d). In modern English at least, it is natural, I suppose, to read this as referring to the trunk and here probably to the thorax. In Cornford's commentary on p. 312, he writes: "the outline of the main vessel [of the weel] enclose the trunk on the outside." However, A.E. Taylor[25] argues about Archer-Hind translation that *onta* (78d4) refers to a word in neuter plural, which Taylor takes to be the 'pouches', or Empedocles' pores. Cornford also takes this same *onta* to refer to a word in the neuter plural, but seems to reserve it for, or make it refer only to, the bigger funnels of the airways. I may be misreading him here, but at any rate, "hollow part" and "funnels" in Cornford's translation, should, according to Taylor's and Martin's reading be referring to the same thing, namely the pores which are all over the body, and are made of air. Now whether we should read with Martin and Taylor that only the fire part of the structure flows gently through those pores or whether also the air part of it does, which seems to me has to be the case, Taylor is right in saying that this leads to the problem I mention above and which Aristotle objected to in both Empedocles and in Plato; that the expulsion of air precedes inhalation. Plato, at least, could have pointed out to Aristotle that this part of breathing was beyond observation because of the fineness of the flow, and further pointed to ideas of the breath of life being given to a new individual to start him off. The remark that the inward flow of air through the pores proceeded *malakos* 78d3 "softly" or even gently[26] may be a hint as to why we do not notice this airflow. In the text on the perception of pleasure and pain, it is specifically said that "gentle and gradual change of either sort is imperceptible."(64d2-3)

Within the context of the *Timaeus,* transfer of elemental stuff across barriers through pores, and a back and forth movement until some sort of equilibrium is

[25] A.E. Taylor, p. 553.
[26] Liddell & Scott, (1994) give the meaning as 'soft, gentle' for things which are not subject to touch, which could be said to apply here.

reached, is not limited to breathing. The formation of hair is a case in point (76b2-c1), where hair is formed by moisture "issued forth through the holes" by internal fire, but so slowly that when it met with the surrounding air it was thrust back inside where it then forms roots, etc. So at least Plato is consistent within the *Timaeus* on such elemental flow in and out of the human body. Furthermore, and more importantly, the emphasis on the through-and-through interweaving of soul and body, e.g. at 36d8-e5 for the world soul and at 70a7-c1for the human soul, is an expression of cosmos, including its inner content, as a mixture of mind and matter. That for this mixing to be successful, the inner parts need structuring and care, is a result of the imperfection of some of the ingredients, but that is precisely the aim of the exercise, to make the whole be greater than the sum of the parts; to discover and apply the kind or order which can turn difference and tension of existing parts into a driving force for unity and thriving by arrangement. One does not have to be a Pythagorean (whatever that means) in order to appreciate the parallels with sound and sounds; they too can be arranged into music or scrambled into noise. However, Timaeus' task in the physiology is to mix, with similar effect, Plato's theory of natural philosophy with recognisable parts of ancient medical theory making it work better, or at least as well. Judged on acceptance within the emerging medical profession, Plato failed, and we could add that judging by what became a leading view in natural philosophy, Plato also failed to convince, namely Aristotle.

Now to what results from this interplay. The body is nourished and stays alive, "as it is watered and cooled." (78e5). The verb Plato uses and Cornford translates as 'cool' is *anapsuxo*, "to cool, to revive by fresh air"[27], which preserves the reference to the element air and all it stands for. Because air is so strongly linked to rational soul and hence with both life and control of passion we have in this the two strands of which man is mixed, reason and the elements. I will argue that on the elemental side which is here depicted as the opposite of air, we have both fire and water, although water dominates the metaphor used.

The irrigation now needs to be explained. The analogy to watering is justified by the form of the nutritive intake by the time it is distributed within the body, that is

[27] Liddell & Scott (1994). p65.

as blood[28]. Yet it does not start like that but as (solid) food (*sition*)[29] and drink. These need to be processed and are cut up and divided or dissolved into minute bits and transferred into the distribution system of aqueducts. Both tasks are performed or caused by the properties of fire on its movement when following air up and down the main structure. In this way fire divides the food but also moves it towards being collected in the proper places for the wellbeing of the whole, both micro- and macro cosmically. We will see that it is on the way down that the division starts. It proceeds further in the belly but being pumped up in the more applicable form of elements, the food moves towards being collected and integrated into the living functional unit, the animal and ultimately the living universe.

Plato restricts himself to giving us the outlines of a greater argument, followed by working out a part in detail before resuming the main line again. This can be confusing or disrupting, but here we have an example. Explaining the process of irrigation in detail is put on hold after this short introduction. First we get the disputed theory of how elemental macro- and micro cosmic physics maintains the cyclical breathing motion that reason kick-started. As Cornford rightly observes (p. 315), Timaeus makes no reference to muscle contraction or will. Neither of these conceptions were current in Plato's time, nor was Sherrington's conception of reflex, so influential in Cornford's time and well beyond.[30] I mention the reflex theory because Cornford claims that the principle Timaeus applies is purely mechanical. If by 'purely mechanical' Cornford is referring only to the geometrical properties of the elements, and not to their 'powers' as well, this would be misleading. Given that Timaeus clearly objects to looking at the elements in this way and provides a theory for their lower construal level of triangles one should be very careful of viewing Timaeus' use of any theory as 'purely mechanical'. In the meeting and battle of two elements the change in ratio of the elements has consequences for the ratio of 'powers' in that place.

---

[28] However, if the analogy is to be based on an example of irrigation, which also brought fertilising on the fields, and was known to Plato, then the Nile delta of Ancient Egypt would be a good candidate for a paradigm.

[29] Cornford translates "meat" which does not tally at all, neither according to the dictionary, which gives first grain or corn or food made from these, nor does the translation fit the fact that plants are the source of nourishment provided by the gods.

[30] See C.R. Gallistel, *The organization of Action*, p. 17 and onward.

Even if we disregard the novel triangular level of Timaeus' elemental theory and refer to Empedocles' elements, these did not have just a body but a power as well. Having issued all these warnings, I must concede that Timaeus begins his explanation of how respiration has come to have the effect it now has (at 79a5) by moving bodies and void, or rather the absence of void and what this means for explanations of movement.

Let us reconsider what is being explained. Cornford translates it as "the means whereby the effect of respiration has come to take place as it now does."[31] Because what is being explained is how cyclical respiration has continued, or how cycles of breathing have continued, the *anapnoe* of line 79a5 is the original *inward* movement of the main vessel of the air-fire structure. Admittedly Timaeus says "at one moment to flow inwards… while at another moment the funnels flow back"[32]. But as the picture is also of the lesser-god at work first placing the air-fire structure "around the body" at 78d2, it is reasonable to say that the first movement is inward, into the body and what needs the explanation begun at 79c5 is how air keeps on being moved about. The first movement, or displacement, in that sequence of events is a movement out of the body. Therefore, if we want to ignore the divine kick-start (for lack of a better word), and concentrate or limit the discussion to how it continues, then we get the outcome Aristotle objected to; namely that human life starts by breathing out. However, the *Timaeus* starts[33] with and is full of contributions to start things[34], which must be maintained by something other than the originator. Breathing is no exception. Let me reiterate: The flow of air in and out of the body starts by air flowing *in*, caused by divine intervention of the lesser gods. It is closer to being macro-cosmic origin of an event than a micro-cosmic one. The flowing of air *out* again is the start of the macro-micro cosmic oscillation, which we call breathing.

On the macro-cosmic scale of observable nature, the cyclical in-and-out flow of air is analogous to the annual changes following the change in distance between

---

[31] *Timaeus* 79a5-6, Cornford, p. 316.
[32] *Timaeus* 78d2-6.
[33] Socrates' largely dismissed or ignored contribution is a case I have made on this point.
[34] The two kinds of causes, given by the demiurge to the lesser god at the start of our main segment of the text, is another example.

the earth and the sun. In the theological teleology of Xenophon, in *Memorabilia* IV. iii, 8-9, the oscillation was the work of gods, done for the benefit of mankind. The more relevant aspect of Xenophon's description here is the recognition of the polarity of the change, between hot and cold, as a gradual change which must somehow be kept within limits and reversed, in order to serve its purpose or purposes[35]. Timaeus has, in this instance as in the others I mentioned above, a divine intervention starting the process but not sticking around to continue intervening in order to keep it in swing. The other relevant example of gradual opposite changes which keep within limits is the exchange between fire and water in *Regimen III*. That account simply starts by stating from what "all animals including man" are composed, namely fire and water. There is much in *Regimen* which is relevant in a discussion about medical theory in the *Timaeus*, but the aspect most relevant here is how the elements of fire and water are supposed to be "working together in their use" and to be "sufficient for one another and for everything else, but each by itself" to suffice "neither for itself nor anything else." In other words, this is an example of theory which does not include how things started, but how their observed continual cyclical nature is to be explained.[36]

In the *Timaeus* a similar attempt is made, based on an elemental theory which in addition has an explanation for death as an elemental structural failure explicable by wear and tear at the most basic formal level, the geometrical unit of triangles. In other words, *Timaeus* proposes a theory which offers at least an attempt at a unified theory of beginning, middle and end of man, based on analogy to sexual propagation in nature, or to father, mother and child as the mixed offspring or product of the two (50c7-d4), and in addition a commitment to a standpoint on metaphysical questions (48d1- e1), which traditionally were allotted to religious authorities but, are in the *Timaeus*, offered as an option and more in the spirit of rational theology of Xenophanes and Heraclitus. The theory of breathing, especially the part dealing with

[35] In the *Timaeus* it serves the purposes of cooling and of irrigating, in Xenophon the purposes of both burning and withering dead vegetation and of facilitating growth of new.
[36] The other does not deny or criticize theories of how things started. He is more concerned to add in where he thinks other authors have either not provided an explanation or not a sufficient one.

how breathing is maintained once it has been started, has proven to be the hardest bit to interpret and to accept.

Back to the *Timaeus* at 79a5 and onwards: that there is no void, as has been emphasised[37]. That whatever moves cannot move into a void, follows. That there is air and fire on the move has also been established. That the air we breathe moves out from us seems to be the third assumption or premise made, (79b2). The conclusion that the air moving out of the body must push its neighbour out of its place is declared obvious. For the conditions under discussion, a statement was made very early on at [the statement that the receptacle closed tightly in on its content.] The point made at 79b7-c1, that all of this happens simultaneously, analogously to the turning of a wheel, makes the argument look quite mechanical and even circular. A.E. Taylor does not think any of this makes much sense (p. 557). When the region of the chest and lungs is brought into the discussion, it can at most be with reference to observed movement, but not as caused by muscle contraction or anything like that, so the observed movement cannot be assumed to have any causal role, but rather be caused by something else. Interestingly no comparison is made with bellows or any other causal implication attached to this mentioning of movement of chest. Rather it seems as if the region is specified as the internal part of this part of the body, perhaps to provide distinction from the passage of mouth and nostrils, mentioned at 79c6, in through which the air flows in 79c7. There is a way in which the region of the chest and lungs act to discharge breath outwards; namely by the elemental power profile as a region. This aspect is taken up at 79cd.

However, before we get to this part, we need to try and makes sense of 79a5-c7. It falls roughly into two parts: 79a5-c1states the principle of no void or vacancy and the meaning this has for movement of bodies, namely a kind of instantaneous chain reaction of displacement. It is important to remember that we have a displacement of elements across a physical barrier or membrane, the outer layers of the chest. Anatomically or structurally, the possible routes are of two kinds; the respiratory tract and the relative porosity of the human body wall. In this part there is no description of breathing in the sense that we now perceive of it as being a cycle of

[37] *Timaeus* 79b1.

breathing air in and of breathing air out, i.e. in the exclusive sense that while one is breathing in one cannot be breathing out. On the contrary, in these lines in the *Timaeus*, air seems to flow in and out simultaneously, and in addition it seems to flow in and out simultaneously through the same channels; that is air is moving in and out simultaneously through the respiratory tract and the pores. Aristotle objected to this as obviously problematic[38] and that is understandable if one treats air or any element from only one perspective, say as either only bodies or only as powers. Plato's elemental theory does not do this, but treats them as bodies with powers. Timaeus can therefore discuss their movement from either perspective and up to a point separately, although this does not always make for an easy reading. So far we have got only a description or explanation of movements of elemental bodies as bodies, in and out of the individual human body, using two types of channels. Cornford is therefore mistaken in looking for an explanation of a reversal between breathing in and breathing out, and consequently mistaken again when he claims to find an explanation for this as the 'original impulse' of fire which started "the whole process".[39] A.E. Taylor, in a somewhat similar vein assumes that "this process" of which the internal heat is said to be a starting point is the whole and everything involved in breathing, because Taylor says, that by beginning by "explaining not how air comes to be drawn into the body, but how it comes to leave it," Aristotle's complaint that the actual order of breathing is reversed is justified. Yet Taylor has just commented on how well Timaeus upholds correspondence between the macro- and micro cosmic coherence in the theory. Recalling that Timaeus says at 79c1that this is simultaneous, like the movement of a wheel, we cannot say that one part of the wheel moves first in order to move another part. All move at once. The association Aristotle takes as obvious to superimpose on the causal argument is the association between the flow of air in and out of the upper airways and the movement of the chest. For better or worse, this association does not feature at all in Timaeus' account and can therefore not be thrown into an analysis of this argument in any way or to any effect. Although joints were obviously an expression of flexibility within the

[38] See footnote 21 for ref.

[39] See Cornford's comments on pp 316-1317. On many points he is right. But I don't know what he means by "main body of fire all round the universe." If the world soul which surrounds cosmos is arranged like its human counterpart its top and outermost layers will be more akin to air than to fire.

body, there was no conception of muscular action or control over the movability of various segments, including the rib cage or the diaphragm. The movements seen and not unreasonably associated with breathing do not feature in Timaeus' theory. The breathing he is speaking about is in a different causal and explanatory framework.

It is reasonable to look to observed phenomena which resemble breathing and which are mentioned in the *Timaeus*. The most obvious one is, I suggest, the cycle of the seasons, but seen as a reciprocal change between hot and cold, changing direction twice a year, namely at the two equinoxes, with each change reaching its maximal, the hot at summer solstice and the cold at winter solstice.[40] In Timaeus' minimalistic approach, only equinox and solstice are mentioned (47a5). What matters is that these are the turning points, or the points marking the point of reversal of a gradual change which has reached its maximum in that particular circle. The progress of seasons in a year can certainly be described as a wheel which turns in the same direction; the order of the seasons does not change. But in terms of the changes in light and in warmth, or in hot, cold, air and water, to use elemental references, there certainly is a change which is more like ebb and flow, a progress and a regress, the kind which is described in the so called digression where other phenomena are explained by the circular thrust. These are also regular changes, but in terms of opposites, they are reversals.

Now if one were to draw similarities between breathing and the changes in the seasons, the barrier or closing line of leaving or entering the body or thoracic cavity would signify equinox. Air crossing that barrier will start to undergo a reverse change. We have two periods or seasons when there is more hot than cold, and two seasons when there is more cold than hot. But a pair of colder and hotter season shares the direction of change namely that the 'temperature' is changing towards hot, and conversely another pair shares a change towards cold. Or in periods and changes: from winter solstice to summer solstice we have a period of increasing warmth and from summer solstice to winter solstice we have a period of increasing cold (or decreasing warmth. Within each we will have two different periods with regard to

[40] If one thinks about the light side of these changes, the chances for analogy regarding epistemology are obvious.

the relative amounts, as in more hot than cold and more cold than hot. Can we relate this to the breathing cycle the way Timaeus describes it? Air on its way to enter and entering the body would be more cold than hot but would be warming up. Conversely, air on its way to exiting and actually exiting the body would be more hot than cold, but would also be cooling down. The crucial difficulty though, is the two ways through which air can travel, entering and exiting through both. Why does Plato choose to include this complexity? I suggest that Plato took on the ambitious project of depicting both the epistemological and emotional side of his psychology of man as an individual and as a member of a kind, using both Empedocles' theory of breathing and/or at least nodding to the changes between the reign of Love and of Strife. To make matters even more complicated, Plato wanted the same mechanism or explanation to cover digestion. Why? My suggestion is that air stands for reason or for a mixture of reason and emotion in which there is more reason than emotion. In the psychology of the *Timaeus* the soul in the thorax, the emotive soul can listen to reason and can have effect on the rest of the body, even on the irrational soul(s) and does this on behalf of reason. This is so because in order to fare well, all bodily function must somehow comply with reason. There are thus two main ways in which reason can influence our behaviour, which swings from more to less rational. This is by discourse; that is the most wonderful of streams, which is voice when it flows out of the mouth and serves reason[41]. Or it is by pleasure or pain, sweet or bitter invoked, using two-dimensional images, imprints in the speechless soul, but on orders from reason and carried out by the emotive soul. Desire drives the whole lot; human desire for reason on the one hand and cosmic/demiurgic desire for sharing reason on the other. A desire for understanding leads to discourse, which is always, in Plato, in the end exhausting and only partially fulfilling, which leads to a need for rest before the next onslaught is made. Conviction leads to discussion, if questioned, as is the theme of so many of Plato's dialogues. Man as a mixture of mind and matter also has a natural desire to eat and cosmos has a desire to that man eats and keeps healthy throughout the natural life span. So even in this there is a mixture of desire and reason.

[41] *Timaeus* 75d5-e5.

Is there a way we can make sense of Timaeus' theory of breathing? I suggest the following: Let us start with a literal version of what the text says; namely movement of air-elements in and out of the body. On my reading, the air which goes out of the pores also goes in through the pores, and likewise, the air which goes out of the mouth and nose goes back in through the mouth and nose. Only *some* of the air which comes out through the different openings actually touches and engages in that part of the circular thrust. This is only the air on the upper part of the thorax; on the rest of the thorax the thrusting is only between air-elements which come out the thoracic pores, and the difference which drives it is the difference in their mixture with the hot and conversely cold. This is entirely consistent with variety within a kind, and in terms of attributes of soul, with the claim that some emotions are nobler than others. The importance Timaeus places on agreement through likeness between neighbours[42], should apply to the variety within a kind, as is also shown by putting the most perfect triangles in the marrow where the rational soul is also placed.

This interpretation gives us two circles of air, each leaving and entering through its own portal, and both driven by difference in ratio of hot/fire versus cold/air across the barrier of the individual body, that is its thoracic wall, and neck and face, leading to the openings of the upper respiratory tract. There is another ratio or rather pair of which we must keep in mind. Firstly the ratio between cold and hot air inside the thorax and secondly the ratio between air close to the body and fire close to the body on the outside of thorax. These do not work strictly in the same sense in breathing, which is why Timaeus has to bring in the mechanical aspect of circular thrust, the pushing. The elemental turned anatomical/ psychological reason is that we are primarily concerned with the relation between the individual emotive soul and cosmic reason. The human part in reason, the rational soul of the individual reaching out to cosmic reason is in the head, not the thorax. This is why Timaeus needs a different impulse, i.e. the circular thrust, to send the cooled exported air back into the individual body/thorax.

In the rules governing inter-transformation of elements (and we are now speaking only of the inter-transformable ones; fire air and shortly water) it is not only

[42] *Tim.* 32b8-32c4.

the difference in relative size which determines the outcome but also difference in numbers in a given place or collision[43]. The principle of like moves toward like, or (79d5-6): "the hot naturally moves outward towards its kindred in its own region," that is, the hot within a human body seeks the cosmic fire in the skies, exports air from the body, because the hot is mixed with air and drags or pushes it along. On the outside this exiting mixture meets with a great deal of air, the air surrounding the individual, in relation to which his exiting fire, or hot, is small and so the relative ratio is turned around. It is not, as Cornford seems to think, that the fire in the exiting mixture "will presumably continue its journey and pass out of the expelled air." (p. 317) What moves is a mixture of air and fire and because of the circular thrust, the mixture which has after exiting changed from being more hot than cold into being more cold than hot, is simply pushed back into the body by the mixture which is still more hot than cold and hence moved by the internal hot outwards towards the cosmic hot, and by the circular thrust pushes the now more cold than hot mixture back in, as it takes its place on the outside of the body.

Within the *Timaeus* and with reference to its text alone we have resources to draw an epistemological and psychological version of this picture. In the mixed existence of man most things have two functions, one serving each aspect, mind and material being. The mouth is no exception. At 75d5-e5 we get a short description of how the mouth is equipped, and once for both what is necessary and what is best; the necessary things entering through it, namely food, and the best exiting, the best of streams, namely that of discourse, when it is "ministering to intelligence", in Cornford's language. Discourse in Plato, particularly in the so called Socratic dialogues, is a very emotionally charged, and the 'higher' feelings of honour and prestige play a great role in getting Socrates' interlocutors starting a discussion with him and continuing even after the going starts getting a bit tough. There is therefore a lot of emotional heat which comes out with or even which carries some air of reason out of the interlocutors to be further cooled down by Socrates' intellectual scrutiny of what they actually bring out. Due to the nature of the *Timaeus* we do not have heated debates but we do have the mixture of emotion and intelligence or desire and

[43] *Tim.*57a7-b7.

intelligence at the highest level, namely the demiurge, of whom Timaeus says at 29e1-e3:

> He was good; and in good no jealousy in any matter can ever arise. So, being without jealousy, he desired that all things should come as near as possible to being like himself."[44]

With the highest instance of active intelligence we have the virtue of generosity, a desire to share.

Regarding the other outlet of emotion or desire, the one I suggest we can pair it with hot leaving and taking with it air through pores all over at least the thorax, we go to the highest instance of emotional soul in a mortal individual, that is the emotive soul of man. At 70a7-b1 the heart is called the knot of "veins," said at 70b3 to, when being made aware of injustice to "boil with anger" which connects it firmly with both being affected by reason and being a seat of heat or the hot; "all the narrow channels" at 70b6 and the "veins", mentioned above connect it firmly with the body at large and with connections between the core or inner parts and the periphery.

Taken together, on the one hand the bewildering elemental description of breathing and on the other the short reference to the regional psychology and the two streams that go through the mouth, gives us the two levels of the interaction between fire and air, the 'upper' one closer to reason and language, and the lower one closer to bodily conditions and comfort. We have still to see the interaction of fire 'downward', that is, to water. Fire, or the hot, has the driving role also in this interaction. The task, in the body, is twofold; the division of foodstuffs into their elemental part, and the distribution of the nutrition thus gained for locally selected replenishment, according to the needs and character of each 'place' in the system. However, because these are internal processes, in that they take place inside the body, we now need to review other aspects of the causal and explanatory potentials of the circular thrust theory and we need to couple these up with the novelty of Timaeus' elemental theory. Only after that can the other main physiological function of the body, namely digestion or 'irrigation', be explained. The text of 79e-80c is

[44] Translation, Cornford.

therefore not only a digression but a necessary further introduction and reiteration of the principles of circular thrust and the hypothesis that there is no void.

Circular Thrust Revisited

Timaeus revisits the theory of circular thrust at 79e10-80c8. Why does he do that and how? Cornford seems to think that Plato is using the opportunity to promote the theory and or to counter the proposal made by the atomists that these phenomena could best be explained by postulating void[45]. As I indicated above, I suspect that revisiting the principle and hence mentioning some or all the examples Timaeus mentions, has a direct relevance to the ensuing topic namely irrigation or replenishment of the body with nutrition. There seem to be three sets of topics or problems, only one of which is discussed in some detail. Is there a likeness within a set and difference between them which could indicate why Timaeus mentions these subjects? Is there a correspondence between each set and a part of aspect of the process of material replenishment in the *Timaeus*?

The Way Down

The first set is of medical cupping, swallowing and the continued movement of projectiles after release. The last of these, the continued movement of projectile after release, I suspect links up with the next topic, which is the question why sounds of different pitch sometimes produce correspondence and hence are harmonious, and sometimes the reverse[46]. Sound and harmony is the only subject which is discussed in some detail, so it is likely to be important to Plato in this context. The example is also rich in that it has aspects of movement of projectiles, of mixture, ratios, of a complex thing being well or badly ordered, and of different levels of appreciation or understanding of it when well ordered. The last can be seen from the words at, 80b5-8, that harmony as a representation of divine harmony in mortal movements gives pleasure to the unintelligent and afford delight to the wise.[47] Both the unintelligent

[45] See DK 67 A6.
[46] Cornford, p. 322, suggests that Plato conceives of sounds as successions of blows and is in this not far from Archytas' theory of acoustics.
[47] I am paraphrasing Cornford's translation here.

and the wise are benevolently affected by harmony, but only the latter knows and appreciates it for what is really great about it namely, being a reflection or indication of something even greater. The last set is of "flowing of any stream of water, the falling of thunderbolts, and the 'attraction' of amber and loadstone."(80b8-c2, transl. Cornford). The problems in the last set are all addressed by Democritus[48], so Plato may have been keen to offer a better explanation; one free of void. If it is to Democritus' explanation for flowing of stream of water, this could well refer to his study of the floods in the Nile (See Diogenes *Laertios*) and if so, then placing this problem here in the order of things mentioned, can be argued to show Timaeus mentioning these subject in an order mapping onto the order in which he presents the different parts of the process of replenishment.

To reiterate; I propose that the placement, grouping and order of the problems Timaeus mentions here as explained by the circular thrust is a preparation for using it on the different aspects or stages of digestion and nutrition. As on other topics, Timaeus first gives a brief description of digestion at 80d3, as cutting up the food and then discharging the cut-up food into the veins. This is the gross picture of movement down and movement up, of division of the food and collection of the right stuff from this divided lot into the whole of the body according to specific local needs in a unified system. The finer details of replenishment await and so does the more detailed theory of harmony. There is a further likeness between this part of the picture, at least if depicted in this way, and the breathing, which is said to drive it, namely the two different pathways, the bigger or the oesophagus, corresponding to the larynges, and the smaller, that is the veins, corresponding to the pores. The oscillation of 89d3 is then, I submit, the ebb and flow of up and downward movement.

Timaeus is committed to macro- and micro cosmology, from the inside of both, and when he speaks of the outside of man, it is in relation to their shared elements as inside the cosmos. Taking this into account, Plato may have chosen to use analogy to medical cupping for the very original feeding by suckling a breast, imagined the milk propelled downward by swallowing and continuing by the way of

[48] DK68 A93.

an object propelled by swallowing and continuing to move after leaving the oral cavity. This calls for a note on my previous use of referring to ancient embryology in the list of topics brought into discussion by Alcmaeon. (See Longrigg (1993), p.56-57.) Previously I suggested that we could look at man inside the universe, the intra-mundane perspective, as if he were in the womb, and by this we could imagine Plato having availed himself of Alcmaeon's suggestion that the embryo was nourished through the whole body. Now I suggest Plato is thinking of suckling when he includes medical cupping in the list of subjects relevant to nutrition and which he must explain using the theory of circular thrust to push out the rival theory of void. Is this over-stretching the possible reference to Alcmaeon and the subject of mode of nourishment of embryo? Not necessarily. In Longrigg's (1993) ibid. list Hippon, Diagones and the atomists all[49] suggest that the embryo is nourished by sucking on protuberances in the womb. Aristotle is explicit in his summary of these views, saying that "those who say that children are nourished in the uterus by sucking some lump of flesh or other are mistaken." [50] Repeating at line 746a28 that they are mistaken, he mentions Democritus by name, as one of and thus a representative for this hapless lot. It is thereby established that both explanations of how the embryo was nourished in the womb, through the whole body and by suckling, were available to Plato, and were held by authors whose views he was both partly using and radically challenging. Furthermore, as Longrigg points out, Rufus thought that Alcmaeon "believed that the embryo took in food through its mouth (*stomati*) while still in the womb."[51]

Plato's theory of breathing uses both channels, or modes. Breathing is the elemental process which also drives the process of 'irrigation', which is as it should be if the elements of air and fire are somehow closer to reason than the elements of water and earth. Furthermore, Plato's theory of the nature of man as a mixture of mind and matter engulfed in cosmos, calls for two kinds of 'nutrition' (and two

---

[49] [Empedocles seems not to belong to this group but there may be some uncertainty about this; see Longrigg (1993), p. 56, for reference to his own 1985a paper.]
[50] Aristotle, *Generation of Animals*, 746a20-21, Barnes, in *The Complete Works of Aristotle*
[51] Longrigg (1993), p. 61. His reference to Rufus is *Apud* Oribasium III, 156 *C.M.G.* VI, 2,2 (D.K. 24A17). Longrigg also recommends adopting Olivieri's emendation of the text, which Longrigg says makes the two reports consistent.

corresponding kinds of exercise) as we shall see in the discussion of care of man at 88d1-2 (the body being heated and cooled by things that enter it) and at 90c6-7 (a call for nourishment and motion which is 'proper' to soul, that is of the right kind given the nature of rational soul). In sum then; including an instrumental or mechanical example of suction in the form of medical cupping is, given the authors he is addressing, a proper beginning of Timaeus' investigation of nutrition. The two other steps for the foods way down, the swallowing and the continued movement towards the belly, resemble that of a projectile being propelled and then continuing to move after losing contact with what caused the initial impulse. If circular thrust can explain all these processes or types of events, then one does not need to postulate void in order to explain them, and if the intake of food can be accurately of sufficiently described by these kinds of events, then the beginning part of nutrition is covered. Now to its counterpart; what happens to the food, once it has reached the belly?

The Way Up

The food, even on its way down, is cut up by fire; the food once cut up is 'water' in the sea of nourishment. Mentioning "the falling of thunderbolts, and the attraction of amber and of the loadstone," (80b8-c2) refers to the theories of Empedocles, Anaxagoras, Diogenes of Apollonia, and the atomic version of Democritus, which Guthrie says is essentially that of Diogenes with the modification that the affluences are streams of atoms."[52] These theories are not only built on void but, in Diogenes and consequently in Democritus, are strongly connected to breathing of inanimate matter, and in Democritus of his atoms. This is therefore relevant for any theory of the redistribution of material, and not least for Plato's theory of nutritional replenishment, because it comes so close. It is strongly linked to breathing, as it is said to drive digestion. Lastly, as an elemental theory which is also corpuscular, it is most likely posed to rival the theory of Democritus. Timaeus makes it clear at 80c4-8, that his point is that it is not by postulating void, but by using the theory of circular

[52] W.K.C. Guthrie, (1962-1981). *A History of Greek Philosophy*, vol.2, p. 373

thrust, inter-transformation of elements and the movements of elements towards their cosmic region that the redistribution of matter should be causally explained.

What kind or level of break-down of nutrition is Timaeus speaking about at 80c4 *diakrinomena* and 'putting together' *sugkrinomena* (80c5)? Is it of food into elements or of elements into their triangles, from which, in the case of air, fire and water an inter-transformation can give rise to any of these three elements from the triangles disentangled by a break-down of any of them? At line 80c4, Cornford translates *to* as "the several kinds of body." Saying that "all interchange the region towards which they move," (80c5-6, transl. Cornford), points to elemental transformation, or here inter-transformation as the second part of Timaeus' causal theory, here mentioned right after the circular thrust at 80c4. For nowhere in the Timaeus is there a case of an element moving, by itself, towards the cosmic region of another element. However, if the "region" ἕδρα at 80c5 is seen in the micro-cosmic context of inside versus outside the human body, then a different ratio of elements in a mixture can cause a flow back and forth, as I suggested in my analysis of breathing. In such case, if air mixed with fire on the inside is more hot than cold, as a mixture, and if then the mixture is moved by the hot towards the cosmic region of the hot, and then once the mixture is cooled on the outside, the ratio of hot to cold is no longer driving it towards the cosmic hot region and it is pushed back into the body by circular thrust from the hotter air-fire mixture which is coming out of the body, either through pores or the upper respiratory tract. In such a case, both the movement out of the body and into it again would be driven by the same rule of an element moving towards its own region, in this case fire and its power the hot. But the movement of the air-fire mixture back into the body is not explained directly by this most fundamental rule, but indirectly in a way which depends on the mechanical theory of circular thrust. This auxiliary theory is mechanical in the sense that in moving three-dimensional bodies, Timaeus' elements, push each other about in a close-packed space[53] on a surface full of holes or pores, leading into a cavity, from which the pushing bodies also come to the surface. Nothing in this interpretation excludes the

[53] There is no doubt that according to Timaeus, Cosmos is a close-packed space, in the sense that there is no void. See previous discussion.

occurrence of inter-transformation between fire and air from being a part of the process. According to the part of the rules of inter-transformation described at 57a7-b3:

> And, on the other hand, when a few smaller particles are enveloped in a large number of bigger ones and are being shattered and quenched, then if they consent to combine into the figure of the prevailing kind, the quenching process comes to an end: from fire comes air, from air, water.

According to this, it is compatible with all that has been said to imagine the part of the fire in the out-coming fire-air mixture is actually changed to air; this would only aid in the cooling of the mixture, since air is colder than fire.[54]

It is perhaps unnecessary to state the obvious difference between the number of particles in a cosmic elemental region and the elemental 'regions' in man. The microcosmic human body is very small compared to the universe and the 'places' or regions within the human body even smaller. This is why the air-fire mixture having come out of the human body, meets with a lot more air, changing the local ratio and thereby also the hot-cold ratio and under the resistance of the overwhelmingly more populous air elements and pushed by the out-coming hotter, returns back into the body.

It seems from the vocabulary used, that the theory of breathing and of how breathing drives the irrigation system, the digestion and gross distribution of nutrition, is all kept at the level of elements without breaking them down to their triangles and using the rules of inter-transformation. But as above, the inter-transformation of elements is fully compatible with it and probably meant to be a part of it, although this aspect is not needed to make the main point that these major physiological processes are driven, caused, and explained by mechanical principles built on the postulate of no void; the principles of like moving towards like and the principle of circular thrust.

The level of triangles is unique to Plato's elemental theory and perhaps its greatest potential is another level of analysis. This is perhaps clearest at the level of

[54] This could also 'explain' why there is a little bit of water in with the air we breathe in, according to Timaeus (70c7), see Cornford's long footnote on p. 284 on various versions this peculiar theory, including the version in *On heart* which is close to Timaeus version.

local replenishment within the individual body[55], because of the emphasis on maintaining specific local elemental profiles for vital tasks most akin to the reigning element in that local blend. The rule described above about the might of the majority, would then come into force. The description of blood, which is what is moved in what I called 'gross' distribution above[56], is based on the level of elements. It seems to me that Timaeus at 81a4-5 keeps to that level of analysis when speaking of what 'dissolves and disturbs our substance' [*tekei kai dianemei*]. At least he speaks of sending 'each kind of body' on its way to "join its fellows," (81a5-6, Cornford.) which can only refer to the cosmic elemental regions. The lines 81a4-b4 describe a circular thrust within the body, called for by the removal of elements from its outside which, unlike cosmos[57] is subject to grinding by the movement of external elements. What is removed by the external grinding is immediately replaced with dismantled elemental stuff from plants in the form of the flowing blood. Thus at the microcosmic level, the same elements and the same laws governing their behaviour reproduce the rational design of cosmos in the micro-cosmos.

In conclusion for this segment I therefore suggest that lines 80c4-8 state a two component causal theory; that of circular thrust, coupled with a theory of how a 'portion' of elements can change direction in relation to the cosmic regions. The latter can be brought about or caused either by changes in elemental (and power) ration in a 'portion' of mixed elements (and in living beings mixture is the norm) or by the inter-transformation, in which the triangles of one dismantled elemental kind particle become or come together to form an elemental structure of a different kind.[58]

---

[55] Here I am treating the body as a human body. If however we are to imagine an analogy between the body and the city, between the physiological conditions and those of the city politics, then in the finer details of nutrition, diseases and health, the discussion has moved to the part of examining the condition of the city Socrates speaks of at 19cd and not of its dealings with other cities, see 19c2-4.

[56] That is the downward movement and digestion during which the food is cut up and then the pumping into veins.

[57] *Tim.* 32c5-8: "Now the frame of the world took up the whole of each of these four; he who put it together made it consist of all the fire and water and air and earth, leaving no part of power of any of them outside." Transl. Cornford.

[58] It may weaken the case for the latter interpretation that when Timaeus gives examples of transformation and inter-transformation of elements at 56d, the verbs he uses are Διαλυω and Συναρμοξω.

Proper Distribution

Timaeus reasserts the principles of respiration at 80d1-6; the fire inside us oscillating or being oscillated [αἰωρουμένου], inside us as it tags along [συνεπομένου] with breath or air, does two things to our food; on its way down to the belly fire cuts the food up; on its way up again fire pumps the cut-up pulp into the veins. Timaeus' choice of verbs recalls the distinction between real, divine causation and that-without-which, auxiliary or natural causation, made at 48a-b. It also anticipates the distinction between available kinds of movements for preservation in the text on the care of man, at 89a1-5, particularly the difference between self-motion and motion as a whole, but by another. At 80d6-7 the image of continuous flowing of streams, causally explained at 80b, is used for the distribution of replenishment in the body. The image of streams is also an image or elemental kind of water, which is reinforced by the explanation of the colour of blood, consistent with the explanation of red as a product of the mixing of water and fire, at 68b.

The next segment (81) contains, without directly saying so or calling it by that name, recognition of the human body as a micro-cosmos with its own outer boundaries and internal division into structural and functional units. Part of this is the theory of the wear and tear caused by elements, both outside the body and also those not yet integrated into the rational fabric and structure of the body. The counter-part of this is the selective, rationally controlled integration of new or incoming elemental material to maintain this vehicle of rational soul in the realm of the elements, as long as reasonable possible. The emphasis at 81a is that the elemental changes, the flow of elements in the body, are governed by the same principles as that of the cosmos, namely that each kind is carried towards its own kind, and that this is an ongoing process, which as it wears and tears must also be managed and harnessed for building and maintaining, and that this is possible if reason oversees the work (see above).

In biological terms, the new set of subjects to be explained is growth in youth and wasting in old age, and eventually death, itself another instance of circulation.[59]

[59] At 81d2-3 the immortal soul "finds pleasure in taking wing to fly away," and at 42e8-43a2 the lesser gods borrow elements from the world on the condition of returning it when their creation, the mortal man as a mixture of soul and body, had run his allotted life-span.

Thus the main theme is, as in the first formulation of the subject of inquiry into nature in the *Phaedo* 95e10, and throughout the text on the nature of man in the *Timaeus*, a pair of opposites namely coming into being and perishing. As Cornford points out, Socrates, at the *Phaedo* 96d, had alluded to Anaxagoras' ideas of growth by addition of substance to substance in our body. This is clearly not Timaeus' model since the food is thoroughly cut up and dismantled into not only elements, but their triangles[60] in order to be re-constructed[61] on the basis of structural and functional needs for replenishment locally.[62] The locality and specificity is emphasised in the theory of health at the beginning of the nosology at 81e6-82b7.

The temporal side of these changes in the *Timaeus* is explained by another change in relative 'strength' of a decisive factor between macro-cosmic and micro-cosmic elements, and therefore as a ratio. 'Materially' youth or being newly made brings with it superiority regarding the shape and form of the triangles (81b). The opposite effect of youth is the havoc rapid growth runs with the workings of the rational soul, (43a6-b2). The factors which make a triangle a good or superior triangle are how closely it resembles an abstract image as we see from the description of the triangles the god placed in the marrow, at 73b5-6, as "unwarped and smooth" (Transl. Cornford). [63]

The decisive factor for the strength of the living structure is described as firmness of the interlocking of the triangles which form the elements, and thus seemingly the structural strength of the element. Here the possibility to break elemental structures down to their triangles is a crucial asset in Timaeus' account.

---

[60] The division into elements is clearly not deemed as sufficient, as we can see from Timaeus' programme statement to this effect and the accompanying clear critique of Empedocles as insufficient on this point at 48b3-c2.

[61] See 82a7-8: "For when any of the kinds is *formed* or shifts its place contrary to nature." Italics are mine for emphasis on the possibility that Timaeus is here speaking about a local construction of suitable element from triangles, according to the rules of inter-transformation.

[62] This, I submit, has its city-political equivalent in Socrates' review of the procreation, examination and positioning of children at 18c6-19a5. As with all other members in the city, male and female, young and old it is the merit or nature of the individual which should be the deciding factor about what function he gets in the city, not the parents or the position into which one is born. This is an expression of the virtue theory that it is best for each and best for all that each thing has or gets to do the work to which it is naturally best suited.

[63] The first attribute refers to how good mirror properties a triangle (and planes made from them) has and the second to how well it interlocks or joins with other triangles, either in a plane or at the angle of planes joined to form a 3d structure.

For it is the quality of the triangles as geometrical forms which seemingly decides how well they interlock to form the sides and eventually the whole structure of the element they form.

Sadly we are not told how the triangles are made or from what. That problem is, I propose, a part of understanding the elusive receptacle. Cornford[64] translates "fresh from the workshop"[65] although there is no such reference which I can see in the Greek text. It gives a hint, nevertheless, one perhaps worth speculating on, although a speculation is all that it can be here. My suggestion is to connect the making with sound, more precisely with making sound. This offers two not mutually exclusive interpretations: to discourse and to consecutive sounds and their harmonies and disharmonies as described a short while ago. On the latter, we may immediately point out the inevitability of declining strength with advancing age and of death, which Timaeus says is pleasant if it comes at the right time, at the end of a natural life. The idea of discourse may seem more far-fetched, and the suggestion I am about to make is a very speculative combination of two big topics; logic and politics. But bear with me a little. In making the rational soul, the demiurge looked to three Forms, and made his structure from *being*, *same* and *different*. In the body, local parts of the human soul control the material aspect, and they can do this because of the formal organisation the demiurge persuaded the traces to take on. Some sort of affinity between what goes into the making of soul and that which goes into the making of a triangle must be assumed, although I shall not venture further down that road here. The tentative suggestion I am driving at is that one way of conceiving the triangles is to see them as sentences containing statements of being, sameness and difference.

The second part of my speculation of speech has to do with the body being described as a living structure and as a city. This analogy between the human body and the city is at the centre of Socrates' request for an account in 19b-20c. The discoursed structure of a new city is its constitution, the parts of which ought to be fresh and clear in the minds of the founders and first members. While they are fresh

[64] Cornford, 1997, p 329, for *ek druochōn* at *Timaeus* 81b6.

and sharp they ought to ensure cohesion and fend off dangers from without and within. The objection might be raised here that when Socrates at 20b1-2 mentions the affairs of the city, he is referring to his own speech the day before, the reiterated parts of which I have suggested are used only hypothetically as a persuasion produced by Socrates logical discourse, as a conviction his interlocutors arrive at and abide by and which makes them all likeminded participants and friends in the *Timaeus*. The answer I propose is to remind us that the *Timaeus* is introduced as only the first part of a trilogy where the next part, that of Critias, although based on Timaeus' account of the nature of man, is definitely on the level of society and difference between its members with regard to rationality (see 27a7-b6). The necessity of this sequel in order to complete our understanding of the plight and possibilities of man and his society is also acknowledged at 87a7-9. The task and aim of Critias' process of bringing men before a tribunal is to "make them our fellow citizens" (27b2-3), to integrate them into the city structure Socrates had described the day before. This is a picture of constant and consistent integration of the young into the city politics and its administrative structures, and as such it shares the nature and requirements of making music, described at length in 80a3-b8. So with regard to renewal of citizens into administrative positions, this can be harmonious or disharmonious, smooth or turbulent. The metaphor can similarly be used on difference in reasoning ability between citizens. Then the difference that needed to be harmonised would be between the ways in which arguments and decisions are made and or presented so as to convince and unite the population in their endeavours. The way in which the pleasure derived from this differs between groups (80b5-8) is a reminder of harmony between different actors, even when enjoying different kinds of pleasure from joint efforts, made collectively of different abilities.

Likewise the explanation of old age and of dying can be taken biologically or mechanically or it can be mused over as a metaphor. The mechanical perspective could be presented as twofold; that of a triangle being smooth - flat and shiny - which would indicate its ability to mirror or reflect. This ability is pertinent to the possibility of a triangle to contribute to seeing, either an image or even the reason behind the perceptible world as reflected in it. Both stages are in play in the administration of reason over the different 'regions' of the created world, as

demonstrated in how reason communicates with the appetitive soul.[66] The sharpness of triangles on the other hand, represents both the ability of a structure made from them to hold tight and the ability to cut through other triangular structures. Metaphorically this could refer to both the strength and endurance of one's own conviction and also towards others the power of persuasion in discussions. In the context of the human body, Timaeus tells us at 81d3-4 that the gradual wasting away of the body is what we call old age. It is quite consistent with the mechanical explanation of the connection between quality and how long things last, that the triangles in the marrow, which are the most perfect ones (73b5-c3) hold out the longest, (81d4, 'finally'). As this is the innermost core of the living being, the one which holds the soul, the structural disintegration leads to the soul being released (81d4-e1). Without the rational soul's administration of the body, the body does not work as an integrated whole. In the first part of the dialogue, Critias, at 23b6-c2, reiterates the words of the Egyptian priest to Solon, that the bravest and noblest race once lived in Greece, and Solon and his fellow Athenians were its biological extension, through a small remnant of the seed preserved. From the description of the formation of brain as the ploughland for the divine seed (the rational soul) at 73c, and the connexion[67] made between this and the anatomy of the male sexual propagation parts, Solon and Athenians are described as being the embodied rational soul of Greece, preserved throughout all the natural disasters which had interrupted the continuity of civilized society, of a city state. The implicit distinction between the country, Greece and the city of Athens, refers to Socrates' mention of other cities with which he wanted to see his city deal.

To conclude this segment: this segment started with distribution of replenishment within the body and ended with death, as the breakdown of the structures in which immortal soul had been kept and its consequent flight. Timaeus keeps to circular thrust as his main model of explanation and the body as a micro-cosmos governed by the same laws at the macro-cosmos which it is an internal part

[66] 70a2-7.
[67] See especially 91a7-b2, about the "compact marrow" which Cornford (footnote 2, p. 356) explains as the connected marrow of the cranium and the spinal cord, in contrast to marrow held in other marrow bones. Note that at 91a4-6, circular thrust is used to explain the movement of the sperm liquid.

of. There are strong references to the first part of the dialogue, justifying a concurrent interpretation of the text in political context. In doing this and in how he does it Plato steers close to both Alcmaeon and to Philolaus. The constant movement and mechanical displacement of the circular thrust is reminiscent of Heraclitus' emphasis on war[68] as a creative force, also embraced in Socrates' long speech at 19c.

Summary

In the *Timaeus* the concluding remarks of 68e state that certain works has already been performed by the demiurge on both kinds of causes at work in the remaining parts of the dialogue. The difference and the hierarchy between divine and natural causation is reiterated and also that all human route to knowledge and understanding is through sense-perception and the kind of causal account associated with this. Just prior to this segment, or at 68d, the difference between the two kinds of study, first laid out at 29b is reiterated, with the same warning that human science based on sense-perception will never be sufficient to complete both "blend the many into one and to resolve the one into many." Timaeus' words at 68d6-7 are as clear and strong as they can be, that no man is now or ever will be 'sufficient' that is capable to perform this divine task. The supremely happy man at 90b6-c6 is not exempt from these limitations. That leaves the glass of human knowledge half empty or half full, but with a theoretical or a metaphysical assurance based on belief alone that what it is a part of is in itself something complete. The belief, though, is argued, if not proven. In the part on physiology, Timaeus applies his main principles of collection and division mentioned in 68d into explanatory practice on the two main physical processes of breathing and digestion as a contestant in a competition for the best available explanation, competing with other contemporary authors.

[68] See fragment 80, pp 48/49 in T.M. Robinson, 1987/1999.

Chapter V - Diseases, care of man and diversification of fauna

Bodily diseases

Diseases are the opposite of health. There are no specific original external pathogens, neither elemental nor divine; rather diseases result from the various ways in which the workings of the body deviate from what is natural, good and best. This is in accordance with the explanatory connection which seems to be maintained at the *Phaedo* 97c6-d5, where Socrates declares that he believes that the same knowledge concerns both how it was best for things to be and how worst for things to be. All diseases are detected by the senses, working through the elements. This is an epistemological or scientific necessity rather than a statement that all diseases are caused by elements or bodily.

The order in which Timaeus mentions the elemental powers at 82a7-b2, is the descending order of places or parts which are naturally dominated by cold/(air), and which on diseases become hot/(fire); and those dominated by dry/(fire) become moist/(water) and the ones which are naturally light/(air, comparatively) become heavy/(earth). The statement at 82b5-7 that "any element that trespasses beyond these limits in its incoming or passing out will give rise to great variety of alterations and to diseases and corruptions without number," (translation: Cornford) is an emphasis on the thought that the elements themselves, regardless of which, are not pathogen, they are, after all, not real reasons, but that without which we would not be able to detect any of the things happening. The order of the changes listed above shows the way down from heaven to earth, if we assume an analogy to the elemental regions in the natural world. The natural construction of tissues and the structures made of them is in the other direction, from the unstructured but all-including elemental base that is blood, to gradual division into tissues, in the order of starting with the 'dullest' and most peripherally placed to the innermost and most precious; the marrow. The emphasis on letting only the purest of water sieve through to the marrow in order to nourish it is reminiscent of the need to place the head with the rational soul as far away from the functions of the rest of the body as possible.

The picture is not of a once-and-for-all building of the tissues and structures but also of maintaining them by the continued flow of the right stuff to where it is needed, hence the comment on the "viscous and oily stuff," feeding the growth of the bone as well as connecting flesh and bone, (82d) and the best formed triangles watering the marrow. Cornford rightly points out that "it is not explained what agency in the living body causes blood without fibrin to be compacted to flesh." (Cornford, p. 336). In fact, the construction of bone, described at 73e1-5, is the only occasion in the formation of tissues where the mixing of elements resembles craftsmanship, which uses the elemental powers distinctively as in working iron or making pottery. However, this is still mixing elements and it gives no indications or any endorsement of any special ideas about how various tissues are formed, over and above what Timaeus actually says. Recall that there is a great variety within each elemental group and in many conditions (58c-61c). The changes between conditions are explained by the theory of circular thrust (see 58e-61c) and by the rules of elemental inter-transformation. Perhaps Plato thought the matter fully demonstrated. Or in the nosology he simply wanted to keep the focus on the theory that the harmful humours came about when the order of natural processes was reversed.

The reversed order of tissue formation (82e2-83a5) leading to diseases, is not that flesh becomes decomposed but that the discharges enter the blood stream. The content of the veins is then no longer blood and air as it should be, but mixed with ingredients which are not part of the designed function of blood or any flow in the veins. Cornford translates 82e4, αἷμα πολύ as "blood of every sort." A.E. Taylor does not comment on this particular part, but thinks that the air mentioned is misplaced and is 'pathologica'. I suggest that this is one of those places where we must be careful not to let modern physiology or histology direct our interpretation. Rather, blood is s stream of nourishment systematically flowing to every part of the body and in that sense whatever mixes with it becomes a part of this operation of distribution (see 83e2-5). It seems that whilst in the blood, the various properties of these various intruding stuffs, develop the humours, which then become the subject in the humoral part of Timaeus' nosology. Bile and phlegm are Plato's main humours; bile seemingly related to fire and phlegm to water. We will not pursue the varieties Timaeus describes here. Cornford points out that the presence of substances

in food, like those needed and absorbed in the body, was clearly assumed by Anaxagoras. Solmsen[1] (p. 521) also suggests that the Plato envisages that it is the triangles rather than the elements that travel with or are carried in the veins. In a footnote (78, p. 521) Solmsen suggests that thinking of elements moving about in the veins fits with Plato's analogy of the movement of nutrition in the body and the movement of elements in the cosmos, and in this I think Solmsen is right. The second point about humours and connected to blood is the idea that phlegm and bile are "superfluous products of nutriment."[2] I mention it here, mainly because the author of *Regimen*, from whom Plato seems to borrow a lot, has a theory of the use of exercise to balance nutritional intake, and Timaeus' emphasis on movement might be seen in similar way. That, I think, would be wrong, for Timaeus is not counting calories and advocating using them, but advocating movement (bodily and mental) to keep the elements colliding and interchanging and changing their direction and thereby preserving the cosmic cycle of movement and life.

Flesh seems to be lowest in the hierarchy of tissues in the *Timaeus*. It also is bulkiest and it is what sinew is separated or derived from. The text of 84ab seems to repeat the thread of and from the flow of nutriment from one tissue to another, resulting firstly in their own demise and secondly in further pollution of the stream of blood around the body. This is a fascinating subject and well worth exploring in detail and perhaps also in other contexts, such as that of city politics. Material moving the right way through the right routes gets, in due time, reintegrated into the cosmic stream. That we see from the comment at 42e7-43a1, that when making the human body, the lesser gods borrowed portions of the four elements "on the condition that these loans should be repaid."[3] Therefore I think that the problem at 82e2-8, is not that flesh is decomposed but that it releases its discharges into the bloodstream. No mention is made of defecation in the physiology of the *Timaeus*. However, the emphasis on the right direction of the movement of stuff in the universe, and the nature of the blood to be a bringer of necessary replenishment suffices to conclude that Plato did not envision blood as the outlet for stuff which had

[1] Solmsen (1968).
[2] Cornford reports this idea in his discussion on p 337, as resembling the doctrine of Dexippus of Cos.
[3] Transl. Cornford.

outlived its usefulness. The mention of "concoction" at 83a6 and "exposure to burning" at 43a7 refers to the role of the internal fire in Timaeus' physiology, but it also recalls Xenophon's description of the blessings of the sun at *Memorabilia* IV.III.8 when he reminds his interlocutor of "how the sun, when past the winter solstice, approaches, ripening some things and withering others, whose time is over."[4] It is particularly the latter which I have in mind, for notwithstanding ideas that elements had their own movement, which is not however a movement in isolation or out of context in the *Timaeus,* the description of 83a and b holds much too much reference to emotional bitterness and resentment, not to invoke thoughts of political factions or individuals, refusing to make way for new recruits when their time of contribution is over. The more severe form of structural disintegration, addressed at 83e, reinforces the idea of mixtures at the junctions of 'regions' or functions. These 'tissues' or structures have qualities that lie between the qualities of the tissues they bridge (see 74d). The image of a bridging tissue, connecting other tissues and structures, mechanically and nutritionally, interestingly follows the cosmic rules of relentless interaction between what there is. Hence Timaeus says at 83e5-7 that the breakdown of the several sorts of flesh is but half the damage and allows for speedy recovery "so long as their roots hold firm" (μενόντων δὲ τῶν πυθμένων αὐταῖς, 83e6). Timaeus is using the same image when he says at 90 that "our roots" (ῥίζαν ἡμῶν) for the part that came from heaven, that is the divine or rational soul in our head, is that which keeps us upright. 'Keeping us upright' and not just raising us up from the ground, is an ongoing process of nutrition for the soul, of love and the pursuit of learning. The most important thing is to preserve the integrity of the natural structure, so that the flow of the needed things, elements for the body and rational study for the soul, can continue. If, as in Socrates' long speech, the city is considered, study and discussion must neither be stifled nor cut off. Given Timaeus' emphasis on the sciences, not least the study of the heavens, as a prerequisite and the only way to philosophy, this takes on an eerie historical weight.[5]

[4] Translation E.C. Marchant, in Loeb, *Xenophon Memorabilia and Oeconmicus*.
[5] Plato would clearly not join Xenophon in condemning the natural sciences, in his defence of Socrates in the *Memorabilia* I.I, 11-16, nor have his Socrates do that.

The science Timaeus has particularly in mind has to do with the triangles, from which all elements are formed, whether that science is geometry, mathematic, logic or all three. The triangles are the "bonds of life" which "root" (κατερρίζουν) or 'bind fast' (συνδουμένης) the immortal soul in the body as long as body and rational soul are united, and the animal is alive (73b3-5)[6]. The most serious case of bodily disintegration of 'tissue' breakdown is that of the marrow (84b), for then "the whole substance of the body is forced to flow in a backward course" (84c6-7). In the physiological context, this signifies the loss of the triangles which have the best reflective or mirroring abilities and the clearest form and sides, and therefore bind together most strongly and efficiently, facilitating all elemental processes and functions and supporting rational life in the cosmos. The marrow is also the substance in which souls are planted (73c3-4) and not least important "seeds for every sort of every mortal kind" (73c1-2). There are therefore at least two ways in which we could interpret the statement that disease in the marrow leads to the whole substance of the body being forced to flow in a backward course.[7] Firstly, stuff which should be discharged from the body has broken into its most important place, destroying the part which should be ensuring both the rational running of a divinely designed being and secondly placing its survival in terms of sexual propagation to the next generation in jeopardy. What is significant is the destruction of the tissue which hosts or is made up of the best and the most perfect triangles, which can also be like paradigms for judging and selecting other triangles for use. These are the ones among which the rational soul can stay and perform its natural function. Without being enclosed in the marrow-bones soul does not remain. Is there another legitimate context in which we could examine these physiological, biological and mathematical images? A brief digression into politics might be in order.

[6] οἱ γὰρ τοῦ βίου δεσμοί, τῆς ψυχῆς τῷ σώματι συνδουμένης, ἐν τούτῳ διαδούμενοι κατερρίζουν τὸ θνητὸν γένος·
[7] Paraphrasing Cornford's translation.

Both T.K. Johansen[8] and Sarah Broadie[9] emphasise the unity of the *Timaeus-Critias* complex, referring to the abandoned *Critias* as that part of a trilogy, heralded by Critias in the *Timaeus* at 20d, and as a part of a plan at 27a. I share their view on this and suggest bringing it to bear closer to home, namely by looking at Critias' description of his task, as it is given in the *Timaeus* at 27a, and coupling it with a relevant detail concerning Solon from a preview of Critias' mentioned at 23b6-c2, namely that: "the bravest and noblest race[10] in the world once lived in your country. From a small remnant of their seed you and all your fellow citizens are derived." (Transl. Cornford) Firstly the exchanges of the Egyptian priest and Solon on the one hand and the gravest of disease are connected through the framework of post-catastrophic amnesia and the clinging to genealogies which are "little better than nursery tales." (23b3-5). These are not proper accounts of origin or cause. They will not do as a foundation or a part foundation on which to build or by which to give an account of the noble living city Socrates wishes for at 19b.[11] For such an account two kinds of things are needed; firstly Timaeus' account of the nature of man, as given in his speech, our *Timaeus*, and secondly from Socrates' previous account; 'those of them' [αὐτῶν τινας] from this 'bravest and noblest race/stock' which according to Socrates [παρὰ σοῦ] had received outstanding education, [πεπαιδευμένους διαφερόντως] (27a8-b1). From this I suggest the following interpretation as an analogy to what could be a subject in the part of the nosology we are trying to come to terms with: Timaeus' task is biology and genealogy based on the proper scientific view, which does not shy away from using hypotheses and acknowledging the limits that this imports into the scientific account. However, this is still what it is; biology, nature of man. The destruction of bone and consequently of marrow is the destruction or elimination by death or exile of the best politicians of the city; politicians such as Solon. These in turn were the protectors and patrons of education

[8] In footnote 1, p. 7, Johansen accepts for his part as "relatively unproblematic and generally undisputed today that the two works form a *compositional* unit."
[9] On p. 115 of her 2012 book on the *Timaeus*, Broadie claims that "the *Timaeus-Critias* from the start was planned and written as a complex unit."
[10] τὸ κάλλιστον καὶ ἄριστον γένος
[11] Socrates' account the day before and Solon's story brought back from Egypt are neither in opposition to each other nor mutually exclusive. On the contrary; as Critias makes clear at 25d7-e5, he "was surprised to notice in how many points your [Socrates'] account exactly agreed, by some miraculous chance, with Solon's." Transl. Cornford.

and philosophy, and they were able to listen to reason in the form of philosophy in order to govern better and more rationally. If such politicians are driven out by those who should have left politics because they were already burnt out, everything will be moving the wrong way. This, I suggest, is the political analogy to this part of the nosology.[12]

The third part of Timaeus' nosology, starts at 84c8. Timaeus says we must recognise the three ways in which nosology comes about; from breath, from phlegm and from bile. The number three indicates the three elements which can inter-transform their powers and associations. Air/breath is already established as the element of contact between macro- and micro cosmology and the element whose effect on fire and movement with it maintain the physiological processes vital to the living creature. This is so both in a micro- and macro cosmic sense, since cosmos could not be a perfect example of its unique kind were it not for the fauna and flora giving life to all regions within it. There is little doubt that air or breath is strongly associated with reason and the highest soul in the *Timaeus*, not that the rational soul is air or made of air, but it is surrounded by air in such a way that what gets mixed with air can affect the workings of the rational soul, as we see from Timaeus' explanation of the sacred disease at 85ab. My suggestion for coming to grips with this third class of diseases is to apply a political analysis or to read it as one. At worst we would be in the company of Alcmaeon of Croton[13] or rather a reverse application, which, given how close to his ideas Plato often sails in the *Timaeus*, may not be that farfetched.

In the political analysis I suggest, air is representative of reason, and as being in elemental form then it is the kind of reason that comes in the stream of speech, i.e discussion of some sort. It can be good or bad, as there are varieties within each elemental kind, but it has a rational or intellectual clout, exiting the mouths of those willing and capable of giving or applying it, and entering the ears and affecting

[12] As I have declared earlier in the text, the study of which medical ides, borrowed from whom and how modified is an interesting and worthwhile study; interest in it was a part of my reason for studying this text in the first place. However the complexity and multiple layers and interwoven threads of this text force a choice on anyone trying to come to terms with it. Fascinating as the medical side is, I simply cannot attend properly to it here.
[13] See V. Nutton, 2004, p.48.

those, even of lesser intellectual standing, but capable of appreciating it. This kind of relationship is undeniably demonstrated in the psychology in the relationship between the rational soul and the emotive soul. In this segment Timaeus applies both anatomical and humoral references, making the deciphering all the more hard and speculative. Let me in suggest the following interpretation: The lungs are a part of the larger and faster track of air into the body and if we allow ourselves to identify the flow of air with open-air discussion[14], as I alluded to, then blocking or hindering these and the consequences of that is the problem Timaeus is describing. Timaeus uses an unspecified word *rheuma* for what could block the flow of air. Meaning *discharge*, the description can cover any of the noxious by-products from disintegration of tissue in the body. The pathological description now diverges into problems of either too little air and or too much air in a place. Too little air in a place causes putrefaction,[15] too much air takes a violent path only to be fought back into submission when it comes close enough to threaten the core of the establishment, by approaching the marrow bone, the "barrier at the centre," (84d7). It is a picture of an intellectually led or reasoned, forceful but unsuccessful revolt against the establishment. The reference to the air having come from outside (by contrast to the inside formation of air in line 84e3) could indicate influence of ideas originating outside Athens or even outside Greek territories. What follows, in 84e, is the admission that such problems can also be fully home-grown, as a result of changes in authority, and can seriously affect the normal natural movement of the city body, disfiguring its appearance and halting its functions. It is the violent gathering and movement of too much air in the canals[16] leading to the citadel, the head, which

[14] By this I mean discussion in public spaces, accessible to men of leisure. At 87a7-b4 Timaeus counts "cities with evil forms of government where no less evil discourse is held both in public and private, and where, moreover, no course of study that might counteract this poison [having a bad personal constitution] is pursued from youth upwards." The lack of social support, in the form of education and good politics is a second cause of involuntary and not-culpable causes of human bad behaviour. The emphasis on education of the young as a part of initiating them into the clans and into society is also underlined in Critias' story at 21b1-7.

[15] There is a possible reference to the ideas, objected to by Aristotle that digestion was a kind of putrefaction. Timaeus does not apply that idea, but the 'region' of water is the lowest and darkest and without (or very nearly without) air in the Timaean cosmos. Timaeus gives an example of moulding of bone due to lack of air.

[16] Recall the tendons no less than veins are channels of material movement.

causes it to sway backward. The force (βια)[17] of 84d6 is the opposite of the gentle persuasion by which the demiurge impregnated the receptacle with form and order upon its content.

The version described in 85a, by mentioning white phlegm, signifies, I suggest, young intellectual men on the opposition path. For white phlegm was formed by the "decomposition of new and tender flesh, accompanied by air" (83c7-8). The "escape to the surface of the body" at 85a2-3, as a milder infliction could refer to the possibility of ostracism, whereas mixing with 'black bile' recalls how black bile came about, namely from decomposed flesh which had long been exposed to burning (83a), presents the more serious problem of the young rebellious teaming up with older factions of ousted politicians. The difference in severity of the condition, depending on the confusion coming on in the waking state or when sleeping could be a nod to Heraclitus, and here have a connection to the difference between the private and the public sphere or arena for discussion. Heraclitus' fragment DK 89 says: "For the waking there is one common world, but when asleep each person turns away to a private one." [18] Forceful and bitter arguments, going at least partly against natural[19] gradual peaceful political changes through persuasion which take place in the public sphere where we are awake in a common world, are a bigger threat to the city and more difficult to shake off than if it is confined to private conversation.

Timaeus' nosology follows a head-to-toe direction, if we may judge from the order in which the elements and their 'regions' and functions within the body are narrated. In the last part we had air, and now the problems with fire and blood take the stage. In Timaeus' cosmos, at both macro- and micro cosmic levels, mixture is the hallmark of life and gives the character and function of each 'place'. Therefore the nosology segments are mostly about what different mixtures, depending on the ratios of their ingredients, will cause and how different circumstances will lead to different outcomes. It is only at the end of this that Timaeus adds a few lines about

[17] That is the βια in διαβιαζόμενον (84d6) "forcing itself through".
[18] Translation McKirahan, second edition , 2010, p. 112.
[19] "Natural" in the sense of following the divinely established movement of elements and change in the cosmos.

each element per se. This he does only in the event of the excess of each, which again, is a disturbance of the ratio of the elements in the body. Timaeus keeps to the theory by, in the case of excess of water and of earth, explaining the duration of the fever as a function of the relative sluggishness of these elements, compared with each other and with fire and air. This short summary about excess of the elements and the characteristic duration of fevers caused by each does not need to be in any direct "connection to the previous descriptions of disease due to bile"[20]. It is a summary of excess of the main elements, and it marks of the section of diseases mainly concerned with the body as opposed to soul.

Following the head-to-toe exposition, diseases associated with fire follow (85b1- 86a2) after the problems associated with air. Again, there is the possible prospect of venting these problems and the more dire prospects if they get pent up inside. In the physiology, fire is instrumental in both digestion and distribution of nutrition and in the part of nosology concerned with tissue and formation of the humours, fire is mostly associated with various kinds of bile. From 85b-86a2 we get a fuller version of fire and bile related diseases. These are diseases and conditions of the two lower regions of fire and water, of chest and belly, although of course, if these conditions get out of hand, they will threaten the life of the living unit or being (85e4-7), by consuming marrow and 'unloosing the soul from its moorings' (85e4-7). The mixture under discussion is that of bile into blood, but the effect on one particular natural factor in the blood is the critical link to further explanation. This factor is the fibrin, a moderator of thickness and thinness in the bloodstream. The rules described for the inter-transformation of elements apply to the extent they describe mixing or coming together of substances with opposite qualities. The main rule is the ratio of quantity; bigger portions win over smaller ones. The other

[20] Cornford makes the comment, on p. 343 that: "This last paragraph on fevers has no connection with the previous description of diseases due to bile." Cornford's reference to 82a is understandable but mistaken. At 82a Timaeus gives an overview which he then fills in with more details in the following segments. Our paragraph at 86a is a summary regarding fevers and the four elements, and as such it rounds of this section with a nice symmetry in scope.

principle invoked for explanation of problems or diseases here is the permeability of tissues. This has already been shown to play a very important part in keeping elements sufficiently separated while at the same time allowing the natural movement of air and fire particularly, through tissues of water and earth. The fibres in the blood stream could well represent the moderate, slightly inert part of the population of young men getting engaged in the politics of the city and therefore up to a point able to defuse the effect of inciting factions on others in the same social layer. It might be of interest to compare Timaeus' characterisation of the fibres with his theory for hair. Besides similar physical description, both have a protective function through their ability to moderate and therefore reduce the risk of devastating extremes, hair in hot and cold, fibres in runniness or viscosity of blood, which will have its counterpart in sluggishness and rashness in problems of the soul. However a further investigation into this will also have to wait for another occasion.

Summary of Bodily Disease

Towards the end of this segment I have suggested that reference to city politics could be one way of trying to make sense of Timaeus bodily nosology. I argue that this is one way to think about it and that in the words of both Socrates and Critias in the first part of the *Timaeus*, we have ample justification for applying this approach, albeit with caution. Timaeus is not, at least not just, discussing a caste system like the Egyptian one, which Cornford rightly mentions in his footnote 1 on p. 17. In the initial exchanges at *Timaeus* 17c1-18a2, Socrates seems to refer to a class system and to refer to the *Republic*. However, Sarah Broadie warns us in her arguments for why she limits her textual evidence to the *Timaeus-Critias*, or to "examining the *Timaeus-Critias* solely from within," and hence abstaining from attempts "to establish any features of the Timaean account by inference from trends of Plato's thought appearing in other dialogues or other late dialogues." It is a problem that, "such inferences require decisions on difficult and often indeed scarcely decidable questions."[21] So I reiterate; the use I suggest that we make of these opening lines lies not in taking up or referring to discussions in other dialogues, but to accepting these

[21] S. Broadie, 2012, p. 5-6. Here I have included only excerpts from her argument which should be read in whole, for a fuller appreciation of the problems Broadie warns us of.

very lines as a part of the *Timaeus* and including them in our attempts to understand it. Plato undeniably invites us to contemplate that these are references, but as such, if they are references, they are very selective and in the form of conclusions rather than arguments of any kind. They belong to a part which I have argued serves as containing metaphysical standpoints of the group; standpoints which will, or were offered in order to serve as hypothesis in each of the three parts of the heralded trilogy. Perhaps an analogy can be drawn from the elemental theory in the *Timaeus* compared to that of Empedocles[22]. Plato's invention of the triangle level of analysis, and his distinction between the structure and the power of an element opens up a new world of possibilities applied and explored in the *Timaeus*. Timaeus is quite clear, even harshly so, on the difference between the Empedocles' type of elemental theory and his own, with a view to the need and potential for causal explanation, at 48b5-c2. It is on the new theory and its application in the *Timaeus* that I want to focus. My aim is to understand how, using also the points reviewed by Socrates from the previous speech, this new version of elemental theory can better address the problems discussed and can as it is on what Socrates says specifically in the introductory conversations about his previous speech, and can do so in the biological framework of becoming, being and perishing.

The *Timaeus* is a cosmogony and cosmology of a *living* world. Movement and function, the hallmarks of life, govern the theory. It is the side of firstly "giving to each man, one craft for which he naturally fitted," (17c10-d1, Cornford) and secondly the education or rather how to care for them [*throphe*] (18a9). The discussion about procreation, examination and the placement of children is a part which even Socrates admits is odd. It is here that we should recall Timaeus' harsh critique of previous elemental theories, for claiming to reach deeper in their depiction of divisibility than they actually do. Timaeus' level of triangles is new and revolutionary and allows him to dig deeper into the problem of change amidst relative stability. In the political parallel, this means going beyond class or cast and looking at the individual and what drives him, namely desires and intellectual

[22] The honour goes to Empedocles, for he is probably the thinker who most firmly established the four elements of air, fire, water and earth, although all had been around for some time.

capabilities. My suggestion is that Socrates' mention of children in the *Timaeus* is a look at them as the bloodstream of society, from which society is to be nourished and maintained by placing individuals where they are best fitted for the task, not based on family or other circumstances irrelevant to the merits of the individual. Public education and open discussion should replace education and politics as the privilege of the few, inherited without regard to ability. However, such a grand view might be accused of ignoring what the text seems to say about eugenics and the historical fact that education was for the well off. The only education Socrates mentions in the introduction is the education of the guardians, from a pool of the best breed. We shall look more closely at this in the next section on the diseases of the soul.

Diseases of the Soul

In Socrates' "review" the only education, care or rearing mentioned was that of the guardians, mentioned at 18a9-b8, while at 19a-5 we learn about the selection of children to be so cared for. The rest of society consists of "farmers and craftsmen" (17c6-8) separated of from the defenders or guardians of the city. The diseases of the body (81e-86a), I submit, refer mainly to 'farmers and craftsmen' of the living being, the organisation and execution of bodily functions from the point of view of the elemental theory. These diseases are also problems in the interaction between the emotive soul and other parts of the soul. The rules of elemental transformation and in particular inter-transformation of the three elements of air, fire and water have been used in conjunction with the notion of mixture and with the explanatory pair of excess and deficiency.

Are there parallels between the four-element theory and the psychology of the *Timaeus*? Yes, there are; firstly the souls, like the elements are four in number, counting the reproductive soul, though this is the least and last discussed in the *Timaeus*. Secondly, there is an interaction between different souls and they form a unity, although, like the elements, they must be kept in the right sequential order and at a suitable distance from one another. This is best seen by analogy with the cosmic regions of the four elements and the movement between them. At 53a2-7 we are told how the movements of the receptacle "separated the most unlike kinds farthest apart from one another, and thrust the most alike closest together; whereby the different

regions came to have different regions." (Transl. Cornford). Although this description is of a pre-cosmic state, the rationale for why there are four elements and in the sequence they are given, applies to it. The outcome of that mathematical argument is given at 32b3-8:

> Accordingly the god set water and air between fire and earth, and made them, so far as was possible, proportional to one another, so that as fire is to air, so is air to water, and as air is to water, so water is to earth, and thus he bound together the frame of a world visible and tangible.

After describing the rules for transformation of the elements, Timaeus points out at 57c2-6 that there is a movement of elements between regions, or rather that it is a part and consequence of elemental transformation that 'portions of elements become unlike themselves and like other' and that the shaking of the receptacle will move or bring these changed 'portions' towards the region dominated by the 'other' kin or kind, into which the portion has now changed. For the elements of fire and water, this picture shows *two* boundaries where such changes and exchanges take place; for fire these are with air on the one side and water at the other, for water, fire is on one side and earth on the other. Analogously the emotive soul has the rational soul on one side and the nutritive soul on the other. We know from 70a2-7 that the emotive soul, specifically said to have two attributes, manliness and ambition, is placed between the rational soul and the nutritive one so that it could be influenced by one and itself influence the other. In the divine plan the flow of influence is from reason in the head through the ambition of the emotive soul (for it can listen to reason) and by the emotive soul's ability to use force on the nutritive soul, so reason's influence on emotion should affect the nutritive soul.[23] Since everything in the cosmos can move in both directions there is no reason to think that mixture or influence between souls cannot move from the lowest to the highest. Indeed this is so and this is how diseases in the soul come about. However, there are also important differences between elemental movement and the souls. Souls, in the sense of immortal soul and

[23] My interpretation of the dynamics of the soul and between its parts seems to me to have much in common with David Snider's interpretation of the dynamics of the Divided Line in the *Republic*. Snider refers (p. 348) to J.A Notopoulos' 1936 article "Movement in the Divided Line of Plato's *Republic*"in Harvard Studies in Classical Philology, vol. 47 (1936) pp.57-83. See Snider in *Rivista De Study Classici* . Discussing the Divided Line here, would bring on a discussion about the *Republic*, which I cannot undertake here.

the different parts of the mortal soul, or portions of them, do not change into each other. The dynamics of their coming together and influencing each other is rather that of a mixture in which relative strength will determine the dominant characteristic of the mixture. Anything which weakens or distorts the regularity of the circular movements of the rational soul thereby diminishes its ability to regulate the linear movements of the irrational mortal soul. Even within the emotive soul 'courage' or manliness disproportionate to the ambition could diminish the influence of reason, hence affecting both the emotive soul and the nutritive soul and all the functions they drive and govern in the body. It is therefore the relative strength of the souls which determines the quality and efficiency of the whole.[24]

At 86b2-3 Timaeus opens the discussion by saying that folly or mindlessness, [ἄνοια] must be granted to be a disease of the soul. What can this mean? The Rational soul, from which the other souls are sprung and under which they ultimately serve, is the vehicle of reason into the material realm. It is the link that Socrates in the *Phaedo* could not find between cosmic reason and rationality in nature and human actions. It is also the bringer of life and when it leaves the body it marks death. 'Folly' is therefore a relative term. However, it signals mindlessness to be absence of mindfulness, as bad as is absence of good in the *Timaeus*.[25]

Mindlessness or folly is, in essence, an extreme, but as reason is a kind of motion, there are two possible extremes, too-fast motion and too-slow motion. We saw a similar argument concerning excess or deficiency of fibres in the blood, leading to too runny or too sluggish blood. The too runny blood could leak out through the walls which would normally keep it in place (85c5-6). At 86c3-7, too watery seed, escaping through porous bone walls (86d3-4), explains excessive sexual behaviour. Both are examples of a physical version of *akrasia* (86d6) or incontinence, and explaining the latter example Timaeus, at 86d7-e3 repeats the well-known Socratic dictum that no one willingly does bad. It is the excess of either of the pair of

[24]The fourth soul, the reproductive is not involved in the day to day cycle of tasks, but in a way somewhat similar to the element earth, is more connected to long term preservation, earth in the construction of bone which guards the marrow and the reproductive soul in preserving the kind by planting its seed.

[25] There is no theory of an active cause of bad, in the *Timaeus*. In that absence, and judging from causal arguments in the *Timaeus*, bad comes about as a result of mismanagement, not of intention.

opposites, pleasure or pain, which cause folly or mindlessness. Pleasure and pain are affections and in this sense, bodily or dependent on perception which is dependent on the elements. It is the ability of the soul to desire and to enjoy and to fear that is what must be kept in the right balance. Pleasure and pain can serve reason, as we see from how reason, through the emotive soul, directly affects the speechless, non-rational nutritive soul, (71a3-71e2). But pleasures and pains are themselves instrumental and not rational, not real causes. This, I argue, is what Timaeus is emphasising at 69d1-2, when he says that pleasure is the strongest lure or bait of evil and pains take flight from good. Pleasures and pains are not inherently good or bad, but they are the strongest instrumental factors in cases where things which should be under the control of reason go wrong, and this is what we are now explaining. The problem of incontinence or *akrasia*, mentioned above, seems to be a problem of madness [*mania*]; the problem is "immoderate haste" (86c1), and "frenzy" (86c2) which seemingly blocks the mortal soul's connection with the rational part. The senses of seeing and hearing are specially mentioned in line 86c2, and these connect, vision the rational soul with the world soul and hearing the emotive soul with human rational soul. A.E. Taylor makes the interesting remark (p. 499) that including pleasure in the great forces distracting man from virtue is something Plato in the *Laws* 633c and 635a criticises the Spartans for missing out on, as they emphasize training in enduring pain. The remark reminds us that Timaeus is objecting to simple hedonism, as well as endorsing reflection in times of pain. Cornford translates 86c2-3 as: "he is in a frenzy and his capacity for reasoning is then at his lowest."[26] It is strictly speaking not the capacity of reasoning which is diminished, such a description would be better placed with "dullness and oblivion", at 87a7, which is a description of the effects of malignant humours on the function of the rational part of the human soul, closing the description of problems of the soul caused by bodily conditions. At 86c2-3 it is the connection between the mortal soul and the immortal, rational soul which is severed or severely hampered by the lure of pleasure, leading to rashness. A detail from the construction of the human body at 73a 4-8 shows this clearly; the gods use the mechanical solution of winding the intestine round in coils to slow down the

[26] λυττᾷ δὲ καὶ λογισμοῦ μετασχεῖν ἥκιστα τότε δὴ δυνατός.

thoroughfare of nutrition, for otherwise insatiability would "render all mankind incapable, through gluttony, of all cultivation and philosophy, *deaf* to the command of the divinest part of our nature."[27]

In the short summary on how pains affect human behaviour in adverse way, Timaeus keeps to the kind of explanation already given for epilepsy at 85a5-b2, and which is consistent with the problems of the soul right after birth and during the most rapid growth, (43a6-d2). It is through polluting the air around the soul, or rather by malign humours mixing with air so as to form vapours, which "making their way to the three seats of the soul" (87a2-4, transl. Cornford) that the movement of the soul is disturbed. This is not a mixing or blending of elements, for soul is not made up of any of the four elements which make up the humours. The causal interaction is purely mechanical[28]. The outcome in terms of symptoms or observable consequences depend on what part of the human soul is perturbed and Timaeus' description starts at the bottom, ending at the top; ill-temper and despondency are the lowest and represent the appetitive soul; rashness and cowardice are the problems or excess and deficiency in the emotive soul, and forgetfulness [λήθη] and dullness [δυσθυμία] of the rational soul.[29]

Until now, Timaeus has been speaking about the micro-cosmos of the human body. However, we are again reminded of the body of the city, of society of man, of which the individual is but a part, and on which he is dependent for nurture and never more so than in his formative years. Recall that when the demiurge mixed the rational soul of man (41d4-7), from which, or in addition to which, the lesser gods make the mortal soul (69c5-8), the demiurge blends it in 'somewhat the same way as the world soul, from leftovers of the ingredients but of lesser purity, second or third grade' (42d6-7). This accounts for the different quality or strength of human souls,

---

[27] Translation Cornford. Italics are mine for emphasis and a reminder that the emotive soul can, under normal circumstances listen to the deliberations of the rational soul.

[28] Another example of the interplay of movement and the matter in or on which it is exercises in the example of the wax table as a metaphor for memory in the *Theaetetus* 190e-195b.

[29] Cornford translates the last pair as "dullness and oblivion" which I find misleading. In the *Theaetetus* 194e3-4 Socrates explains the condition in some of being fast learners but also quick to forget, as due to softness of the wax and those who are slow and imprecise in their learning as having a table of wax which is impure and hard. I take the pair in *Timaeus* 87a7 to be the same as discussed in the *Theaetetus* 194e3-4.

undeniable on observing the human condition. However, just as forming society can be aimed at pulling together our resources for material survival[30] of food and shelter, what passes for a soul in the city, its governing principle, the constitution, should be the means whereby those with a better or stronger natural constitution or soul come to their fellow citizens' aid. Apparently, just as individuals can be less fortunate with their souls, so can cities.[31] Thus, if individuals who have weak souls are also stuck[32] in cities which have weak or bad governance, their misfortune is doubled. The way in which a city can fail its weakly constituted citizen again alludes to the emotive soul and the rational soul, because the first type of failure is bad speeches in public or private, which the citizens *hear* and the second type of failure is lack of study, the rational activity which would strengthen the movements of the rational immortal soul and help it withstand the disturbance from the polluted fumes which have invaded its dwellings. Yet Timaeus cannot leave it quite there, because having reiterated (at 87b4-6) that the individual is not to blame but rather his begetters and nurturers, he must exhort on both levels; the individual and the city, that each seek to strengthen his rational principle through study. The segment therefore ends on a teleological reminder to persuade them to understand and assimilate to what is good and best, as this will provide escape from what is bad.

---

[30] This is Socrates' theory for why societies were formed, expressed at the *Republic* 369b5-8: "I think a city comes to be because none of us is self-sufficient, but we all need many things. Do you think that a city is founded on any other principle? No." Transl. Grube and Reeve in Cooper, ed. *Plato Complete Works*.

[31] Which is presumably why seeing cities compete and comparing them is a worthwhile thing, as the outcome is an indicator of the quality of their constitution. See 19c.

[32] ὅταν οὕτως κακῶς παγέντων πολιτεῖαι κακαὶ καὶ λόγοι κατὰ πόλεις ἰδίᾳ τε καὶ δημοσίᾳ λεχθῶσιν, ἔτι δὲ μαθήματα μηδαμῇ τούτων ἰατικὰ ἐκ νέων μανθάνηται, ταύτῃ κακοὶ πάντες οἱ κακοὶ διὰ δύο ἀκουσιώτατα γιγνόμεθα·87a7-b4. Cornford translates παγέντων as "dwell" which seems to me to give a too transient situation. Plato makes much of Socrates' hardly ever leaving the city in the *Crito* 52b-c, which the laws, in their imaginary speech interpret as Socrates commitment to them, and Socrates in the *Timaeus* 19e2-8 dismisses the sophists from the task at hand, seemingly mainly for their life of wandering from city to city, implying that their art of persuasion lacks the direction of real commitment to any one constitution or 'place'. In the above quotation Timaeus is not speaking of people who are passing through but who are a life-long part of the city they live in. This also ties in with Plato's frequent use of the military terminology of standing ones ground or remaining in post as a commendable virtue.

Summary of Diseases of the Soul

The human soul is divided and ordered into a dynamic hierarchy, which means that the direction of influence matters. The structure of this hierarchy is analogous to that of the elemental realm and aligned with it. As an administrative structure, information is meant to flow in one direction and decisions in the other. When this is reversed at any or all levels, problems ensue. When what happens follows the right natural sequence, including in the temporal sense, it is pleasant; when it goes against this it is painful. The ultimate example of this is death, which if premature is painful, and if at the end of a natural life-span "is accompanied rather by pleasure than by pain." (81e5). The wording of that something - *a rather than b* - is compatible with the conception of mixtures or blends that are more one than the other of their ingredients. Natural death "is of all deaths least distressing, and is accompanied rather by pleasure than by pain." (ibid). With comparative terms, Timaeus says that even natural death has a portion of distress in it but is overwhelmingly, or more than the opposite, pleasant.

The human soul is composed of an immortal and a mortal part and their problems differ. The mortal parts contain tricky[33] but necessary affections (69c). These are in pairs of opposites which take on different guise or have different subjects, depending on which part of the mortal soul they are in. The danger with all of them is that if unrestricted each can lead to excess or deficiency, which threatens the necessary balance of changes and can even lead to the direction of natural changes to be turned round to its opposite. At 69d4-6 the reproductive soul is acknowledged, and the problems related to it are a part of the nosology (8gb-e) although its nature and relevant anatomy is not described until after the part on diseases, at 90e. This is not a unique problem in the *Timaeus*, for at 34b10-c2 Timaeus explicitly says that the order of exposition does not reflect the order in seniority and the authority which comes with it. At 34c2-4 he explains this by there

[33] 'Tricky' might not be a translations to everyone's liking, but what I want to express is that having these affections is instrumentally powerful, for they drive the individual to seek all that is biologically necessary for maintaining life in cosmos, but as mortal soul on its own does not have the teleological direction of divine reason it's efficiency is also a potential threat. It is however necessary.

being much with us which partakes of the random and that its image appears in our reasoning.

Soul as an administrative part of the union of body and soul drives and directs motion. Its problems conceived as excess and deficiency in motion towards or away from the objects the diverse parts of human soul naturally deal with are described in terms of motion. Since the soul has four parts, including the reproductive one, and each has at least one pair of opposites, (the emotive soul in fact has two, one for each of the upper and lower layer), this makes for a complicated, picture. It is nevertheless systematic and coherent and analogous with the movement of the elements in cosmos.

Returning to the Bigger Picture of the Union

After detailing how to analyse health problems, Timaeus returns to the teleological premise that considering how things are good and best[34] is the proper object of study, thus how to keep both parts of the union healthy is our next subject. This part is also the final or closing part of the argument of natural philosophy begun at *Timaeus* 69a6. The topic of the differentiation of the sexes and diversification of fauna are not connected to the elemental theory, but are preparations for the sequel dialogues[35] and are given in a different, abbreviated form. This is a move similar to the one made in the *Phaedo* 107c, where Socrates starts to tell the myth about the afterlife of the soul in Hades in preparation for the discussion in the *Timaeus*.

There is a problem involved with drawing the bigger picture of the relationship between the rational soul and the body. The rational soul is invisible and the discussion will have to include aspects that are beyond language and the kind of reasoning which is dependent on it. A.E. Taylor, Cornford and Zeyl all miss the point

[34] At the *Phaedo* 97c2-d1Socrates declares his belief that if intelligence arranges everything, it would arrange it in the best possible way, and consequently that in trying to understand the cause or reasons for anything one should always look for how it would be best arranged.

[35] The nature and relevance of the problems of bad political constitutions of cities and lack of appropriate education is made clear at 87a7-b9, and deferred to another discussion. At 90e1-e6 Timaeus declares that he has pretty much completed his assignment, arguing that what is still missing is comparatively small part and therefore a comparatively short account for it would preserve right proportions, and indeed that the subject *must* be treated briefly, διὰ βραχέων ἐπιμνηστέον, (90e3-4).

of 87c7-d1: τὰ δὲ κυριώτατα καὶ μέγιστα ἀλογίστως ἔχομεν. This is not a statement that says 'we do not grasp the most important and decisive proportions *at all*'. It merely says that the way in which we grasp them is not the way, form or nature of the reasoning which proceeds from language. It is a point about logic and reasoning, not an epistemological statement. Plato uses the word ἀλογος at the *Apology* 37c and the *Republic* 493d in this same logical way; that it would be a strange *argument* or *reasoning*, if he were to say certain things. Therefore Cornford's: "escape our reckoning," and Zeyl's: "we are unable to figure out," import an epistemological statement which simply is not in the text and throws its argument into disarray. Taylor[36], obsessed with the Pythagorean interpretation, argues that the problem is the "greater number of terms," needed for the expression of these ratios and the "much higher integers," which is why "we have not succeeded in working the sum" (ἀλογίστως ἔχομεν). I argue that Plato is lining the end of Timaeus' discourse up with its beginning at 27d5-28a4. At 27d5, Timaeus declares his own epistemological commitment to the Theory of Forms.[37] The main thing is the division and distinction between "that which is always real and has no becoming, and that which is always becoming and never real."[38] The first, says Timaeus, is "embraced by mind involving reasoning"[39]; τὸ μὲν δὴ νοήσει μετὰ λόγου περιληπτόν. The emphasis is clearly on mind or reason as that with or by which (instrumental dative) we embrace the real and ever-being, although some sort of reasoning is involved. That there is, in the *Timaeus*, some sort of reasoning going on at the highest human level, and for that matter at the cosmic level, on which the human mind is modelled, is evident from 70a2-7, particularly 70a4-5, where the emotive soul is said to be placed near the head so "that it might be within hearing distance of the discourse of reason,". What kind of reasoning it is and what resources do we have, given the constraints Plato places in

[36] A.E. Taylor, p 621
[37] This is not the place to discuss the Theory of Forms and its alleged development. Timaeus states here what he needs, and that is all we need to read and interpret the *Timaeus*.
[38] 27d6-28a1, transl. Cornford.
[39] My attempt at translating this difficult and important text. TLG gives a reference to precisely this line and Liddell and Scott translation given there is: "Things mentally comprehended." That seems to me to avoid interpreting the part logos plays in the sentence.

the *Timaeus* by keeping Socrates silent after the initial recollection of a few metaphysical principles, which Timaeus accepts and uses as hypotheses?[40]

We must look at what Timaeus says. We know that the rational soul consists of the same and the different; hence it is a dual thing capable of interaction, a kind of discourse[41]. We also know that the emotive soul is shown only as capable of listening in on the discourse of reason, not partaking of it.[42] We also know that in addition to the discourse of reason, the force [βία] [43]of the emotive soul is needed to enforce the commands of reason upon the nutritive soul, in cases when it does not obey. It is significant, I submit, that the reaction of the emotive soul is described in terms of emotion, not an assent unavoidable because of the logical rigour of what it hears. This interpretation is in line with the emphasis on persuasion and consent in the demiurge's dealings with the content of the receptacle. [44]

Unlike the lesser ratios, those which we can embrace by sense-perception, the most important ratio, that between our mind and our body, we cannot fathom because the mind does not permit being grasped by sense-perception[45], it is not made out of the four elements, but construed with a view to the forms and by geometrical and numerical manipulation. This is the problem which Timaeus seeks to solve by mathematical extension through a rule of ratios governing things beyond sense-

---

[40] On my interpretation Timaeus uses hypothesis as unproven starting points and does not try or aim at proving them. That these hypotheses have been discussed is obvious from the 'review' of points from yesterday's discussion. The commitment of every member of the group is made clear. Timaeus also starts his own account on these and draws the distinction between them and the conclusions he argues for in his speech, at 29b.

[41] See *Timaeus* 37a-c.

[42] At 27c4-d4 is the very beginning of Timaeus' speech. Cornford, p 21 comments in footnote 1 on c7-d1ἑπομένως δὲ ἡμῖν εἰπεῖν, quoting Proclus as having understood this as 'and consequently sufficient for us'. I understand him to be interpreting Timaeus as saying that if the account he is about to give is good enough for the gods it will be good enough for Timaeus and his friends. This segment merits much closer scrutiny than I can undertake here, for it sets, I believe, the four epistemological and logical levels of the dialogue, (and the trilogy) and pins them to Socrates, Timaeus, Critias and Hermocrates.

[43] ἵνα τοῦ λόγου κατήκοον ὂν κοινῇ μετ' ἐκείνου βίᾳ τὸ τῶν ἐπιθυμιῶν κατέχοι γένος, ὁπότ' ἐκ τῆς ἀκροπόλεως τῷ τ' ἐπιτάγματι καὶ λόγῳ μηδαμῇ πείθεσθαι ἑκὸν ἐθέλοι· 70a4-7.

[44] It also recalls the limits Simmias at the *Phaedo* 107a8-b3 draws up for the power of Socrates' preceding arguments, and which Socrates at 107b4-9 endorses and accentuates.

[45] *Timaeus* 36e5-37a2; "Now the body of the heaven has been created visible; but she is invisible, and, as a soul having part in reason and harmony, is the best of things brought into being by the most excellent of things intelligible and eternal." Transl. Cornford.

perception. In order to keep within the text of the *Timaeus* [46] we can pursue two lines; firstly Cornford's interpretation that Plato's harmonies of the soul are geometrical and governed by concerns for arithmetic and physics rather than music,[47] and secondly by assuming that Timaeus' arguments for why there had to be four elements is meant to reflect the otherwise invisible realm of soul and its division. I will not repeat Cornford's arguments for the physics approach but accept them, not least because of the obvious emphasis on physical nature, first in Solon's story from Egypt and then in Timaeus' theory of the four elements. In the arguments Timaeus gives for why there are four elements (31b4-32c4) he sacrifices parsimony in number of elements for parsimony in number of rules governing their relationship. The argument starts from the necessity of including the third 'thing' in order to form bonds between two things. These bonds are such that if the order is preserved in their alignment then the relationship between any two numbers remains the same, no matter in which 'direction' they are described, up or down or left to right. All the numbers "come to play the same part towards one another, and by so doing they will all make a unity." (32a4-7, transl. Cornford). The fact that in the physical world two means are needed does not change the nature of the ratios between the parts, preserved over the whole range and in both directions. One rule about proportions makes a four-way division of a whole harmonious. This is the closest one can get to unity between parts, in a similar way as circular movement in one place is the closest one can get to no change or dislocation and yet allow movement. The rule about the elemental relationship is also circular in a way, which is necessary if it is to describe a relationship between elements which interchange in an everlasting cyclical fashion.

The upshot for the problem of observing the right ratio between the body and the invisible immortal soul is that the ratio between the mortal and immortal soul can be observed by the ratio between the two mortal souls, as reflected in bodily functions. From these ratios, the condition of the immortal human soul can be deduced. Thus, using the rule that in terms of organisational hierarchy we can suggest that what the nutritive soul is to the emotive, so the emotive soul is to the

[46] As opposed to invoking the Divided Line from the *Republic*, which undeniably springs to mind.
[47] See Cornford's arguments on pp. 66-68.

rational, we can see signs of excess or deficiency in the bodily and physical functions that each soul is to govern. From that we can conclude about the relationship between the soul in charge of these functions and the relationship between that soul and the soul physically and with regard to rational organisational power and status above it.

The ratio between the rational human soul and the world-soul is that which gives the human rational soul its value and weight in relation to the mortal soul.[48] It is the latter relationship or ratio which we can see reflected in human movement of various kinds, whether physical or mental, which is why Timaeus describes mental attributes in terms of quality and quantity of movement. This is what Timaeus calls 'the living creature as a whole and its bodily parts' at 89d2. Timaeus actually refers to natural ratios in the size of body parts, and aesthetic and functional calamities of disproportion, mostly in terms of excessive or deficient movements, (87e1-e6).

We now go back to the problem of how to observe and tend to the most important proportions; those between the visible body and invisible soul (87d1-3). The solution is to interpret the quality of movement in what we see, namely the living, moving animal which is combined of body and soul. Now recall that in discussing ratios, Timaeus at 31b8-c2, stressed the necessity of having the third thing to combine two. In the human combination of body and mind, the emotive soul is in this position, as was so evident from its role in the physiology. This, I argue, is the soul discussed at 87e6 τε ἐν αὐτῷ ψυχὴ. The argument is not straightforward, but in two parts. Firstly the wording at 87e6 is very similar to the wording at 69c7; "in it another form of soul" ἄλλο τε εἶδος ἐν αὐτῷ ψυχῆς. Now it is clear that at 69c7-8 Timaeus is speaking about the entire mortal soul, τὸ θνητόν (69e7), which has two parts, the nutritive and the emotive. Why do I then suggest that at 87e6 Timaeus is speaking about only the emotive soul? The reason is it is the middle part, that thing in between the nutritive soul on the one side and rational, immortal human soul, on the other. Yet it is not a thing wholly separated from the nutritive soul and the rational, as an intervertebral disc is separated from the two vertebrae it joins. To some extent these get mixed and influence each other, just as in the division of the

[48] This is why care of the rational soul is treated specially at 89d2-90d7.

cosmic elements into homogeneous regions there are layers or zones where 'potions' of elements change into portions of different elements and are therefore carried by the cosmic laws of motion in the direction of regions towards which they had not been moving before changing, (see 57c and discussion above.). This is why the description of the excesses and deficiencies is so confusing, unless one applies the dynamic interpretation of the movements of the soul, the interpretation that the souls actually mix[49] to some extent and the direction and the extent of this mixing determines the outcome of their administration.

At 87e6, Timaeus starts the soul-body comparison, after discussing the aesthetic and functional consequences of the disproportional size of body parts. Cornford translates 87e6-88a1: ὅταν τε ἐν αὐτῷ ψυχὴ κρείττων οὖσα σώματος περιθύμως ἴσχῃ as "when the soul is *too* strong for the body, and of ardent temperament." Strictly speaking, there is only a comparative here, the soul is stronger than the body, which may be *too* strong compared to the ideal ratio, but is not too strong in an absolute sense, so Cornford loses the comparative, which Zeyl observes: "When within there is a soul more powerful than the body, *and this soul gets excited*."[50] The latter part, however, comes through in Cornford's translation as the enduring condition of the mortal soul, in this case, that it holds relatively high proportion of enthusiasm or θύμως. In Zeyl's translation, this condition looks like a much more transient state; something which happens occasionally to the soul in question. The meaning I am arguing for is: "When the living creature has in it [a] soul that is stronger than the body, and whenever this soul happens to be overly enthusiastic…" the living creature has problems of excess and deficiency, a disproportion which leads to manifest excess and deficiency, according to the rule that like causes like. These problems are rising from within (88a2)[51], for the soul starts and demands more and stronger movements within the body than the body can sustain. Included in that is the problem that the body cannot absorb or cushion the

[49] This is a minority view, as I have already marked in my reference to an article by Snider; *On the Structure Of the Republic VI*.
[50] Italics mine for emphasis.
[51] See the *Timaeus*17d3-4 on the two possible origins of threats to the city, internal and external.

heat and strength of movement, as sufficiently strong lungs would absorb the pounding and the heat coming from around the heart (70c1-d6).

The language and imagery used to describe the problems in 88a is of two spheres, elemental-physical and psycho-physical on the one hand, and city politics and study, on the other. The emotive soul or the emotive aspect (88a) of the human soul seems to take centre stage. Fire and burning (διάπυρον 88a5) are the main elemental involvement, which agrees with 83a7, for example, about long exposure to burning, with the innate heat as a factor in producing malign humours or streams in the body. Mentioning humours is Timaeus way into commenting on the mistaken medical epistemology which relies only on the material and perhaps humoral conception for its causal analysis and excludes soul, "laying the blame on the unoffending part."(88a7). The 'unoffending part' in this case would be the body, which suffers the consequences of relatively too strong a soul. But which soul is at fault? Answering that question in an anywhere near sufficient way is a huge task. The sketch towards an answer which I draft here will read like a digression. At its core is a view of the psychology of the *Timaeus* which is dynamic in a way of seeing the functions of the souls, or parts of souls, as blending across the 'borders' with its neighbour. The rational/immortal human soul is in the cranium, yet it can correct itself by looking to the movements of the world soul in the heavens. The emotive soul is in the chest, but it can listen to reason and be aroused by it. In the physiology, air and blood share the veins and push each other back and forth along them. These are dynamic images.

The language of 88a is city-political and epistemic at the same time; study, research, (μαθήσεις καὶ ζητήσεις), teaching and controversy in words or arguments (διδαχάς τ' αὖ καὶ μάχας ἐν λόγοις), in public an in private (ποιουμένη δημοσίᾳ καὶ ἰδίᾳ), of war and love of victory (δι' ἐρίδων καὶ φιλονικίας), (88a2-5). These are all activities which, in themselves are positive and which Socrates wants to see their city perform (19c), and which are acknowledged by Timaeus as important to get right at 87a7-b9. The problem here is that the body - the structure, the tissues and organs - are not strong enough to contain and accommodate this level of soul-activity. It is in a way the opposite of the situation straight after birth, when the activity of the body

impinged upon and disturbed the circular movement of the rational soul. Only now the excessive activity is in the soul.

There is another definite distinction here, the kind or level of rationality is mainly that of the emotive soul. The *forcefulness* with which all this study, seeking and teaching in public and private is done, and the *inflaming* and racking of fabrics is through war and love of victory. This, in political terms, is a reference to eristic argumentation, which is contrasted with persuasion. In the *Timaeus*, there is a statement about the use of persuasion at 48a2-5.[52] Cornford rightly says that "the opening paragraph [47e3-48b3] is of fundamental importance for the understanding of the whole discourse," adding words about Reason and Necessity and "how they *co-operate*[53] to produce the physical world." Yet, Cornford translates ἄρχοντος (48a2) as "overruled," which I find a strange beginning for co-operation. A.E. Taylor[54] does not provide a translation but sees in this an 'obvious' example of his favourite conception of the advance of empirical science. Zeyl translates; "Intellect prevailed over Necessity," which is still closer to the sense of fight than consent.

How should we translate ἄρχοντος without violating the sense of consent which is so important to these lines? Perhaps there is help in what Timaeus later calls the demiurge and the receptacle and cosmos in biological terms of sexual propagation, namely father mother and child, at 50d2-4[55]. Casting this in terms of biology and of sexual propagation here may most obviously serve the difficult task of explaining the neutrality of the receptacle with respect of the four elements, but the importance of the nature of the act of conception is no less central, as Cornford hinted. There certainly is no image of the Forms forcing themselves in any way upon the receptacle; the union was by consent, although persuasion (48a2) was involved. The aim of the union was to establish teleological reason upon the chaotic content of the receptacle. The biological metaphor links this to the union of a young man and a

---

[52] νοῦ δὲ ἀνάγκης ἄρχοντος τῷ πείθειν αὐτὴν τῶν γιγνομένων τὰ πλεῖστα ἐπὶ τὸ βέλτιστον ἄγειν, ταύτῃ κατὰ ταῦτά τε δι' ἀνάγκης ἡττωμένης ὑπὸ πειθοῦς ἔμφρονος οὕτω κατ' ἀρχὰς συνίστατο τόδε τὸ πᾶν. *Ti.* 48a2-5.

[53] Italics are mine for emphasis.

[54] A.E. Taylor, p. 303.

[55] καὶ δὴ καὶ προσεικάσαι πρέπει τὸ μὲν δεχόμενον μητρί, τὸ δ' ὅθεν πατρί, τὴν δὲ μεταξὺ τούτων φύσιν ἐκγόνῳ,

young woman in marriage in order to beget children and maintain the population of a city. In a dialogue so laden with reference to divinity and divine causation the divinities concerned with marriage are relevant. Timaeus' words at 91d2, calling the womb a 'ploughland' ἄρουρα, echo the words with which the bride was given away: "I give you this girl for the ploughing of legitimate children."[56] The religious aspect merits a chapter, if not a study in itself. Here a brief, if bold, suggestion will have to do.

Six deities are most relevant to marriage in Ancient Greece, particularly Athens, and I will argue that they are all represented in the text of the *Timaeus*. These are, presented in pairs: Zeus and Hera, Hermes and Peitho, Aphrodite and Artemis.[57] Zeus is the father, representing the realm of Forms, not as being that realm but as bearing its (male) seed. Hera, is here Hera teleia, the receptacle *after* it has been impregnated and given birth. The transition is from Artemis, the

> venerated virgin"[58] who roamed and hunted in the wild outside the city walls, and was also the "protectress of the savage world, of all those beings - including young humans, both boys and girls - who have not yet entered the domain of the civilization.[59]

Artemis therefore encapsulates both the potential and the chaotic condition of the pre-cosmic receptacle in the *Timaeus*. [60] In this sense Hera and Artemis both represent the female part of the parental pair. The next male-female pair is that of Hermes and Peitho. Using the eternal as the paradigm for cosmos (29a1-5), the demiurge displays domains characteristic of Hermes, namely "of spatial boundaries and movements across them."[61] The demiurge can look to the Forms and make a model involving their image. In connection with marriage Hermes had two main functions; preparing "the path leading the young bride from the house of her father to

---

[56] Louise Bruit Zaidman and Pauline Schmitt Pantel, *Religion in the Ancient Greek City*, p. 68.
[57] I am not claiming complete identity between the gods and the parts in Timaeus' creation story, but rather using each deity as the main image of each. I suggest, but cannot argue for it here, that there is a similarity between how the gods were paired up, for instance Apollo and Dionysus, and the mixing of elements or the thought that no element was at any time found in entirely homogenous cluster or region, nor a part of human soul untouched by its neighbours.
[58] *Homeric Hymn to Artemis* I, see p 187 in *Religion in the Ancient Greek City*.
[59] Ibid, p. 187.
[60] How Artemis is also connected to the transition from pre-agricultural to agricultural society is also interesting in the context of the *Timaeus*.
[61] *Religion in the Ancient Greek City*, p. 188.

that of her husband," and "within marriage Hermes employed his powers of persuasion, prompting in the newly-wed bride honeyed words with which to beguile her husband."[62] Peitho also had a role in persuasion and sexual attraction, but according to Plutarch (*Mor.*138c-d, see A.C. Smith) she was "one of the divinities invoked by fiancées" (ibid). Plutarch emphasizes sexual union by persuasion as opposed to fighting and quarrelling, while Mourelatos[63]

> has suggested, the conception of *peitho* as an agreeable compulsion that was associated with erotic inducement probably underscored the development of rhetorical *peitho.*" (ibid)

Thus the pattern repeats itself; Hermes and Peitho are a male-female pair; both are causes in uniting the would-be parenting pair and Peitho is associated with non-violent coming together or unification based on mutual desire, but within formal boundaries of engagement and marriage. In this last part she differs from the erotic powers of Aphrodite, which like Archer-Hind's[64] "love that ventures all things" for the ἐπιχειρητῇ παντὸς ἔρωτι of *Timaeus* 69d4-5 operates outside the constraints of marriage. To conclude this digression into the ancient Greek mythology of the divinities of marriage; the demiurge as a cause for the becoming of cosmos has Hermes' ability to move across boundaries and hence connect them or created or lay out roads between them. In the *Timaeus*, the demiurge also employs the art of Peitho, although for the world once created to keep reproducing the kinds within it must also be equipped with erotic love closer to Aphrodite. These are some of the theological elements which might help us understand and appreciate the complexity of the *Timaeus* on the demiurge and on persuasion. Will they help us understand which part or parts of the human soul are to blame or cause the problems of the body in 87e-88b? Only if they sufficiently exhibit inter-dependence of the deities and on overlapping each other's function in a causal and explanatory chain which crosses boundaries. On this reading, the emotive soul is a recipient of wisdom at its border with the rational soul, but a provider of wisdom at its border or in its dealings with the nutritive soul. The emotive soul can be affected and affect because it comes into

[62] Ibid.
[63] Alexander Mourelatos, *The Route of Parmenides*, New Haven 1970, p. 139.
[64] Archer-Hind, R.D. (1888) *The Timaeus of Plato*, London.

contact with its neighbouring souls. In this sphere, as in the elemental, there is no void in the *Timaeus*. And where there is touching there is also blending and exchange of powers. The problem depicted in this section of the text is *hubris* in the form of mistaken epistemological authority.[65] The emotive soul has mistaken its relationhip to reason, believing itself to be a source of reason rather than its servant. It can listen to the discourse of reason (70a), understand some of its formal figures, at least enough to be moved or aroused by its *eristic* powers, since this chimes with the characters of this soul as being eager and keen on victory. It mistakes *eristic* discourse for the discourse of gentle persuasion, or rather the *eristic* part of verbal investigative discourse for the whole of it, and thereby misses out on the limits it puts on itself and the authority it claims. The emotive soul does not have the insight of Simmias in the *Phaedo* 107a2-7, and can therefore not procede using hypotheses and "follow the argument as far as a human being can follow it."[66] Socrates' promise, in the following lines of *Phaedo*, that "should this become clear, then you won't seek anything further,"(107c8-9) is repeated in the *Timaeus* at 90b6-c3, especially in c4-6: "So as[67] he always tends to the divine one keeping him, holding in good order the spirit cohabiting within himself, he stays exceptionally blessed."[68] My translation differs from Cornford's and Zeyl's. I wish to emphasise the distinction I think is well supported by the text, namely the two, not one, subjects of man's careful attendance, firstly the living god Cosmos, which holds man in the sense that man is an inner part of it, and secondly the immortal rational human soul, which here is properly called *daimon* (c5), compared with the cosmos as *theon* (c4). The love of learning (90b6) *and* sincere prudence concerning truth are two subjects or approaches, not one. The first covers, or can refer to, all kinds of study because they are all, at least in the beginning, dependent on sense-perception. Timaeus makes this clear at 47a1-b2, where he says that were it not for vision and the possibility it affords us to see the movements of the heavenly bodies, observe the changes through the year and the days which mark off the extremes and changes in direction of these changes, it would

[65] Plato here parallels Xenophon's picture of a possible *hybris* of sciences at *Memorabilia* I.I. 15-18. But unlike Xenophon, who condemns the study of cosmology Plato argues for its place in and connection to philosophy of nature.
[66] Transl, Long, in Sedley and Long, *Phaedo* 107b7-9.
[67] Meaning "so long as" or "as longs as". Man needs to keep at it in order to reap the benefits.
[68] My translation.

be impossible for us to embark on the other sciences mentioned. It is then *from* experiencing these studies that the philosophic kind of study (47b1) came. This difference between science and the kind of philosophy which tends prudently to the problem of truth, subtly as it is made on both occasions, is repeated at 90c4-6. That should come as no surprise after Timaeus' distinction between these two subjects at 29b, where he also clearly imposes on himself and his account the same kind of limits as Simmias of the *Phaedo* 107, having declared the same convictions for himself.

The interpretation of mixture and overlap and ratio of strength between the different parts of the human soul can now be seen more clearly in the shorter description of the extreme in the other direction; that is from the gut upwards at 88a7-b5. Alluding to beauty and the comparison between the relative size of body-parts at 87c3-5, Timaeus first contrasts body and soul, then moving on to the two kinds of desires, the bodily for food and the mental for wisdom, argues from a assumed self-interest governing all parts, that the bigger part, in this case the body, will pursue food and grow the flesh and hence make the mind duller[69].

Caring for the mixed being as a whole

There is, says Timaeus at 88b5-c1, but one way to safeguard against the perils of disproportion in strength between body and soul; not to move the soul without the body nor the body without the soul, in order to ensure they become equal and healthy. This is the general principle; more detail now follows. The activities or motions of soul mentioned are those of the mathematician or "one who is intensely occupied with any other *intellectual* discipline" (88c1-2). Cornford here translates *dianoia* (88c2) as intellectual, which calls for a brief comment. Timaeus is speaking of movement and study, of a body and or city in motion, doing Socrates' bidding from 19c, and a work that Socrates declares to be obvious to them all that he himself cannot perform. The intellectual activity Timaeus speaks of here is therefore firmly in the realm of inquiry into nature or natural philosophy, a likely account to refer to

[69] The precursor and perhaps physical 'arguments' for this conclusion are made in the discussion about the inverse relation between amount of flesh on the bones and the sensitivity, and hence intelligence of the part of the body under discussion and particularly the head, at 74e-75b, 75e, 76d.

29b. This interpretation is also supported by the fact that a following section of the text (89d2-90d7) addresses the rational soul in relation to or engagement with the world soul. It is also in line with the emphasis on the emotive soul as the main physiological mover within the body, which connects it to the elemental theory. This allows Timaeus to apply all that he has said about the natural motion of elements in the universe, their natural arrangement in relation to each other (e.g. 57c, 58b) and the need for something like the shaking up motion of the receptacle (57c), so as to avoid a complete separation of the elements into homogenous 'regions'(57e).

Lines 88d3-5 about the more serious effects of the elemental powers[70] on the body at rest as opposed to in motion mirror lines 85a7-b about the effects of morbid bodily humours on the immortal soul in the head. This opposite picture underlines the difference between the rational soul and the body as causes, or the difference between the movement of reason and of the elements, of divine as opposed to elemental causation, first made at 46cd and at 48a6-7. The movements of the rational soul are as close to no movement as a movement can be.[71] The movements are circular and in one place; thus, having a nature closer to rest than to movement, the rational soul is less perturbed and better able to shake off disturbance when the body is at rest. The movements of the elements by contrast tend to sort them into homogeneous regions, which would stop motion and life if it were not for the shaking of the mysterious receptacle.

Cornford makes a very interesting comment[72] on 88c5-6 about who might rightly be called beautiful and good. He contrasts the true sense with the "vulgar use of *kalos kagathos* for an upper class person." This, I submit, supports my interpretation that mentioning the examination and placement of children and re-

[70] In lines 88d1-2, clear emphasis is placed on the external origin of the elements affecting the internal workings of the body. Recalling 17d, some of what had been said about the guardians of the city, assaults are also said to come from either within or without. In the first case the guardians should respond mildly but in the second case 'with a stern face.' This augments the danger in using drugs (89b-c) as they all originate outside the body. One can only speculate whether Plato is here referring to influences from outside the city, such as travelling sophists or other political influences, or alluding to intra-city elements or factions or both. At line 89a5 the point of external or origin foreign to the body, and given to only a part of the body is repeated as being the worst kind.

[71] And thus as close to no change as can be, bar the eternal unchanging Forms which provide a paradigm for cosmos.

[72] Cornford, footnote 1, p. 351.

considering of this placement based on performance, at 19a, could well refer to ideas of social mobility and of meritocracy rather than aristocracy in the ideal city. There is too little in this dense text to support speculations about how mixed or integrated education of children should be, but there idea is hinted at that individuals might be helped to move towards an occupation suitable for the constitution. Such thoughts would be in accordance with the kind of mixture of virtue ethic and ideas about *eudaimonia*. These say, roughly, that a thing is best applied to that which it is by nature best suited (like a sharp thing for cutting), and also that an individual will be happiest in life doing what he is best suited to. However, this is an argument for another occasion.

Moving, Stirring and Prodding

The soul and its parts are the primary moving principles of the mixed being and each part of the soul has its own relationship to reason. Therefore there are three kinds of motions available to keep the elements moving and rearranging themselves optimally in the body. The human soul is a part of a hierarchy[73], the human immortal or rational soul being at the top in the micro-cosmos of the mixed human being as a body. The motion akin to the rational motion is the best (89a1-2), for the reasons given above. It is worth noting also that in calling the cosmos 'the all' (89a3) Timaeus also indicates that the second best motion, that by another, is a motion affecting the *whole* body, as is also clear from the analogical example his gives of being aboard a boat or carriage (89a7-8). The lowest type of movement is the opposite of both self-movement and of movement as a whole; it is a movement of only a part of the body and by a foreign or external agent. All these types of movements are represented as natural functions of the three parts of the human soul. The rational soul is fully capable of holding a discourse with itself.[74] The emotive

[73] This hierarchy extends to the world soul, as we shall discuss in the next section. This creates the interesting problem of five rather than four souls being discussed in the cosmology of the *Timaeus*, namely world soul, and four souls in the human body. Plato clearly favours the number four in his model of ratios. A possible solution to the problem of five souls present, is to look at their 'areas' of overlap or mixture, the fussy borderlines of 'regions' which gives us the more befitting number four, than looking at each as a separate unity or region.

[74] See *Timaeus* 37a2-c5. See also *Theaetetus*

soul is moved as a whole by listening to the discourse of reason. Lastly the nutritive soul is prodded piecemeal by images impressed on its mirroring surface.

The bulk of the arguments given in this part explain why the third way of moving the body, a way Timaeus likens in medical terms to purging by drugs, is worst and should be used only as a last resort. As a medical argument this may seem incomplete as it stands, for nothing else is said about drugs than that they are representative of an agent, which is foreign to the body it enters and which will affect only a part of it. The term φαρμακείᾳ (89b2), "use of drugs"[75] also has the general meaning of "use of any kind of drugs, potions and spells."[76] For this latter meaning in Plato, see the *Laws* 993a-d which contains a detailed discussion and 933d-e; the (seemingly mandatory) death penalty for 'professionals', i.e. doctors, diviners and soothsayers who harm anyone by these means and a milder court-decided penalty for the layman. The thrust of the argument in the *Laws* is that the professionals are abusing their self-professed knowledge and harming the ignorant. This is clearly false authority and a blasphemy against the goddess of wisdom. In the *Timaeus* however, emphasis is on the natural and the good and well-ordered nature, which has its own way of dealing with diseases; these after all also abide by the law that everything living, composed of elements and hence of triangles, has a naturally limited lifespan (89bc)[77]. Moreover, in the *Timaeus'* discussion of how the theory of circular thrust explains the concord of musical sounds (80a-c), Timaeus says that sounds arriving at different times to the same place do not create a disturbance if the latter arrives when the movement of the preceding one is drawing to a close. In a very different context, the *Apology*, at 38c1-6, Socrates warns the jury who had just sentenced him to death, that by doing so they would "acquire reputation and guilt in the eyes of those who want to denigrate the city,"[78] for by doing so they had harmed the city.[79] Socrates' point at *Apology* 38c5-6 is that had they waited a short time, they

[75] TLG links to Liddell and Scott.
[76] Ibid.
[77] Cornford, footnote 1, p. 352, refers to the interpretation of Taylor and Fraccaroli that these limits are special for each kind and within a kind to each of its individual according to his constitution. This I agree with.
[78] Transl, Grube, in Cooper ed.
[79] As citizens of Athens the jurors are internally arising causes in contrast to drugs. But the point here is natural life span, rhythm and timing.

would have been rid of him naturally because of his age, and not caused the city a loss in reputation. The link to φαρμακείᾶ, is the accusation of impiety by people Socrates does not consider to be knowledgeable about divine matters. The examples from the discussion of musical concord in the *Timaeus* and the examples from the *Laws* and the *Apology* show a wide application of the theory of circular thrust, used again here in a medical guise of use of drugs. Timaeus' final word on the treatment of the body-soul complex is to take good natural care of body and let its nature take its course.

Care of the Human Soul and Especially Mind

After the description of bodily movements and training, both in terms of the elemental bodies and the human body, the more important concern of movement and training of the soul is raised. Corresponding to the three inter-transformable elements there are the three distinct souls,[80] reason, emotion and nutrition, each of which has its own motion (*kinesis*). The amount of exercise each one gets must be kept in ratio to the others. We are told only what an excess of activity or exercise of the mortal part of the soul leads to (90b) but, unlike a possible imbalance between body and soul, the exercise of the rational soul seems not to be restricted by an upper limit, at least not in relation to the other souls. At 90c6, Timaeus claims that "there is but one way to care for anything, namely to give it the nourishment and motion proper to it." (Transl. Cornford). Timaeus must here mean anything living[81] in our care. After mentioning both nutriment and motion he goes on only to speak about which movements are proper and says nothing about proper nourishment. The emphasis on man's lifelong need for incoming nutrition, and the emphasis on nutrition in ancient Greek medicine, not least the part which Plato most probably looks to for medical thought, (as in *Regimen, Ancient Medicine, Nature of Man*) makes it very unlikely that in the chapter on care of man, the nutrition referred to is only the one consumed

[80] See 89e.
[81] A.E. Taylor does not exactly make that point but all his examples are living. Taylor makes much of the ambiguity of *therapeia*. Cornford does not comment on this.

during the growing period of youth[82]. If we are speaking here about nutrition for the soul[83], then Timaeus' emphasis on life-long commitment to love of wisdom at 90b6-c6 is a very good candidate.

Yet a beginning to our answer to the question of nutrition for the soul may be answered at76a6-b1. There Timaeus makes a comment about cranial sutures which has proven puzzling.

> The sutures are of very various patterns due to action of the revolutions and of the nutriment, being more or fewer in number according as the struggle between those powers is more or less intensive. (Transl. Cornford)

Both A.E. Taylor (p. 536-7) and Cornford (footnote 1, p. 300) take the nutrition part in these lines to refer to the overwhelming influence of elemental movement during the growth period in infancy. In that case the variation in density of the suture patterns would then seem to be dependent on how well fed the individual was in infancy. I find it hard to believe this seemed relevant to Plato in the *Timaeus*. The description both Taylor and Cornford are referring to is the clash between the different movements of soul, on the one hand, and the elements on the other, unfolding when the soul is newly incarnated (43a6-d4). It is a description of a chaotic condition of different movements affecting each other without either completely gaining the upper hand or control; all the six motions of the elements flowing counter to the revolution of the *Same* and dislocating the revolution of the *Different* (paraphrasing Cornford's translation of 43bc). The strength of the elemental motions is on this occasion caused by the strong influx of nutrition and the strength of the new elements of a new-born body to overcome them and put them to use in growing the body (81c). At the end of the section on perception, we are again reminded that all human intellectual endeavours are dependent on sense-perception, also the study of divine causality, a point also previously made on the purpose of vision (47a4-b3)

---

[82] Plato cannot have known about how the skull grows and when the sutures take on their final form. Nor would it have stopped him from using the sutures as a sign for the activity inside the head, in the way I am suggesting.

[83] Some might say that also in this case most happens in childhood and youth, and Plato would not protest the importance of these formative years. However, if the order and timetable of education in the *Republic* 521c-537e, is anything to go by the serious education aimed at seeing beyond sense-perception does not start until after the age of thirty, (see 537d).

and hearing, (47c4-5). At 61c, Timaeus starts his account of sense-perception by referring to the qualities of the elements, that is, their powers. So, although discussing sensation as having only established elemental properties is only half the account of sense-perception, as Timaeus warns us in these lines, this is the subject of sense-perception (that is elemental qualities), including elemental motions. Thus if studying this world of ours is food for our soul, and this study can only be carried out or at least begun through sense-perception, and if furthermore all sense-perception is some sort of reception and transmission of element and elemental qualities and movements, then the rational soul has to deal with a lot of movement of a nature different from its own; it has to manage a long standing and difficult conflict. Further support for the idea that this puts its mark on the density of the sutures on the cranium, and conversely that their density is evidence of much study, can be derived from lines 42e7-43a6, particularly 43a4-6:

> and cemented together what they took, not with indissoluble bonds whereby they were themselves held together, but welding them with a multitude of rivets too small to be seen and so making each body a unity of all the proportions." (Transl. Cornford)

The body being made here is not the entire body but the head[84], which also fits with the comparison with the body of the lesser gods, which are spherical celestial bodies, (40a4). We can now go back to the question of why nothing seems to be said about nutrition of the soul at 90c6: Timaeus has already discussed it. The reason why Plato places the statement that the care for man is twofold, *after* Timaeus has spoken about the nutrition but *before* he speaks about exercise, is that Timaeus is emphasising that it is *not only* through nutrition but *also* by exercise that we preserve health and increase our vigour. Making this point, Plato would be gently pointing to a lack in *On Ancient Medicine* and following the more complete *Regimen*, which emphasises both factors.

To sum up this lengthy digression on the two-fold care of the soul: Timaeus' comments on the variable density of the cranial sutures is Plato's application of the thought that the practice of science and philosophy is hard physical work and that as such it will place a visible physical mark on the body part in which it takes place.

[84] This reading also agrees with the account of the beginning of the work of the lesser gods at 44d3-5.

The image is of the head as a receptacle of rational soul and the place where sense is made of incoming sense-perception, involving a clash between the two kinds of motions, the circular motion of the two parts of the rational soul and the six linear motions of the elements and sense perception. The head, then, is like a ball which is kicked in all directions, not from without but from within, like the cosmic receptacle. Unlike conditions in infancy, when the ratio of strength between the two different kinds of motion was unfavourable, when the triangles of the body slacken and it is no longer growing, the right ratio is restored, the rational soul in the head gains control and 'order and method" (43b1) are established. This does not mean the end of conflict between the two kinds, for man is dependent on his sense-perception also in higher education or at least to get to the level of being able to contemplate independently of sense-perception.

An Even Less Likely Myth and Applied Mythology

Finally we get a note on the differentiation of the sexes and on diversification of fauna at 90e1-92c3. It appears late, it is short, is presented as being on the fringes of Timaeus' assignment. It seems fantastical, even made in jest, and it seems to run counter to the emphasis Socrates laid on the equal standing of men and women at 18c1-5. I shall, briefly, offer some suggestions as to why it is late, how it is on the fringes but still needed, why short, some of the humour involved, and how it is not a derogative remark about women. In short, I will argue that this segment is a necessary part of the dialogue and consistent with it in every relevant way, from the very start to the last word. In addition I shall suggest how it points forward towards the next supposed part of the trilogy, namely the *Critias*.

It appears late because in the causal analysis of human biology the emphasis is on cosmological relations and analogies between the macro- and micro cosmos. Although analogy of sexual propagation is highly relevant in the cosmogony, the cosmos, once born, does not need further reference to it; cyclical regeneration does not apply to cosmos, only to mortal beings. Man as a mortal animal needs causes and causal accounts in these matters. How this comes about is therefore a brief return to

cosmogony, although sexual desire is included in the making of man as "love that ventures all things"[85] at 69d4-5. The slight awkwardness of timing or placement in the narrative results from its complexity, in a similar way to the problematic order of appearance of body and soul of the universe which Timaeus at 34b10-35a1 acknowledges and explains as an imperfection of our language.

These topics are at the fringes of Timaeus' remit because they partly overlap with the topics to be covered by Critias in his announced sequel, the second part of the trilogy. At 87a7-b9, Timaeus makes a brief, albeit important mention about education and social nurture. From it we see that these social-political aspects of human life must play a causal part in the differentiation of the sexes and the diversification of the fauna, if we were to apply Timaeus' short description to it in some sort of earnest. In fact, I suggest that this is the main reason for Plato's use of a style so close to myth in this segment. The serious treatment is saved for later, but that does not mean the segment is any more loosely connected to the text it is a part of or contradicts it.

In terms of the humours aspect, the joke is in the diversification and it is on Empedocles' theory of 'evolution' of fauna[86]. Timaeus turns it on its head, in line with the tradition of creation stories which start with the perfect and describe its fall into diversity of varying quality. In the *Timaeus*, sexual procreation also becomes a part of teleology, involving divine or real reason as cause for the good and the best only, placing the causes of what falls short of this in the causes without-which-not, phrased in the language of the *Phaedo* 99a-b, and in the language of the *Timaeus* 48a7, that is the "errant cause."[87]

---

[85] This is the translation of Archer-Hind, see Cornford, p. 281. I prefer it as it is more in line with the difference of sexual love without the marriage, of which Aphrodite is the divinity, as opposed to marital love as presided over by Peitho.

[86] For a discussion of this in Empedocles see Brad Inwood; *The Poem of Empedocles*, p. 66. The main point I am referring to is that various would-be body-parts and their combinations occur, apparently all alive, but eventually only some forms of their combination survive. In *Timaeus*' case the two different sexual organs, male and female could be seen as such parts and even to roam the world till they find their counterpart. But both are created with that specific goal, and can furthermore be seen as a pair of organs in the body of the cosmos. Thirdly the 'all venturing love' is goal-directed as is its counterpart, the womb, which also roams the body if its desire for childbearing is not fulfilled in due time.

[87] Transl. Cornford. Zeyl has "Straying cause." A.E. Taylor (pp. 303-304) does not translate it and makes no reference to the discussion in the *Phaedo*. The Greek, *ta to plenomenos aitias* refers to the

Can we reconcile the strong and clear statement of the equality of the sexes, reiterated at 18c-4, and the transfer of all men who had behaved in a cowardly and unjust way into becoming women, at 90e6-91a1? At 18a4-7 Socrates recalls the certain temperament a guardian should have, one "at once spirited and philosophic to an exceptional degree."[88] Our next stop is 18c1-4:

> And we spoke of women. We remarked that their nature should be formed to the same harmonious blend of qualities as those of men; and they should be given a share in men's employment of every sort, in war as well as in general mode of life.[89]

Cornford remarks[90] that the qualities in the above quotation are the spirited and the philosophic elements and their proper blend. I can see nothing so far which suggests that the sexes differ with regard for the ratio of such excellent individuals in their midst. On the contrary, the text is revolutionary in the place and age it was written. All this text says is that not all men are material for becoming guardians, and neither are all women incapable of it. Both sexes seem to be an equally mixed lot with regard to these qualities[91] once the differentiation has come about. Nevertheless, it does come about from an all-male start[92]. Timaeus has undertaken to give an appropriate causal account of the world including the nature of man. He has followed an undeclared principle of parsimony and now needs to explain a division of animals into the male and female sex. His main principle of placement in the cosmos is that like moves towards like and further that this involves changes between elemental groups, which, I would argue, a sex-change or transfer at re-incarnation is sufficiently similar to be analogous; is indeed similarly used to explain the transfer of souls between kinds of animals, based on elemental regions. Timaeus does not offer the full argument, but one could be made using similar situations elsewhere in the text and the way in which they are solved. First of all, Timaeus warns that the

---

band of the different, the somewhat straying movements of the planets to and from the path of the sun in its middle, and by this to both live as the realm of movement and on difference and multiplicity.

[88] Transl. Cornford.

[89] Ibid.

[90] In footnote 1, p. 10.

[91] See the *Republic* 455d6-e2, and 456a10-11.

[92] I disagree with Cornford's claim on p. 291 that "this is not to be taken as a historical fact." At least this sentiment weighs less than the question of coherence and consistency in Timaeus' account, for which I am arguing.

account will be imperfect, at least by Socrates' standards, but we should do our best. Secondly, we may suggest that just as the elements and souls seem to be finite, all changes involve a transfer between 'kinds'. Thirdly, this recalls the rule of compromise, which we have seen, for instance, in relation to the distribution of flesh, in a trade-off between longevity and intellectual quality of life. Can we use these 'rules' to explain why men behaving in a cowardly and unjust way are transferred to the 'kind' of women in their next life?

Being 'spirited' and 'philosophical to an exceptional degree' are mental capacities and reflect the status of soul rather than of body. The guardians' use of force is well remarked in the *Timaeus*, but unlike in the *Republic*, particularly in what is said at *Republic* 456a10-11, no comparison is made between the physical strength of males and females. Having pledged to keep to the text of the Timaeus, this leap into the *Republic* could be challenged. However if it is accepted, one could argue thus: the cosmos contains a limited number of humans and they must be divided into men and women. Since there is the very important task of guardianship, to which the male and the female kinds hold equally many of the well-suited, but for one aspect, physical strength, this one difference gives a rational teleological incentive to transfer the souls which score low on the most important character attributes to the other gender, where the physical strength of the male sex will not be expected of an individual in the allotted tasks. But it is still a sorting of humans or human souls and a transfer of some to the other gender[93],not a general statement about the female gender.

On this reading, Timaeus holds to the suggestion, made at the *Republic* 454d9-e1, that the only difference (apart from physical strength) between male and female is "that the females bear children while the males beget them."[94] We do not,

[93] There is a story about the opposite of the *Timaeus* sex change and then as a reward for bravery alluded to at the *Laws* 944d, where the Athenian laments that man cannot change the sex of a deserter from battle in a way "opposite to what people say that some god did to Caenus of Thessally." (Transl.T.J. Saunders, in Cooper ed. *Plato Complete Works*). Ovid has a version of the story in *Metamorphosis* book XII. It is interesting with regard to the *Timaeus* because it is a story of how the originally female Caena agreed to yield to sex with Poseidon and was rewarded by becoming male and invulnerable. I have argued that the emphasis Timaeus places on the demiurge having persuaded the content of the receptacle is a reference to marital sex and to its deity Peitho.

[94] Transl. Grube and Reeve, in Cooper, ed, 1997.

in fact, need the reference from the *Republic* since Timaeus, very early on in his own speech, uses the biological sexual propagation analogy, saying at 50c7-d4, that the three things we must conceive, namely "that which becomes; that in which it becomes; and the model in whose likeness that which becomes is borne," may "fittingly" be compared thus: "the Recipient to a mother, the model to a father, and the nature that arises between them to their offspring."[95] This is also a story explaining why there are two genders, and further how the pre-cosmic conditions of two unalike things must come together to create offspring and the desires which must be in place in each for this to happen by consent. The playful and perhaps fantastical description of the organs of reproduction (once active from onset of puberty) is a reference to Artemis, who was the protector of young unmarried girls and boys and who roamed the wild outside the city walls. The blocking of air inside the body by the misplaced uterus or receptacle could be an image of the lack of the calmness and orderliness that was supposedly created by the formal arrangement of marriage on the important need for new citizens. These are speculations, but they are reminders of the cultural and religious elements at Plato's disposal and remind us that although he may be using myth, he can be serious nonetheless. I suggest that the playful myth form of our present segment is meant to connect these matters firmly to the main text of the *Timaeus* while acknowledging that it overlaps with aspects to be treated further in the *Critias*, rather than here. By this, Plato accomplishes two things: he does not have to venture into social and political theory in a serious philosophical way, and he can complete the biological description of life as we know it beyond the established prototype male human. The outcome as far as the differentiation of the sexes is concerned, which applies to other species too, is a mixture of the biological theories of sexual propagation and the divinities of marriage and sexuality, which Timaeus has already used.

The story of the origin of the female sex (covering all animal kinds, 91d5-6) represents a diversification of the proto-animal into a pair, each part of which has a special role in reproduction. The further diversification of fauna into kinds bringing life to the four different elemental regions, follows, on the other hand, the principle

[95] Timaeus 50d2-4, translation Cornford.

of like to like. Comparing Timaeus' description to Longrigg's table[96] reveals Plato's choices from the available biological theories. Regarding the nature of the semen, Plato agrees with Alcmaeon that it is a brain substance and with Hippon that it is moist and flows from the marrow. But he follows Anaxagoras and Diogenes in the thought that only the male produces the seed and Anaxagoras in that females provide the place for it to develop. Yet there is the important modification to this crude summary to be made, that the receptacle in the *Timaeus* actually holds the diverse traces which upon 'persuasion' take on rational mathematical shape and can be arranged into kinds which make rational dynamic order of a complex living being possible. Hence Plato uses sexual metaphor for the coming together of "that for the sake of which", divine cause or reason, and the "that-without-which-not" distinguished at the *Phaedo* 99a-b. Without this coming together or mixing of unalike things there would be no cosmos. What interpretation we can possibly ponder from this regarding the wider question of the relationship between philosophy and science, which we have reasons to believe Plato was engaged with, will be addressed in summary and conclusions.

[96] See Longrigg, 1993, p. 54.

Summary and Conclusions

In this thesis I investigate the causal theory of the nature of man in the *Timaeus* 69a6-92c9. That has proven to be a formidable challenge. I hope that my results may be a fair warning about some of the difficulties involved, but also an encouragement and a foot or handhold for others venturing on this difficult route. For I firmly believe that until this part of the text and its opposite at the very beginning of the dialogue, is fully brought into the discussion, our view of the seminal *Timaeus* will be badly skewed.

The challenges may be summarised as follows: for a text as dense as the *Timaeus* this is a long segment. It is also at its end and as such is both the culmination of the previous parts and must function as a closure. This closure is further more to serve as the foundation on which to begin the next part of a trilogy. This double role of the end of a segment as a logical conclusion of one part and a theoretical foundation for a new ensuing argument is a pattern repeated throughout the dialogue. I argue that there is an important difference to be observed between these seemingly overlapping functions, but that the commentators have failed to acknowledge this. Lastly, a point made by Sarah Broadie in her 2012 book[1] namely that any attempt to bring together the beginning middle and end of the *Timaeus* is bound to bring home the inevitable tension between having to assume an extra-mundane standpoint in any study of the world as a whole and the equally undeniable intra-mundane standpoint of any man performing such a study.

In fact, looking at this part as a whole and connecting it to the rest of the dialogue seems to have been an enduring challenge to study of any kind, making available research literature on it embedded in different frameworks and with no existing trail to follow. The outcome has been an investigation more focused on suggesting a route through the text, than re-interpreting existing secondary literature in the framework for interpretation which I have sketched, than on securing every

[1] Broadie, 2012, pp 2-3. In retrospect I happily acknowledge that Broadie is arguing for inclusion of parts which have often been side-lined or dismissed in the interpretation of the *Timaeus*, such as the proto-historical beginning and the demiurge. See her p 5.

suggested step rigorously in the existing vast scholarship on other parts and other approaches.

My main text, *Timaeus* 69a6-92c9 is introduced at 69b1-2 as an "attempt to crown our story with a completion fitting all that has gone before."[2] At this point, quite a lot 'has gone before', namely the demiurge's sorting of the kinds of causes (69a7) the lesser gods now have at their disposal to construct the human body and to start animal and plant life in cosmos. At the beginning of my research I hoped to examine causation in the text against the background of biological and medical thought at Plato's disposal when writing of the *Timaeus.* Gradually I realised that, although this is an interesting topic in itself, I first had to understand the *Timaeus* 69a6-92c9 as a completion befitting what had gone before it in the *Timaeus*. This is largely, although not entirely, uncharted territory. Catherine Joubaud wrote a detailed study[3] of corporality and the human body in the *Timaeus*, but took her points of departure firstly from Plato's reduction of the constitution of matter to minute [4] elements and secondly that these elements above all else encompassed or dictated bodily events. Although this is closer to home, it hardly incorporates, neither 'all that has come before' nor indeed the diversification of fauna, at the very end. The latter is perhaps more easily dismissed as a light-hearted ending, although I do not agree with a total dismissal. However, the part before Timaeus' speech is harder to ignore, as is the significance of the fact that Socrates does not speak after Timaeus starts his long speech.

There is no doubt that the *Timaeus* proceeds in arguments which form sections and sub-sections. It is harder to keep track of what gets transferred over the boundaries of the sections, what role and status it has there and how it relates to still other parts of the argument. I have argued for applying to the reading of the *Timaeus* a distinction or difference we see at work in the *Phaedo* 107a-b, between two functions that a conclusion from an argument can have. Firstly the conclusion of an

---

[2] Transl. Cornford 1937/197.
[3] Le Corps Humain Dans La Philosopie Platonicienne (1993)
[4] Ibid, p. 282. Fr. "Éléments infimes" by which she could not have meant that these 'elements' did not admit of further division, since Timaeus clearly says at 53d6-7 that the principles beyond the triangles "are known only to Heaven and to such men as Heaven favours." Transl. Cornford. But the triangles is what the arguments are based on and in this sense fundamental in the dialogue.

argument can convince a man for his own part, but he will still not anticipate others to be necessarily convinced by even the same arguments, nor think in any way that they should be, and he can keep some doubt in his own mind. The doubt kept in one's own mind allows for the continued investigation that Socrates endorses at *Phaedo* 107b. Secondly a conviction provides a starting point for an argument, and in cases where hypotheses are needed for getting an argument going, these arguments and anything built on them has only the qualified strength of a conviction. This I argue is the point of the qualification made at the *Timaeus* 29b in the distinction between the two accounts. My further point is that there is a double reference to the 'discussion which took place yesterday' in which Socrates gave his contribution; first in 17c1-19a9 and then again at 19b3-d3, where, among other things, Socrates asks to see the outcome of his previous account tested in the realm of movement and change and strife, and at 20b describes his contribution as "a discourse of the constitution of society."[5] Since Socrates clearly anticipates something built on and related to his work, declares himself unqualified for the work ahead and remains silent throughout it execution[6] , we can assume that his conclusions are about to be used differently but used nevertheless. Since furthermore, neither the equality of the sexes, arrangement of procreation nor treatment of children is discussed in the chapter on man in the *Timaeus*, but mentioned as conclusions in the previous discussion, we must assume that these are used analogously or metaphorically in the text on the nature of man. Plato is using a biological metaphor for leading together two kinds of causality and examining the offspring of such an encounter, ostensibly in the field of health problems and care of man. The scope and complexity of this mixture make it very hard to argue for its success or failure. Nevertheless, I suggest that such conclusions will neither be construed nor supported successfully without taking full account of the beginning and the very end of the dialogue.

I have argued that interest and emphasis in the majority of interpretations of the *Timaeus* has been regrettably selective regarding how parts of the text fare. Parts of the dialogue have been suppressed and other parts neglected or dismissed. This is

[5] 20b1,translation Cornford.
[6] My suggestion here is that his silence is a sign of approval just as Socrates of the *Apology* 40a-c interpreted the silence of his divine sign at the day of the trial as an approval of his own defence.

detrimental to our understanding of the dialogue, although not at all surprising given its scope, both in subject and in the way it is presented. Apart from questions of where 'seriousness' lies in the work and where 'light-heartedness', there certainly are a number of reasons for either including or excluding parts of the dialogue in any discussion of it. Starting with the text of the *Timaeus* as it has come down to us, there is the question of whether it is genuinely a unity, or pertinently, as A.E. Taylor alludes to the text from 69a6 is crafted on the cosmogony and physics either by Plato in a misguided homage to Pythagorean heritage, or even by someone else. A different question concerns the extremities of the text, by which I mean, firstly the exchanges up until Timaeus starts his own solo speech, and secondly the part from 90e1 throughout to the finish at 92c9. Concerning the first part, there seems to me to be a mismatch between the interest expressed in what could be gained from expounding understanding the contribution of Critias, both in the *Timaeus* and in the abandoned dialogue *Critias*, and the carefulness to the point of avoidance with which the contribution of Socrates in the *Timaeus* is handled. The latter may partly stem from and understandable reluctance to engage with enormous material on the *Republic*, as this may seem to be called for by the points Socrates 'recalls' from their discussion the 'day before'. While I agree that a discussion of the *Republic* is not called for, I have argued that we should not shy away from including this part of the *Timaeus* text in our interpretation, but rather embrace it as providing us with hypothetical points in a metaphoric guise. Regarding Critias, by the same arguments his part in the *Timaeus* must also be included, although I make no claim to have done so in any depth. About the connection between the *Timaeus* and the abandoned *Critias* or what text if any in Plato's authorship was written in its stead, (and for that matter also to cover the heralded part of Hermocrates), I hope to have made my view equally clear. Neither is needed to make the conceptual and argumentative unity and completeness of the *Timaeus*, and thereby the framework within which it can be interpreted sufficiently clear. My argument for this rests on the same plea to accept the last part of the *Timaeus* as a metaphor, all wrapped up to be unpacked as hypothesis in another investigative discussion.

I maintain that such an approach may contribute to the interpretation of the *Timaeus* but the same time I must concede that my attempts have proven to be over-

ambitious. If, however, I have managed to make novel suggestions which others could, in smaller bites, fruitfully put to the test in more manageable portions, benefitting from my attempts to put the parts into context, my efforts will not have been in vain.

Bibliography

Archer-Hind, R. D. (1888). *The Timaeus of Plato*. London, New York, Macmillan and Co.

Ayache, L. (1997). Est-il vraiment question d'art médical dans le Timeé? Interpreting the Timaeus-Critias, Academia Verlag Sankt Augustin.

Barnes, J. E. (1984). *The Complete Works of Aristotle*, the Revised Oxford Translation. Princeton, Princeton University Press.

Brisson, L. (1974). *Le Méme et l'Autre dans la structure ontologique du Timeé de Platon*. Paris, Publications de L'Université De Paris X Nanterre, Éditions Klincksieck.

Broadie, S. (2012). *Nature and Divinity in Plato's Timaeus*. USA, Cambridge University Press.

Bruit Zaidman, L. and Scmitt Pantel, P. (1992 from orig. French publication 1989) *Religion in the Ancient Greek City*, translated by P. Cartledge. Cambridge, Cambridge University Press.

Burnyeat, M. R. (2005). 'ΕΙΚΩΣ ΜΥΘΟΣ' *RHIZAI II(2)*: 143-165.

Bury, R. G. (trans.) (1960). *Plato:Timaeus, Critias, Cleitophone, Menexenus, Epistles*. Cambridge, Massachusetts/ London, England, Harvard University Press.

Calvo, T. and. Brisson, L. (1997). 'Interpreting the Timaeus-Critias', *Proceedings of the IV Symposium Platonicum*. Sankt Augustin, Academia Verlag.

Claghorn, G. S. (1954). *Aristotle's Criticism of Plato's Timaeus*. The Hague, Martinus Nijhoff.

Cooper, J. M. (1984). 'Plato's Theory of Motivation', *History of Philosophy Quarterly* 1(1): 3-21.

Cooper, J. M., (ed.), (1997). *Plato. Complete Works with Introduction and Notes*. Associate Editor D.S. Hutchinson, Indianapolis/Cambridge, Hackett Publishing Company.

Cornford, F. M. (1937). *Plato's Cosmology, The Timaeus of Plato*, reprinted 1997. Indianapolis/Cambridge, Hackett Publishing Company.

Craik, E. M., (ed.),(1998). *Hippocrates, Places in Man*, Oxford, Clarendon Press.

Curd, P., and Graham, D. W., (ed.)(2008). *The Oxford Handbook of Presocratic Philosophy*, Oxford, Oxford University Press.

Driscoll, J. (1979). 'The Platonic Ancestry of Primary Substance', *Phronesis* 24: 253-269.

Evans, N. (2010). *Civic Rites: Democracy and Religion in Ancient Athens*. Berkeley, Los Angeles, London, University of California Press.

Ferber, R. (1997). Why did Plato maintain the "Theory of Ideas" in the Timaeus? Interpreting the Timaeus-Critias, Academia Verlag Sankt Augustin.

Frede, M (1987) *Essays in Ancient Philosophy*, Oxford, Clarendon Press

Gallistel, C.R (1980). *The organization of Action; A New Synthesis*, New Jersey, Lawrence Erlbaum Assiciates.

Grmek, M. (1998). *Introduction. Western Medical Thought from Antiquity to the Middle Ages.* Cambridge Mass., London, England, Harvard University Press: 1-21.

Guthrie, W.K.C (1962-81). *A History of Greek Philosophy*, vol.2.Cambirdge, Cambridge University Press.

Hankinson, R. J. (1998). *Cause and Explanation in Ancient Greek Thought*. Oxford, Oxford University Press.

Harris, C. R. S. (1973). *The Heart and the Vascular System in Ancient Greek Medicine from Alcmaeon to Galen*. Oxford, Oxford Clarendon Press.

Hippocrates Volume IV, (1931). The Loeb Classical Library, Cambridge, Mass., London, England, Harvard University Press

Holmes, B. (2010). *The Symptom and the Subject, the Emergence of the Physical Body in Ancient Greece*. Princeton and Oxford, Princeton University Press.

Inwood, B. (1992) *The Poem of Empedocles: a text and translation with a commentary*. Toronto, Buffalo, London, University of Toronto Press

Johansen, T. K. (2004). *Plato's Natural Philosophy, A study in the Timaeus-Critias*. Cambridge, Cambridge University Press.

Joubaud, C. (1993). *Le Corps Humain dans la Philosophie Platonicienne*.

Jowett, B (1892) *The Dialogues of Plato*, London, MacMillan.

Kuriyama, S. (1999). The Expressiveness of the Body and the Divergence of Greek and Chinese Medicine. New York, Zone Books.

Leith, D. (2009). 'The Qualitative Status of The Onkoi in Ascleiades' Theory of Matter', *Oxford Studies in Ancient Philosophy* XXXVI: 283-320.

Lennox, J. G. (1985). 'Plato's Unnatural Teleology', *Platonic Investigations*. D. J. O'Meara (ed.). Washington, The Catholic University of America Press. 13: 195-218.

Liddell & Scott (2nd ed. 1994, first published 1889). *An Intermediate Greek-English Lexicon*, Oxford: Clarendon Press

Lloyd, G. E. R. (1968). 'Plato as a Natural Scientist', *The Journal of Hellenic Studies* 88: 78-92.

Lloyd, G. E. R. (1991). 'Plato on Mathematics and Nature, Myth and Science', *Methods and Problems in Greek science*. Cambridge, Cambridge University Press: 333-351.

Lloyd, G.E.R. (1966). *Polarity and Analogy, two types of Argumentation in Early Greek Thought*, Cambridge, Cambridge University Press: pp. 96-99

Longrigg, J. (1993). *Greek Rational Medicine, Philosophy and Medicine from Alcmaeon to the Alexandrians.* London/New York, Routledge.

McKirahan, R. D. J. (1994). *Philosophy Before Socrates, an Introduction with Texts and Commentary*. Indianapolis/Cambridge, Hackett Publishing Company, Inc.

McKirahan, R. D. J. (2010). *Philosophy before Socrates, an Introduction with Texts and Commentary*, second edition. Indianapolis, USA, Hackett Publishing Company.

Miller, D. (2003). *The Third Kind in Plato's Timaeus*. Göttingen, Vandenhoeck & Ruprecht, Göttingen.

Morrow, G. R. (1968). 'Plato's Theory of the Primary Bodies in the Timaeus', *Archiv fur Geschichte der Philosophie* 50: 12-28.

Mourelatos, A. P. D. (2010). 'The Epistemological Section (19b-d) of the Proem in Timaeus' Speech: M.F. Burnyeat Analysis, and Comparison with Xenophanes B34 and B35 *One Book, the Whole Universe, Plato's Timaeus Today*. (eds.) R. D. Mohr and B. M. Sattler. Las Vegas, Zurich, Athens, Parmenides Publishing, 2010: 225-247.

Mueller, I. (1996) *The Triangles in Plato's* Timaeus, *Mathesis* 12, pp. 286-333

Notopoulos, J.A. (1936) article 'Movement in the Divided Line of Plato's *Republic*' in *Harvard Studies in Classical Philology*, vol. 47 (1936) pp.57-83

Nutton, V. (2004). *Ancient Medicine*. London and New York, Routledge.

Ostenfeld, E. (1997). 'The Role and Status of the Forms in the Timaeus. Paradigmatism Revised?' in Calvo, T. and Brisson, L. (eds.), 'Interpreting the 'Timaeus'-'Critias', *Proceedings of the IV Symposium* ... Sankt Augustin: Academia Verlag

Owen, G. E. L. (1953). 'The Place of Timaeus in Plato's Dialogues', *Classical Quarterly* 3: 79-95.

Peck, A. L. (1928) Pseudo Hippocratus Philosphocus", unpublished thesis, University of Cambridge. Classmark PhD. 7033

Resnikoff, H.L and Wells Jr, R.O. (1973) in *Mathematics In Civilization*, p. 250

Robinson, T. M. (1987). Heraclitus: Fragments, A Text and Translation with a Commentary. Toronto, Toronto University Press

Robinson, T. M. (1991). 'Heraclitus and Plato on the Language of the Real', *The Monist* 74: 481-490.

Russell, B. (1965). A History of Western Philosophy and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day. London, Georg Allen & Unwin Ltd.

Rutherford, R.B. (1995). *The Art of Plato: Ten Essays in Platonic Interpretation*. London, Duckworth

Sayre, K. M. (1983). *Plato's Late Ontology, A Riddle Resolved*. Princeton: Princeton University Press.

Schiefsky, M.J. (2005) (trans) Hippocrates: On Ancient Medicine, Lieden, Boston, Brill

Sedley, D. (2007). *Creationism and its Critics in Antiquity*. Berkeley, Los Angeles London: University of California Press.

Sedley, D. and Long, A., eds (2011). *Plato: Meno and Phaedo*. Cambridge: Cambridge University Press.

Sedley, D. (1998), *Platonic Causes*, Phronesis XLIII/2, p.114

Sider, D. (1976) 'The structure of Plato, Republic VI,' *Rivista di Studi Classici* 24 (1976) pp. 336-348.

Sisko, J. E. 'Cognitive Circuitry in Plato's Timaeus and Pseudo-Hippocratic Peri Diaites' in *Hermathena* 180, (2006), pp. 5-17.

Sharples, R. W. and Sheppard, A. (eds.), (2003). *Ancient Approaches to Plato's Timaeus*. London, Institute of Classical Studies, School of Advanced Studies, University of London.

Solmsen, F. (1968). *Kleine Schriften*. Hildesheim, Georg Olms Verlagsbuckhandlung.

Taylor, A. E. (1928). *A Commentary on Plato's Timaeus*. Oxford, Clarendon Press.

Taylor, T. (1995, first edition in 1804). *The Works of Plato*. Somerset, The Prometheus Trust.

Vegetti, M. (1998). 'Between Knowledge and Practice: Hellenistic Medicine' in M. Grmek, *Western Medical Thought from Antiquity to the Middle Ages*. Cambridge Mass., London, England, Harvard University Press: 72-103.

Xenophon (1923). *Memorabilia.* The Loeb Classical Library. T. E. P. E. Capps, W.H.D. Rouse. London and New York London: William Heinemann, New York: G.P. Putnam's Sons.

Yonezawa, S. (1991). 'Are the Forms "aitiai" [Greek] in the 'Phaedo'?' *Hermes* 119: 37-42.

Zeyl, D. J. (2000). *Plato, Timaeus*. Indianapolis: Hackett Publishing Company, Inc.