ARISTOTLE'S CONCEPT OF MATTER IN THE CONTEXT OF CHANGE

AN EXAMINATION OF ARISTOTLE'S CONCEPT OF MATTER IN THE CONTEXT OF CHANGE

By

HORATIO ION BOT, B.A.

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AUTHOR: Horatio I. Bot, B.A. (University of Toronto)

SUPERVISIOR: Professor C. Georgiadis

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ABSTRACT

The concept of matter is discussed by Aristotle in the context of investigations dealing with the issues of causality, substance, and change. The following inquiry focusses on the discussion of matter in the context of change by analysing the two accounts of change that Aristotle gives in the first book of the Physics and the ninth book of the Metaphysics, respectively. The two schemas of change are outlined and the development of the concept of matter is followed from the hypokeimenon of accidental change, to the primary matter of elemental change, to the matter that underlies substantial change and finally to the potential of the second model of change.

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CHAPTER 1: THE PROBLEM

Aristotle begins his investigation into physis, or nature, by asserting that we should begin by examining those "things which are more knowable and obvious to us" and from these proceed to the less obvious things "which are by nature clearer and more knowable"[1]. One of the aspects of physis which is most obvious and clear to us is change: the cycles of the sun, seasons, life and death and countless other examples are inescapable reminders of change. Yet, this inescapable feature of the natural world must be explained--though clear, and obvious to us--it must be made more knowable "by nature" by referring to more fundamental entities. Aristotle's predecessors struggled with the problem of giving such an account of change unsuccessfully: they left themselves open to the harsh critique and ultimate rejection of the reality of change by Parmenides.

This Parmenidean criticism is rooted in deep methodological differences: for Parmenides reason is the starting point and it and its objects are those things that are the most clear and obvious to us. The ruthless exercise of reason, by Parmenides and the careful building of arguments reveals the true nature of change to be illusory. For Aristotle there is no need for argument, the existence of change is self-evident to any one engaged in the study of

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[1] Physics 184a 17 {All references to the Aristotelian corpus, unless otherwise indicated, are drawn from The Works of Aristotle, ed. by W.D. Ross, Oxford, 1930.}

'physis', to any physicist: "We physicists, on the other hand, must take for granted that the things that exist by nature are, either all or some of them, in motion--which is indeed made plain by induction."[2]. But taking experience and change for granted as features of the natural world does not explain how either of them is possible. In these pages the focus will be on change and more specifically on matter, or that which underpins Aristotle's understanding of change. Now Aristotle does not provide one account of change, he gives two, and through both matter runs as a common thread.

In the following pages it is this common thread that I wish to follow, though 'follow' is perhaps not the appropriate term. The examination that is to come is not simply going to 'follow' the common thread, mentioned above, to some solution, as Theseus follows the twine, his thread, out of the Labyrinth. Rather, the 'follow' that is meant here, though retaining some of that initial sense, will be primarily concerned with the analysis of the thread itself and it is by means of an examination of its nature that this thread will lead us out of the labyrinth.

Matter is not one of the aspects of the Aristotelian physical system which is discussed separately by Aristotle. The topic of

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[2] Physics, 185a 12-14

matter, its nature and its role in the larger system, emerges out of other considerations. Very much like Theseus' thread, the importance of matter in Aristotle's philosophy is not given a place in the foreground, it is not explicitly discussed on its own merit though it plays a vital role in the final result. The focus on matter in these pages will bring it into the foreground, but to do so it will have to be examined within the context of Aristotle's concerns about change with all the additional difficulties that this involves.

This has brought us back to the issue of change and Aristotle's explanation of it. Earlier it was indicated that two main approaches were taken by Aristotle in his accounting of change. The first is thematically presented in the first book of the Physics and the second in the ninth book of the Metaphysics. These will be the principal texts of the investigation as they comprise the bulk of Aristotle's discussion of change and consequently, the bulk of the discussion of the concept of matter in change. The concept of matter, which is central to this investigation, is discussed by Aristotle in other contexts, such as the discussion of causality in the Physics, or the consideration and ultimate rejection of matter as primary being in the Metaphysics VII, 3. The aim of this paper, however, is to consider matter in the context of change and though these additional texts contribute to the wider role of the concept, their examination goes beyond the scope of the current discussion.

The above sequence of the two accounts of change represents, very likely, their chronological order. In a passage of the Physics (which follows one of the explanations) Aristotle himself acknowledges the duplication of explanatory schemata with regard to an accounting of change:

> This then is one way of solving the difficulty. Another consists in pointing out that the same things can be explained in terms of potentiality and actuality. But this has been done with greater precision elsewhere.[3]

The 'difficulty' referred to at the beginning of the above passage points back to the issue of change and the specific problem of becoming from non-being. Aristotle is keen to show that his view of change is not plagued by this, the problem of his predecessors and he does this by a further examination of the model of change that was completed in the previous chapter. Thus, on the one hand, Aristotle indirectly refers to one of his models of change while the 'elsewhere' in the above passage is a likely reference to the model provided in the Metaphysics. This passage gives the impression of a later addition, (if the Metaphysics is to be considered a later work) it suggests that Aristotle, after having analysed change in another way at a later point in his philosophical development, entered this cross reference in his earlier work. What is significant, however, is that Aristotle points to his later work as an alternative route to the same end, implying that he considers both accounts to be valid and consistent. The question that is to be followed here is whether

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[3] Physics, 191b 27-30

both routes to the explanation of change avail themselves of the same concept of matter, and how the two accounts are to be understood in relation to each other.

This connection, by Aristotle, of the models of change lends credence to the view that Aristotle does not later abandon his earlier position, nor can it be considered spurious. Given this duality of approach and Aristotle's recognition of this duality, the task that lies ahead, the analysis of both approaches to change in terms of the common thread of matter, must establish that the use of 'matter' in both cases is compatible. The appropriate place to begin following this common thread is the chronological starting place for Aristotle's own analysis, to be followed by his later views. Subsequent chapters will expand on the main points of these two interpretations focusing on the issues of substrate, prime matter and potentiality. The final chapter will bring all these issues together into a comprehensive account of the thread which has been analysed, matter. The immediate task is to establish, at least in outline, the two views which will be expanded upon in the subsequent analysis.

The first of Aristotle's accounts of change develops out of an analysis of the philosophical position of his predecessors. This analysis of the views of others leads to the conclusion that change is governed by a finite number of principles which must be contraries[4] and whose exact number is yet to be established: "the

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[4]Physics, 189a 10

number of elements is neither one nor more than two or three; but whether two or three is, as I said, a question of considerable difficulty."[5]. To distinguish this view from Aristotle's subsequent position, I will call this the replacement model of change and the subsequent view I will refer to as the actuality-potentiality model of change.

The replacement model of change that Aristotle is presenting in the Physics is one which will deal with "becoming in its widest sense"[6]. It is at this level of generality that the word 'change' unaccompanied by qualifiers will be employed; other, particular, kinds of change will be qualified as such. In the widest sense, then, becoming is resolvable to at most three principles. One principle is not enough because a careful observation of change reveals that change occurs between contraries, which implies that there are at least two principles. The argument for three is that contraries need to act on some third thing which is not a contrary, simply because contraries are mutually exclusive. Further, contraries are not jointly substantial in that they do not "constitute the substance of any thing"[7].

To this schema of three elements Aristotle adds a wrinkle by introducing the concepts of simple and complex. The simple are the

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[5] Physics, 189b 27-29

[6] Physics, 189b 31

[7] Physics, 189a 29

contrary principles and the third, neutral, principle considered singly. For example 'musical', 'not-musical' and 'man' are simple while 'musical man' and 'not-musical man' are complex. In the case of the simple the two contraries are 'musical' and 'not-musical', while 'man' is the third element. Change may be described in three ways: man becomes musical; the not-musical becomes musical; the not-musical man becomes the musical man[8]. The first two descriptions are in terms of the simple elements while the third is in terms of the complex. The second simple case reveals change purely in terms of the two contraries, while the first shows the third principle and one contrary. The first two descriptions are not adequate since they deal simply with replacement; one principle is replaced by another leading to problems which I will not examine here. These descriptions of replacement characterize the view of change held by Aristotle's predecessors. Aristotle's first model of change grows out of his predecessors' replacement model and it is from an analysis of their views that the contrary principles are extracted by Aristotle (and it is because of this association that I chose to refer to Aristotle's own view as the replacement model). But it is the third, neutral, in so far as it is not a contrary, principle and its unique nature that is Aristotle's major contribution to the replacement model.

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[8] Physics, 189b 34--190a 7

In the 'musical' example this third principle is 'man'. This mundane example is the springboard for Aristotle's unique understanding of the underlying principle of change. To fully appreciate Aristotle's position I will look at the complex analysis of the same 'man becomes musical' example.

In the complex analysis of the 'musical man' example before the change there was the 'not-musical-man' and the change turns him into the 'musical man'. The one element in this change that remains and which supports the change is the 'man', since it is the 'man' which was able to take on one contrary before the change, 'not-musical', and the other contrary, 'musical', after the change. (Thus one contrary is replaced by another in the process of change.) Keeping this schema of principles in mind Aristotle extends his analysis to all cases of change:

> "there must always be an underlying something, namely that which becomes, and... this, though always one numerically,in form at least is not one. (By that I mean that it can be described in different ways.). For 'to be man' is not the same as 'to be unmusical'. One part survives, the other does not: what is not an opposite survives (for 'man' survives), but 'not-musical' or 'unmusical' does not survive, nor does the compound of the two, namely 'unmusical man'."[9]

Whether or not this is an adequate account of all cases of becoming is not my concern here, except as far as the success of this schema impacts on the concept of matter. The importance of this passage, however, is to be found in the insight it provides into Aristotle's

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[9] Physics, 190a 14-21

model of change.

Aristotle, in the above excerpt, identifies the three principles of change and universalizes his example to all cases of becoming. He points out that 'there must always be an underlying something' which becomes and which is two in form, though only one numerically. This underlying element understood as two in form is the complex hypokeimenon. The hypokeimenon, in the example given above, is the composite 'unmusical man' and in this sense it is one numerically. There is one entity before the change, the unmusical man. But this numerical identity is complex, as the above discussion pointed out. The 'unmusical man' consists of one contrary, or opposite, principle and the underlying principle on which the opposites operate: 'unmusical' and 'man' respectively. (It should be noted that 'man' as employed in common usage is used equivocally to refer to both 'unmusical man' and 'man'.) The complex hypokeimenon does not survive the change since the opposite, the 'unmusical' in this case, does not survive. The underlying neutral principle, however, the 'man', survives the change. This principle that survives is the substratum of change or the hypokeimenon. The complex hypokeimenon as a whole does not survive even though one part of it does.

It is this duality of the hypokeimenon that allows Aristotle to say that the principles of change are in one sense two and in

another sense three. The complex hypokeimenon is one numerically, but it incorporates the two principles: (a) opposite principle, and (b) underlying substratum, or hypokeimenon taken per se. Thus the complex hypokeimenon may be considered both as one principle, when taken as a whole and contrasted to the the other opposite principle which is present after the change, and as two principles, when its two principles are considered separately. The principles of change which I introduced above are the three principles which obtain from the breakdown of the complex hypokeimenon into its two principles plus the form which the change brings about.

Now, one of the relationships between the principles of change is the relationship between the complex hypokeimenon and the other opposite, or the form after the change, or simply the form. In this relationship the complex hypokeimenon is considered one principle and the form is the other principle. This, of course, is a simplification of the relationship of the three principles of change. The opposite which is incorporated into the complex hypokeimenon, and which is the contrary of the form, is in fact the lack of the form which obtains after the change. For example, 'not-musical' or 'unmusical' is this lack of the form 'musical'. Due to this characteristic of 'lack of form' the opposite incorporated into the complex hypokeimenon is referred to as the privation. The three principles of change are privation, form and hypokeimenon, or

the substratum. Their relationship consists of two sub-relationships. The first is the relationship between the privation and the form and these two contraries are the opposite poles of the change. The second relationship is between the contraries and that on which they act, or the subject of the change, which I have called the substratum, or the hypokeimenon. The contraries are two poles between which the change takes place, but it is the hypokeimenon which persists, and when contrasted with the contraries, the hypokeimenon emerges as the source of continuity in the change. The analysis of change only in terms of contraries reveals simple replacement (as I indicated above), but it is the hypokeimenon which provides continuity and which is the locus of change.

It is important to notice that this analysis of the elements of change is carried out in terms of a conceptual analysis driven by linguistic considerations. Aristotle does not identify particular items in the objective realm as the principles of change; he develops his principles through the analysis of statements or phrases. There is no mention of the ontological term 'matter' in the model of change that has been built up so far. The only illustration Aristotle provides is the 'musical man' example. In that example 'man' is the underlying element. From this it is possible to imply that the underlying principle must be something which takes on the various

contraries during the course of the change. 'Man' had to be able to be both 'musical' and 'not-musical'. Aristotle gives no further insights into its nature than that. Yet, since this is an account of becoming in its widest sense it must include substantial change which must also involve this third element or principle. In the 'musical' example there is only a change in attributes, or qualities, and the subject 'man' is that which acts as this substratum of change. It is less obvious what exactly the substratum will be in substantial change, but Aristotle assures us that there is in fact such a substratum:

> "...substances too, and anything else that can he said 'to be' without qualification, come to be from some substratum... For we find in every case something that underlies from which proceeds that which comes to be; for instance, animals and plants from seed."[10].

This issue of substantial change and what underlies it will be discussed in the third chapter of this paper.

I will examine in greater detail the nature and relationships of the substratum in the next chapter. There is, however, a reason to linger on the model of change that Aristotle has developed so far. As I pointed out above this model has been developed almost completely at the conceptual/linguistic level. What may be puzzling however, is that the stated topic of discussion within these pages is the Aristotelian view of matter, but so far the word has not yet appeared. The natural assumption is that one of the principles of

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[10] Physics, 190b 1-4

change corresponds to 'matter' and the most likely candidate is the substratum of the change. In the analysis of change presented thus far Aristotle does not, himself, use the word, but he has been working towards it:

> "...everything comes to be from both subject and form. For 'musical man' is composed (in a way) of 'man' and and 'musical'... Now the subject is one numerically, though it is two in form. (For it is the man, the gold-- the 'matter' generally-- that is counted, for it is more of the nature of a 'this', and what comes to be does not come from it in virtue of a concomitant attribute; the privation on the other hand, and the contrary are incidental in the process.)"[11]

Here, for the first time, Aristotle introduces the term 'matter' and a cursory examination of the text does reveal it to be a suitable substitute for substratum.

'Matter' as used in the above passage refers back to 'the man' and 'the gold'. The 'man' was discovered, in the 'musical' example, to be the hypokeimenon of the change, but the 'man' can also be considered with reference to the complex hypokeimenon if the usage is meant to include 'man' as hypokeimenon plus the privation 'unmusical'. This is the usage that Aristotle has in mind since he speaks of the subject as 'one numerically, though it is two in form' and this duality in form is the hallmark of the complex hypokeimenon. Therefore, Aristotle only seems to identify the hypokeimenon with matter, but in fact he is connecting the complex hypokeimenon with the 'matter that is counted'. Thus Aristotle does

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[11] Physics, 190b 20-27

not identify hypokeimenon with matter at this point. The detailed analysis of the nature of the hypokeimenon and its relation, if any, to matter, will be addressed in the next chapter.

After presenting the three principles of change and explaining how they may be considered to be either three or two, Aristotle focuses his attention on the substratum of change, for which he uses the phrase 'underlying nature'. He presents it as part of an analogy:

> "The underlying nature (hypokeimene physis) is an object of scientific knowledge, by analogy. For as the bronze is to the statue, the wood to the bed, or the matter and the formless before receiving form to anything which has form, so is the underlying nature to substance, ie. the 'this' or the existent."[12]

The substratum is to be understood by analogy and the analogy is presented in form of proportions. Aristotle does not provide a clear-cut answer explaining the characteristics of the underlying nature of change. The interpretation of this analogy has been at the heart of controversy regarding the exact role and nature of the hypokeimenon. One interpretation claims the underlying nature given in the analogy to be the primary matter as involved in substantial change by taking one side as showing the role of the substratum in non-substantial change and the other side as capturing the relationship of the underlying nature to substance in substantial change. Another plausible explanation of the analogy is to consider

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[12] Physics, 191a7-11

the relationship on one side as illustrating change in terms of quasi-substantial entities, artefacts, and the relationship on the other side as attempting to convey the relationship of the underlying nature to true substances, biological entities. The view that I will pursue in the following chapter argues against the first interpretation, and though not explicitly discussing the second alternative (that is beyond the scope of this paper) my view may be made compatible with it. Thus Aristotle's own view of the nature of the hypokeimenon is difficult to extract from the given analogy and the task is daunting for the interpreter. The details of the interpretation as far as the hypokeimenon is concerned must now be reserved for subsequent discussion.

This brief outline of the first Aristotelian account of change has attempted to establish two things: provide a skeleton, a precis, of the Aristotelian approach; indicate some difficulties and raise questions about this approach which will be tackled in depth in subsequent chapters. Yet the replacement model discussed above, with its associated controversies, is but one of the two accounts of change that Aristotle provides.

The second account of the problem of change is provided in the Metaphysics, but it is anticipated by Aristotle in the Physics as he writes:

> "The matter comes to be and ceases to be in one sense, while in another it does not. As that which contains the privation, it ceases to be in its own nature, for what ceases to be--the privation-- is contained within it. But as potentiality it does not cease to to be in its own nature, but is necessarily outside the sphere of becoming and ceasing to be."[13]

In this passage Aristotle connects the concept of matter with the concept of potentiality. Whether or not this is a later addition need not concern us; the important thing is that the connection is made and in the Metaphysics the connection is broadened and deepened, once again within the context of change.

In the philosophical lexicon, Book 5 of the Metaphysics, Aristotle provides three descriptions of potency: 1. "the source, in general, of change or movement in another thing or the same thing qua other"[14]; 2. "The capacity of performing this well or according to intention"[15]; 3. "The states in virtue of which things are absolutely impassive or unchangeable, or not easily changed for the worse"[16]. Potency emerges from these three descriptions as active and passive potency, at times normatively considered, or as a capacity to resist change. Potency is not characterless, it is not without what could be termed actual attributes. The capacity has a

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[13] Physics, 192a 25-28

[14] Meta., 1019a 17-19

[15] Meta., 1019a 24

[16] Meta., 1019a 26-28

requirement that it be a capacity for effecting change, or excellence in the activity to be performed or a capacity for a thing to withstand attempts at altering it for the worse. This implies the passive sense of potency, as that which allows for change to occur. A further qualification is also introduced to the effect that there is no potency for the actually impossible.

The initial connection between matter and the second model of change was made in the passage of the Physics and matter was referred to as potentiality. The preceding discussion, however, revealed several senses of potency, not of potentiality. (Though the Greek text has the single word, 'dynamis', Aristotle uses the term in various ways. The two senses of the word that are germane to the discussion of change I differentiate by calling the first potency and the second potentiality. Potency is further subdivided into active and passive. These distinction will be drawn again in the penultimate chapter) Potency, from the brief exposition provided, reveals itself to be a 'power' or 'capacity' which plays out in causal interaction. The active potency is the source of change, but the connection of matter has not been made to this sense of potency. The potentiality to which Aristotle connects matter is an existential concept. The matter as potentiality is necessarily a way of being which needs to be explained. The ultimate goal of my investigation

is to uncover the concept of matter as Aristotle employs it in the context of change and in this model of change the two senses of potency as power and potentiality are connected. This connection and how it colours the concept of matter will be the goal of the penultimate chapter of this treatise.

Before I begin the detailed investigations on the nature of Aristotle's two models of change and their associated concept of matter there is an interesting wrinkle that becomes apparent by juxtaposing Aristotle's analogy relating the underlying nature of change to substance, presented in the context of the first model of change, with the analogy explaining actuality. This second analogy is germane to the second model of change and it is presented by Aristotle in Metaphysics IX. Aristotle's statement from Metaphysics VII that the substrate of change "is in one sense the matter"[17] must also be kept in mind.

In the analogy to explain the nature of the actual Aristotle states that "we must not seek a definition of everything but be content to grasp the analogy"[18]. The analogy that is set up here is the flip side of the analogy set up in the Physics, 191 a 7-11.

> "...that which is seeing to that which has its eyes shut but has sight, and that which is shaped out of the matter to the matter, and that which has been wrought to the unwrought. Let actuality be defined by one member of the antithesis, and 'the potential' by the other."[19]

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[17] Meta., 1042a 26

[18] Meta., 1048a 36

[19] Meta., 1048b 1-5

There the analogy uses matter and potential as the known parts of the proportion and compares them to the unknown which in this case is the actual. In the Physics Aristotle also forms proportions: "as... matter and the formless before receiving form (is) to any thing which has a form, so is the underlying nature to substance, i.e. the 'this' or existent."[20]. The striking feature of these proportions is that in the former, Aristotle is using an analogy to explain how the underlying element of change, the substratum, is to be grasped, while in the latter he is providing a way to account for actuality. The underlying element of change is, in some cases, to be identified with matter (in cases of substantial change 1049a27-37) which is potential. Thus read together the two sets of proportions define both potentiality and actuality by means of analogy. Both elements that are to be related on the same side of the equation are, if taken in this light, not fully explained and are in fact given in analogies which in turn relate the two terms to each other by means of analogy.

This is a problem if Aristotle does not provide independent accounts of actuality or of potentiality. Aristotle does give such explanations of his key concepts, for example potentiality is discussed independently of the analogy. The use of the two analogies is not problematic for Aristotle, but it is indicative of a certain approach to the foundational concepts of the two models of change.

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[20]Physics, 191a 10

Specifically, Aristotle seems to indicate by his use of analogy, instead of providing explicit argument, or description, that these foundational principles, precisely the ones that I will be discussing in the following chapters, are not fully amenable to rigorous scrutiny. The two concepts that Aristotle attempts to illustrate are opposites and are connected by the very fact that they are opposite poles. The concept of underlying nature cannot be fully described, except by analogy, since as a concept it involves indetermination of various degrees as part of its character, depending on the nature of the change underlain. The concept of actuality, on the other hand, involves determination, and the fully actual, is the fully realized, fully determined entity Neither one of these concepts is easily pinpointed precisely because, as foundational principles, they are not supported, or underpinned by other concepts, since it is they which support and underpin the models of change.

My investigation will necessarily involve the examination of both concepts in the process to uncover the implications of the concept of matter in Aristotle's accounts of change. The question of the exact nature of the potential as related to matter, for example, will require further explication. Aristotle refers to the connection of matter to the potential by contrasting it to the actual: "by matter I mean that which not being a 'this' actually, is potentially a 'this'"[21]. Further, this one perspective on the concept of

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[21]Physics 184a 17 {A

matter will have to be reconciled with the view given in the Physics: "my definition of matter is just this--the primary substratum of each thing from which it comes to be without qualification, and which persists in the result."[22].

The challenge is twofold. First, the foundational concepts must be explained and accommodated in the models of change. The second challenge is to see if there is a possible interpretation which allows for bringing together these different accounts into a unified whole. The schemas of change are quite different, but as was seen above, there are some common elements particularly 'matter' which is connected in one case with the substratum of change and in the other with potentiality. Toward these ends I turn now to the issue of the substratum as matter.

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[22]Physics, 192a 31-33

CHAPTER 2: SUBSTRATE AS MATTER

There is a crucial issue in the discussion of the nature of matter that needs further attention. This is the need for a more precise formulation and articulation of the concept of substrate (hypokeimenon). This concept is extensively discussed in the first book of the Physics, particularly in Chapter 7. The general argument advanced by Aristotle has been presented in the previous chapter and now that discussion must be expanded and deepened. This further analysis of the concept of substrate will look at the concept in contrast to the closely associated concept of substance and its relation to matter.

The first order of business is to anchor the discussion in Aristotle's text. The way to do this most readily is to look at the concept of substance. According to Aristotle "--that which is called a substance most strictly, primarily, and most of all --is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse"[23]. This statement and many others in the Categories present a picture that is very telling, not only of the concept, but also of Aristotle's approach to the concept. Primary substance is identified by a logical and linguistic examination that identifies the relevant metaphysical entities,

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[23] Categories, 2a 11-13

individual men, individual horses etc.. This is not meant as a trivial observation about how the concept is formulated. Substance at this point in the Aristotelian corpus is presented as a conceptual tool, a technical concept in the larger philosophical lexicon which is being assembled by Aristotle in the Categories.

Of course, substance is presented and discussed by Aristotle in different contexts. In Metaphysics V substance is defined as having two general senses "(a) the ultimate subject, which is no longer predicated of anything else, and (b) that which is a this and separable --of this nature is the the shape or form of each thing"[24]. In this case the presentation of substance is done in terms that place greater emphasis on the metaphysical entities. In the approach taken by Aristotle in the Categories the logical and linguistic elements of the analysis are more predominant (but the ontological equivalents are also necessarily present). This difference in emphasis and approach to the problem of substance in the two texts illustrates more than Aristotle's philosophical development, it brings out a duality of explanation.

I wanted to draw attention to this issue of the duality of explanation because this duality is very prevalent in the presentation of the concept of substrate, as was hinted at in the

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[24]Meta., 1017b 24-26

previous chapter. In the case of substance the conceptual analysis reveals it to be a logical subject of which other concepts are predicated essentially or accidentally. This is the thrust behind the analysis of the Categories, which presents substance as that which is "neither said of a subject nor present in a subject". The substance also emerges as the cornerstone of Aristotle's metaphysical system as the independent existent and the "ultimate subject" as well as "that which is a this and separable". The two approaches to substance, the conceptual/linguistic and the metaphysical, are not as sharply separated by Aristotle and in fact the definition given in the Categories is not presented as a purely conceptual--linguistic construct. The examples that Aristotle gives are of concrete, existent things, horses and men, which are also linguistic subjects and conceptual bearers of predicates. The two approaches converge on the existing metaphysical entity. A question which may arise at this point is one concerning the order in which Aristotle arrived at his views; from conceptual analysis to metaphysical reality or vice versa? This issue will not be explored here as it falls outside of the scope of our inquiry. The relevant aspect, for our purpose, is the duality of approach with respect to substance which is paralleled in the discussion of substrate.

Regardless of the order in which the two approaches were developed they bear striking resemblance to the scientific and

empirical approach of modern inquiry. The conceptual development of 'substance' from linguistic and logical considerations (this does not remove the possibility that Aristotle was developing such a conceptual framework to account for some empirically observable phenomenon) parallels the scientific development of conceptual tools, or the analysis of empirical data by building the required conceptual apparatus which allows the possibility of such analysis. This process will be further elaborated in the analysis of the concept of substrate, which Aristotle connects with substance. This connection was indicated in the previous chapter and it is also hinted at in the definition of substance as an "ultimate substratum, [or subject] which is no longer predicated of anything else" which was presented above.

The definition of substance as an ultimate substratum (or subject) is also connected with the notion of predication. Predication of attributes to a subject is central to the question of substance. In the Categories the subject of predication is the particular 'this', and this is one of the definitions of substance. That of which something can be predicated, being an individual, an independent existent, cannot be predicated of any thing else, it is substance. Of substance there can be predicated two general kinds of predicate, essential and accidental. Accidental predication includes things which can be predicated of a substance as qualifications of

something which is of a given species and genus. This kind of predication includes things such as colours, place, size etc. and it is revealed in language. The 'man is musical' example is a paradigmatic case of accidental predication and it fits perfectly with what Owens points out about accidental predication:

> "Accidental characteristics, like white, large, running, and so on, were predicated of substances and ultimately of an individual substance. There was nothing more fundamental of which they could be predicated" and further "The predicates other than substance are the accidents. They are quantity, qualities, relations activities, time and place. They are predicated without difficulty of a concrete, individual substance."[25]

In the 'man is musical' example the quality 'musical' is predicated of the subject/substance 'man'. This is straightforward since in this case there is no ambiguity about the subject as substance. The difficulty arises in accounting for essential predication in which the essential predicates are predicated of something. The essential predicates are those which form the definition of the substance, they are the nature of substance, the substantial form. That is to say, they are the formula or the definition of the substance and this aspect of predication is that which leads to difficulties as every predication is in need of a subject and these sets of essential attributes are the subject, or more precisely the substantial form. The difficulty is to identify

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[25]Joseph Owens, "Matter and Predication in Aristotle", in The Concept of Matter, ed. by E. McMullin, University of Notre Dame Press, Notre Dame, 1963. pg. 101 and pg. 103

the subject which supports the substantial form. The only talk of predication that fits in with the account of substance provided thus far is predication of accidental characteristics. The definition of substance presented does not, on the surface, provide an easy solution to this difficulty. The approach taken by Aristotle of analysis in terms of predicates and subject does suggest that there may be predicates which are necessary for the existence of a particular substance.

The subject of predication is itself defined by a set of predicates. This definitive set of characteristics are essential since they comprise the nature, the 'what', of the subject, or substance. The problem that emerges when the analysis developed for the predication of accidental characteristics is extended to the essential attributes is, as was pointed out above, how to account for the subject which underlies the essential attributes. Since the nature of the subject is precisely the set of essential attributes the inevitable question is: what is left? The essential characteristics are all predicates, or determinations, and the linguistic analysis if pressed reveals a subject which is not accountable, definable and which is wholly without any characteristics or determination. Some suggest that the determination can only be given in terms of the essential characteristics and the subject without them is laid bare and

indeterminate. This indeterminate, indescribable subject seems to sound remarkably like what Aristotle had in mind when he wrote:

> "By [matter] I mean that which is in itself not a particular thing or quantity or anything else by which things are defined... Everything else is predicated of primary being; whereas primary being must be predicated of [matter]. Hence, in the last analysis a subject is itself not a particular something or quantity or anything of the sort; nor even their negations for the negations, too, would belong to it only accidentally."[26]

From this passage and the previous considerations of substance and predication it becomes apparent that the ultimate subject which supports the essential predicates is matter seen as an indeterminate entity. This passage also brings with it the implication that matter is a substance, for it is an ultimate substratum, or subject, and that is one of the senses of substance (1017b 25) discussed above and in terms of which substance is defined in the Categories. But as Aristotle himself points out in the lines immediately following the above passage, matter may not be considered as substance: "this is impossible; for both separability and individuality are thought to belong chiefly to substance"[27] and matter is considered to be indeterminate. This has brought us to the conclusion that matter is both indeterminate and something real, that it is a reality lacking definiteness or determination which is a requirement of substance.

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[26] Meta. 1029a 20-26 (Hope translation)

[27] Meta., 1029a 27-28

This discussion began by considering the question of substance, its development from conceptual/linguistic origins and its connection to the objects of experience. The analysis led to the concept of matter, but it led to puzzling conclusions about the nature of the concept because of the attempt to expand the conceptual apparatus to cases which are not readily found in experience. To crystallize the problem as well as to facilitate a solution, the question of substrate will be explored. 'Substratum' or substrate is mentioned in the definition of one of the senses of substance: substance is the "ultimate substratum, which is no longer predicated of anything else" (10176b 24). The study of the nature of the substrate, the hypokeimenon, of change may be of some use.

This question of the hypokeimenon is also approached in a manner similar to the analysis of substance; namely it is a discussion at the conceptual level which is generated from a linguistic consideration. This linguistic/conceptual exposition follows an overview of the positions of Aristotle's predecessors in the field. Thus, some of the conceptual apparatus is already present, primarily the format of two contraries, to which Aristotle adds the requirement that they have some other entity on which to act. This schema was expanded by Aristotle into hypokeimenon, privation and form. This arrangement was

discussed in the first chapter. This arrangement of three principles is refined in the seventh chapter of the first book of the Physics and the development and refining process is language-based: "We say that one thing comes to be from another thing..."[28] and "we speak of 'becoming that from this'..."[29]. These kind of language-based and language-rooted accounts and analyses abound. It is from a linguistic perspective that the complex/simple distinction is introduced.

Seen from a linguistic perspective the complex elements in the analysis of change are a compound of subject and predicate while the simple are either the subject or the predicate taken singly. In the musical man case there are three simple units 'man', 'musical' and 'not musical' and the complex cases which obtain by pairing the subject 'man' with one of the two predicates. The conceptual linguistic analysis of change explains the change in terms of the occurrence of the subject in conjunction with the lack of a predicate (i.e. the privation) at time t_0 and with the presence of that predicate at time t_1. The subject persists throughout the change, it supports the change, it is the substrate or the hypokeimenon.

This linguistic interpretation reveals that the hypokeimenon is a subject and that it must have the ability to

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[28] Physics, 189b 33

[29] Physics, 189b 21

have and receive predicates. The possibility of introducing sometimes two principles of change instead of three is also due to linguistic accounts in which the hypokeimenon is "one numerically, [though] in form at least is not one"[30]. In the parenthetic explanation which follows the above sentence Aristotle writes: "By that I mean that it can be described in different ways". The plurality of form of the hypokeimenon is a plurality in description. In one case the hypokeimenon is describable without mentioning the predicate which is to be replaced in the change, e.g. as a man. In the other case the hypokeimenon is described so that the contrary, the privation, which will not survive the change, is included in the description, e.g. non-musical man. In the first case the principles are three since there are the two contraries and the hypokeimenon, while in the second case the principles are two since the privation and the hypokeimenon are counted as one; the complex hypokeimenon. To the hypokeimenon always some characterization is attached; before the change it is the privation of the form; after the change the privation is replaced by its contrary form. The poles which are the contraries of change are forms, they are different descriptions attaching to the subject, different formulations of the characteristics of the subject.

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[30] Physics, 190a 15-16

This linguistic/conceptual approach to change is applied to the changes occurring in the world. The linguistic analysis built the conceptual framework in which to account for change, and now the task at hand is to identify the elements of existence which correspond to the conceptual constructs. The example of the musical man provides some hints. The contraries, 'musical' and 'non-musical' are, relative to each other as being to non-being and so

> "a thing may 'come to be from what is not'-- that is in a qualified sense. For a thing comes to be from the privation, which in its own nature is not-being,-- this not surviving as a constituent of the result."[31].

The privation and the form stand for non-being and being, respectively; these are the basis of change, understood as something coming to be where there was absence or nothing. But the change is not a complete becoming from non-being, it is so only in respect of the privation. The hypokeimenon, which persists throughout the change, is non-being only with respect to the form it will have after the change (or the privation it has prior to the change), thus it is non-being in a qualified sense[32]. The contraries have been identified as non-being and being, but the substrate, the hypokeimenon, is also being in some sense, since it persists, but it is not yet fully realized.

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[31] Physics, 191b 15-18

[32] Physics, 191b 15-25

Aristotle underscores the unique nature of the hypokeimenon by repeating his earlier observation that "the subject is one numerically, though it is two in form"[33] and by introducing at this point the concept of matter. Matter is introduced parenthetically by Aristotle as a further elaboration of the passage quoted above; "there is the man, the gold, and in general the measureable matter; this is more of a this thing here..."[34]. This explication of substrate is in keeping with the above analysis which revealed the hypokeimenon to be a subject and consequently a 'this'. The element upon which the concept of hypokeimenon is converging is a subject, a 'this' and what Aristotle calls "in general the measureable matter". This expression refers to the two examples given in the passage: "the man, the gold".

The substrate of change, the hypokeimenon, has been shown to be, in this case, a particular. In this sense, and with the references to 'the man' and 'the gold', matter must be distinguished from the matter that was arrived at in the earlier analysis of substance. Matter points here to particular individuals, to substances. The hypokeimenon is not presented as indeterminate in these passages, on the contrary the examples given look exclusively at determinate individuals. The gold and the bronze as mass nouns may elsewhere refer to indeterminate

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[33] Physics, 190b 23-24

[34] Physics, 190b 25-26 (Ackrill translation)

stuff, to indeterminate matter, but the mentioning of 'the gold' in conjunction with 'the man' and the further qualification of the matter by saying that it is "more of the nature of a 'this'" strongly suggests that Aristotle is using 'gold' in the sense of 'a piece of gold' and not as a mass noun. This lends support to the view that this sense of matter generally is a specific use of the term referring to a parcel of determinate matter only. The hypokeimenon sense of matter here involves a very specific kind of matter.

This sense of matter fits very neatly into what Owens calls 'materia secunda' or secondary matter.

> "In the everyday universe of discourse the material or stuff out of which things are said to be made is always of the concrete individual stamp. The wood of which a house is constructed consists of individual pieces. The bronze in which a statue is cast is a piece of bronze in definite dimensions in a definite place at a definite time. In the later Scholastic vocabulary these concrete materials out of which more complex things were made received the designation, 'materia secunda', or 'secondary matter'. Bronze and wood and stone were indeed matter, in the sense that things were made out of them. But they were not basic or ultimate matter out of which those things were made."[35]

'Matter generally' which occurs in the discussion of the nature of the hypokeimenon meets the requirements of secondary matter set out above. The gold is similar to the case of bronze since it was argued above that Aristotle is not using the term as a mass noun. Aristotle

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[35]Owens, Op. Cit., pg. 102

is also pointing to the example of 'the man' and that, at first glance, does not seem to be a case of secondary matter. 'The man' however is matter for change in the same way that 'the gold' or 'the bronze' or 'the bricks' are. The secondary matter is that which takes part, or participates, in something else. The gold, the bronze, the bricks and the man are hypokeimena, they are matter for changes which take place.

From the analysis of change taken generally the substrate, or the hypokeimenon, has emerged as the secondary matter. This matter is not the ultimate matter which was arrived at by stripping substance of all predicates, or determination. In fact secondary matter is most often substance. The changes that the hypokeimenon discussed above underlies are all changes in attributes, the substance that underlies the changes is not generated or destroyed, but persists with the only changes being accidental. The accidental changes do not affect the essence of the hypokeimenon. The man becomes musical, but he is still a man. In the previous chapter I pointed out that Aristotle's stated objective for the exposition in Chapter 7 of the first book of the Physics was to account for "becoming in its widest sense"[36]. The discussion so far has accounted for becoming without mention of generation and destruction of the substances that act as the hypokeimenon of the accidental changes. Can this conceptual model of change accommodate the case of

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[36]Physics, 189b 31

the man becoming, full stop, or without qualification (i.e. coming into being) as well as the man becoming musical?

The question of becoming in the widest sense is addressed at the beginning of the chapter, but a little later on Aristotle qualifies and distinguishes the two senses of becoming, as was pointed out in the previous chapter: "But there are different senses of 'coming to be'. In some cases we do not use the expression 'come to be', but 'come to be so-and-so'. Only substances 'come to be' in the unqualified sense."[37]. This issue of the two major kinds of change, accidental or qualified coming to be 'so and so' and essential or unqualified coming to be (or coming to be simpliciter) is acknowledged by Aristotle. He very clearly states a few lines down that "substances too, and anything else that can be said 'to be' without qualification, come to be from some substratum...for we find in every case something that underlies from which proceeds that which comes to be; for instance, animals and plants from seed."[38]. The linguistic/conceptual framework which was developed above on the basis of qualified, or accidental change is also to be applied in the case of unqualified, or essential change. (This extension of the conceptual framework is carried out on the basis of inductive generalizations from observation, and not from purely conceptual reasons.)

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[37] Physics, 190a 32-34

[38] Physics, 190b 1-5

The conclusions which were drawn about the nature of the hypokeimenon as a result of the above extension of the conceptual framework to cover cases of unqualified substantial change, are only partial and incomplete. The hypokeimenon is the secondary matter, but that cannot account for cases in which substances themselves undergo change. Aristotle points out that substantial changes are underpinned by a substratum or hypokeimenon; therefore there must be more to the nature of the hypokeimenon than secondary matter. The hypokeimenon, as was pointed out above, is a conceptual tool, and it may have more than one metaphysical equivalent if it is the case that the conceptual model of change developed from the case of qualified change is applicable to cases of unqualified change. The problem then, is to find what the substrate is in the cases of substantial change and if it is matter.

Aristotle lists five ways in which unqualified coming to be manifests itself and these follow on the emphatic affirmation that all change is accountable by the conceptual framework outlined thus far[39]. Aristotle, as part of that affirmation and in the five ways of becoming, provides a cryptic answer to the question of the nature of the hypokeimenon of substantial change. Just before listing the five ways in which substantial change manifests itself Aristotle writes: "we find in every case something that underlies from which proceeds that which comes to be; for instance plants and animals from

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[39] Physics, 190b 1-10

seed."[40]. This passage was mentioned previously (quoted in its entirety above), but an important aspect of it has not been commented on. This relevant aspect is simply the example found in the excerpt presented of the hypokeimenon of substantial change.

This is a crucial passage and I want to provide two more translations of the passage to verify whether or not the text makes the suggestion that I wish to present. The translations are by Ackrill and Apostle, respectively: "There is always something which underlies, out of which the thing comes to be, as plants and animals come to be from seed" and "..for there is always some underlying subject from which the thing generated comes to be, e.g., plants and animals from seeds.". Both these translations and the Ross translation presented earlier agree. The text is providing an example of the hypokeimenon of substantial change in the case of the generation of animals and plants, namely the seeds, but the text is also saying that the hypokeimenon in these cases is that out of which plants and animals come to be. If this is the case, namely if in the case of the generation of plants and animals the hypokeimenon coincides with the complex hypokeimenon, namely the combination of hypokeimenon and the absence of the form, or the privation, then the nature of the hypokeimenon in the cases of unqualified change will be quite different than in cases of accidental, or qualified change. To establish the sense of what Aristotle is saying we need to examine

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[40] Physics, 190b 3-5

the ways in which he is using the words 'coming to be'. The linguistic/conceptual analysis once again appears.

Aristotle does address the way in which language is used in describing change in conjunction with bronze becoming a statue and man becoming musical:

> "We speak of 'becoming that from this' instead of 'this becoming that' more in the case of what does not survive the change--'becoming musical from unmusical', not 'from man'-- but there are exceptions, as we sometimes use the latter form of expression even of what survives; we speak of 'a statue coming to be from bronze', not of the 'bronze becoming statue'. The change, however, from an opposite which does not survive is described indifferently in both ways, 'becoming that from this' or 'this becoming that'.[41]

The privation, one of the opposites and the element which does not survive the change, can be talked about in either of the two ways described above. The hypokeimenon, however, is most commonly found in expressions of the type 'this becoming that', e.g., 'man becomes musical'. This is precisely the expression not used in the case of substantial change, where Aristotle writes that "animals come to be out of seeds" (Ackrill) or "...animals and plants from seeds"(Ross) or "...plants and animals from seeds" (Apostle). So it seems that Aristotle has something different in mind since he uses an expression generally reserved for use with the privation. Unfortunately things are not so simple. Aristotle allows for exceptions "as we sometimes use the latter form of expression even of what survives; we speak of

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[41] Physics, 190a 21-29

'a statue coming to be from bronze'". Is it conceivable that Aristotle is simply making use of an expression in exceptional circumstances and there is nothing more to be gained from it?

This question has to be answered negatively because of a difference in the two cases. The case of the 'statue coming to be from bronze' involves something which persist throughout the change. The bronze persists throughout the change. In the case of animals coming to be from seed this is not so clear. Certainly the seed does not persist[42], it is the seed which changes, which becomes the plant or animal. Aristotle, when he talks of animals and plants coming to be out of seed, must have a new, or at the very least a broader, view of the hypokeimenon in mind.

This broader view includes the view of the hypokeimenon as that out of which things are made, or become. The animals and plants come to be, they are the end point of a process of change which started with the seed. The nature of the hypokeimenon in this case is that very material which is changed in shape and to which new material is added and whose material substance is altered in the process of change from seed to animal or plant. These changes are all listed by Aristotle as substantial changes[43] and they are underpinned by a substrate which, this interpretation suggests, is to be considered as the material constituent of the seeds and the

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[42] Generation of Animals, 728b 1-730a 25

[43] Physics, 190b 1-3 [Ackrill]

animal. Using the conceptual model of the three principles of change, the seed in this case is the composite of hypokeimenon and the privation (the seed lacks the form of the animal), the form is the animal or plant. This interpretation is supported by the above examination of the way in which language is used in expressing the change. The fact that we say that 'animals and plants come to be from seed' is in the form which involves both contraries and implies the hypokeimenon. But in this case the privation and the hypokeimenon coincide in so far as the seeds are the matter out of which the plants or animal will develop and the seed underlies the change in so far as its composition will be carried on and will be modified into the plant or animal.

This sense of hypokeimenon, as that which constitutes the substance before and after the change, supporting then one substantial form now another, is not to be identified with that which underlies changes of the qualified variety. This substrate is not what we earlier called secondary matter. On the contrary this representation of hypokeimenon is not determinate or qualified and it is in many ways reminiscent of the indeterminate matter which was uncovered in our analysis of substance in the opening pages of this chapter.

Joseph Owens, from whom the account of secondary matter was borrowed in the above explanation, also provides an accounting for

the matter which was uncovered in the study of substantial change.

> "Bronze and wood and stone were indeed matter, in the sense that things were made out of them. But they were not basic or ultimate matter out of which those things were made. That was signified by calling them secondary matter. That designation implied that there was a still more basic or ultimate matter that was not concrete or individual...The absolutely basic matter of Aristotelian Physics became known in in Scholastic terminology as 'materia prima', primary matter."[44]

The hypokeimenon of substantial change, if not identical with this materia prima, or prime matter, appears to be very nearly related to it.

The inquiry into the referent of substrate has brought us to matter, as the inquiry into substance has also done. The hypokeimenon has two referents depending on the nature of the change that is being examined. In the case of non-essential, or qualified change, the underlying element is, what was defined above as, secondary matter. In the case of substantial change the referent of the hypokeimenon appears to relate to the more elusive primary matter. The conceptual/ linguistic framework applies to both cases of change, but the referents differ in both cases as indicated.

The argument for primary matter is based on an analysis of the way Aristotle uses language in one, albeit very crucial, instance. The introduction and support of such a concept, however, requires more work, more development and support. Primary matter is also a very elusive concept and it needs to be more precisely pinpointed (as

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[44]Owens, Op. Cit., pg. 102

far as an indeterminate entity may be). There is also the definition of matter as "the primary substratum of each thing, from which it comes to be without qualification, and which persists in the result"[45] which needs to be further explained: is Aristotle talking about primary matter here? The next chapter will focus on these and other issues related to this elusive topic of prima materia.

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[45] Physics, 192a 32

CHAPTER 3: PRIME MATTER AND SUBSTANTIAL CHANGE

The discussion thus far has repeatedly run into the issues of primary matter and substantial change and they have usually entered the discussion as side issues to other inquiries, yet they represent two important aspects of Aristotle's view of matter and as such they require further attention. The importance of these two aspects of Aristotle's philosophy of matter is readily apparent since they are both dealing with the most fundamental levels of matter and change, respectively. Primary matter was briefly introduced in the previous chapter as the "absolutely basic matter of Aristotelian Physics"[46]. Substantial change, which was also introduced above, is that change which involves the most basic ontological entity, substance. It is that change in which the essential attributes of a thing have changed such that the entity after the change is substantially different from the entity before the change. The problem before us, however, is not only to give Aristotle's view on the nature and role of primary matter and substantial change in his physical philosophy but also to tie this into the larger picture of matter that is emerging.

Aristotle's schema of change that postulates three elements, that is the model of change I referred to as the replacement model

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[46]Owens, Op. Cit., pg. 102

and which I outlined above, must be kept in mind--namely that every change conforms to the schema of form, privation and hypokeimenon. What must also be remembered is the view according to which the hypokeimenon in cases of substantial change is primary matter, a position I hinted at in the previous chapter. This is the position that must be demonstrated to be mistaken in order to allow for what will be shown to be the proper place of primary matter in Aristotle's scheme and the nature of substantial change. The taking of primary matter as the hypokeimenon for substantial change may be seen as an extension of the view of secondary matter as the hypokeimenon in changes of a non-substantial nature, or changes which do not require the generation or the destruction of substance. This extension may seem to be warranted because of the apparent difficulty in finding a subject for change in cases of substantial change. In these cases the subject itself changes qua subject and not simply in respect to its accidental attributes as in all other cases of change. This difficulty in finding a hypokeimenon in the case of substantial change may be seen as a factor in adopting primary matter as the hypokeimenon. The evidence for this may be traced to the difficulties of interpretation posed by a crucial passage in the Physics.

In the Physics, Book I, Chapter 7 Aristotle formulates an

analogy. This analogy, according to Aristotle, is the only (Ackrill's translation makes this evident) way by which 'the underlying nature can be known'[47]. The underlying nature that Aristotle is after in this passage is the hypokeimenon, but it is the substrate of change understood in a narrow sense. In the previous chapters it was indicated that hypokeimenon may be used broadly as referring to both hypokeimenon and privation if both, together, were contrasted to the form which is taken on after the change. There is also the narrower sense of hypokeimenon that refers to the hypokeimenon as the substratum alone, without reference to the privation. This latter usage occurs in cases where the hypokeimenon is contrasted with both the privation and the form. The hypokeimenon in this sense is taken as precisely that underlying nature which is the subject of the change, which supports both the privation and the form, both before and after the change, respectively. This is the underlying nature which can only be known by analogy and it is to present an insight into this sense of hypokeimenon that Aristotle provides the analogy.

The analogy aiming at providing knowledge about the underlying nature of change runs as follows: "For as bronze is to the statue, the wood to the bed, or the matter and the formless before receiving form to any thing which has form, so is the underlying nature to substance, i.e. the 'this' or existent."[48] This analogy may be

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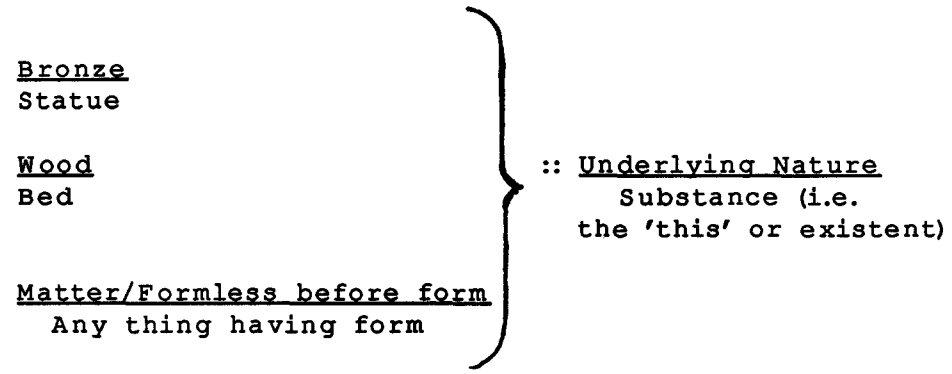
[47] Physics, 191a9 [Ackrill]

[48] Physics, 191a 9-13

further schematised as follows:



This schema reveals at a glance the proportions which Aristotle establishes. What is striking about these proportions is that the third proportion on the left hand is practically identical to the proportion on the right hand side. The 'Formless before form' and the 'Underlying nature' are the same thing if the hypokeimenon is taken in the narrow sense described above and 'Anything having form' is a 'this', which is a substance. If this interpretation is correct then Aristotle is using two descriptions to designate the same principle by introducing the third proportion. Further, it may be maintained that the third proportion does not belong on the left side of the proportion as shown, but that it belongs on the right side and Aristotle has made a mistake. This may seem to be a trivial observation, but if Aristotle is in error then the analogy is in jeopardy and the only epistemological access to the underlying nature will have been lost.

Yet another interpretation might present itself if the 'underlying nature' is taken in the broader sense which includes the privation. In such a case the underlying nature already possesses a form, the privation, and as such it is the 'formless before receiving form' only in a loose sense. The 'formless before receiving form' is paired with 'matter' which is, from the examples given, secondary matter. This secondary matter is bronze, for example, which is a chunk of bronze and as such it has a form, only its 'chunky' form is not describable in language. (This issue was discussed in the previous chapter.) Also this alternate reading of the analogy comes up with the same difficulty: both the third and fourth proportions are identical.

A careful analysis of the text, however, reveals that the sense of hypokeimenon employed in the fourth proportion by Aristotle must be that of underlying nature taken in the narrow sense: "it is clear that there must be something underlying the contraries, and that the contraries must be two"[49]. Aristotle is contrasting the contraries to that which underlies them, the hypokeimenon taken simply without incorporating the privation. The correct interpretation of the analogy is closer to the first attempt, presented above, in which the underlying nature was taken without reference to either of the contraries.

This reconsideration of the possible usage of 'underlying

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[49] Physics, 191a 4-6

nature' also requires a reconsideration of 'the matter and the formless before receiving form'. This part of the analogy was analysed in the second attempted interpretation of the analogy and it was revealed that it does involve form. Matter is used in the sense of secondary matter as described above.

This reconsideration has opened up the analogy to two further interpretations, one of which is wrong and is the source of much misunderstanding. The erroneous position is very simple and it is partly this simplicity which makes it so compelling.

The first, and erroneous, interpretation of the analogy, based on the considerations presented above, holds that the entire left side of the analogy deals with the proportion of secondary matter before the change, which is relatively formless with respect to the form it will have after the change, to the newly enformed entity occurring after the change. Thus there is the chunk of bronze, the secondary matter, becoming a statue, or in general the matter, formless qua the form which it will have after the change, but having some definite form, becoming some thing with a form which was not present prior to the change. The proponents of this view argue that the right side of the analogy is a proportion relating (a) 'underlying nature' in its narrow sense, that which is contrasted to the form and the privation and as such is without form and so is identified with primary matter, to (b) substance or a 'this', a

particular. The entire analogy is then given a very symmetric and compelling interpretation: as secondary matter is to things with form in cases of non-substantial change so is primary matter to substance in the case of substantial change.

This last move which assigns the left side of the analogy to the realm of non-substantial, or accidental change, and the right side to cases of substantial change is not explicit in the analogy itself. This is a further inference drawn from a passage found a little earlier in the chapter:

> "Now in all cases [of change] other than substance it is plain that there must be something underlying, namely, that which becomes. For when a thing comes to be of such a quantity or quality ...a subject is always presupposed, since substance alone is not predicated of another subject, but everything else of substance.
> But that substances too, and anything that can be said to be without qualification, come to be from some underlying thing, will appear on examination. For we find in every case something that underlies from which proceeds that which comes to be: for instance, animals and plants from seed."[50]

This passage claims that something underlies both types of change, but it is evident what is that which underlies accidental change: it is that which becomes, it is the bronze which becomes a statue, it is the matter, that is the secondary matter, which takes on a new attribute The cases of substantial change are also supported by something which underlies the change of one substance into another, but it is not at all apparent what is the nature of that which underlies these substantial changes. It is this sense of the

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[50] Physics, 190a 33 - 190b 4

'underlying nature' that needs to be given to us by Aristotle and it is likely that it is this that is presented to us in the analogy.

Thus, this interpretation of the analogy holds that the analogy is needed in order to explain this 'underlying nature' which is not determined by substantial form because it is that which allows for substances to change from one to the other. It is a primary matter which is not enformed and makes possible substantial change. The analogy is needed because of a lack of form, that is, of a lack of intelligible determination. Since we cannot have knowledge of anything without a formula, i.e. of primary matter, the only way in which we may have knowledge of this formless underlying nature is by means of an analogy. The analogy in question parallels the relationship of secondary matter, in non-substantial change, to the altered substance, to the relationship of primary matter, in substantial change, to the new substance.

This interpretation of the analogy connects the notions of primary matter and substantial change as was indicated in the opening page of this chapter. This interpretation is very influential as some form of it may be traced to the authority of St. Thomas Aquinas[51]. My concern here was not to discuss in detail any one specific interpretation, but rather to show, in a general way, how primary matter and substantial change are claimed to be connected and to point out that such a coupling of these issues is not uncommon and

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[51]Hippocrates G Apostle, Aristotle's Physics, Peripatetic Press, Grinnell, Iowa. c.1980. Pg. 200, Note 25.

that it enjoys a rather lengthy and distinguished history. This connection of the concepts of primary matter and substantial change, however, obscures, in my opinion, both concepts and makes the study of either difficult.

The first salvo in the attempt to overturn this interpretation will be the presentation of what I hold to be the correct interpretation of the analogy. This will be followed by an examination of the concepts of primary matter and substantial change which will establish each as distinct and will indicate their respective ranges of application.

The interpretation of the analogy which will be presented here borrows and depends upon some of the material discussed above. The principal element in this interpretation which separates it from the previous accounts is its perspective on the right hand side of the analogy. Aristotle presents the analogy on the heels of a summary of the number of principles of change: how many and what they are. The number has been presented as three and it has been explained in what sense there may be considered to be only two principles. The preamble to, or the set up for, the analogy is simply that "it is clear that there must be something underlying the contraries..."[52]. The 'underlying nature' that Aristotle is trying to bring out is that which is in opposition to the contraries. It is the underlying nature considered as an element in the explanatory

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[52] Physics, 191a 5

schema of change. Aristotle has talked of the contraries and he has explained what they are, but he has not given a similar explanation of the underlying nature. In this context the underlying nature of change must refer to all changes and not just the substantial. Thus the 'underlying nature' employed in the right hand side proportion is simply the concept of hypokeimenon and its relationship to the concept of substance. The third proportion on the left hand side is the metaphysical equivalent, it is the relationship of the actual entities to each other. The first two proportions on the left side of the proportion are particular 'bronze' and 'wood', and the 'matter/ formless before form' is simply the consideration, by Aristotle, of the general case. This generalization of the physical case is not the same as the conceptual framework because it is based on the particular cases of proximate matter, it is a process of induction that culminates in the generalization. My view is that Aristotle wants to account for all changes, he wants to establish a relationship between the concepts he has developed, hypokeimenon and substance, by using their physical counterparts as derived from particular cases.

Further, there is no support for thinking that the 'underlying nature' refers to primary matter. One reason falls out of what has just been indicated, namely that the right hand side of the analogy encompasses all kinds of change. To think that the the underlying

nature refers exclusively to primary matter would include primary matter as a consideration in all change and clearly that is not the case, as most change is accounted for by referring only to changes in secondary matter. There is also no indication that Aristotle is trying to deal with this fundamental question of primary matter in this chapter, and a passing reference to substantial change at 190b1 may be construed as dealing with primary matter only if the connection of primary matter and substantial change has already been accepted. Thus strictly speaking there is no reference to primary matter at all in this chapter.

There is, however, an apparent reference to primary matter in the last chapter of the first book of the Physics: "by matter I mean that primary underlying thing in each case, out of which as a constituent and not by virtue of concurrence something comes to be..."[53]. In this case Aristotle seems to connect, in a very direct way, matter with the notion of a 'primary underlying thing'. This may indeed be interpreted as a case in which primary matter is explicitly mentioned by Aristotle, but there is a more likely explanation that makes no reference to primary matter in the technical sense of matter devoid of any form. The misinterpretation of this passage as a reference to primary matter occurs because of an ambiguity in the concept 'primary'. The misinterpretation springs from a reading of 'primary' as 'first', or 'fundamental'. The more

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[53]Physics, 192a 31-33

likely explanation of this passage is based on reading 'primary' as 'antecedent', or 'immediately before'. This will appear to be a more plausible reading of the passage if the lines just preceding the given excerpt are also considered: "...there would have to be something underlying, out of which, as a constituent, it came to be; that, however, is the material nature itself, for by matter I mean...."[54]. The complete passage suggests the consideration of 'primary' as 'immediately before' since Aristotle has in mind that matter which is immediately before the present existent, that which immediately underlies it. Aristotle is thinking of the 'bronze' which is immediately before, or below, the 'statue'. In the language that I introduced earlier, the sense of matter that is used here is that of secondary matter not of primary matter and to read this passage as endorsing a Thomistic interpretation of primary matter is simply to equivocate on the meaning of 'primary'. Thus there is no mention of 'primary matter' in the entire first Book of the Physics and it would be very odd for Aristotle to suddenly introduce this important concept unannounced and disguised as 'underlying matter' as part of an analogy. There are very strong reasons to doubt the reading of 'primary matter' into an interpretation of the analogy.

If this is the case then the position I presented earlier does provide a plausible account for the analogy. The 'underlying nature' of the right side of the analogy must be understood only as

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[54] Physics, 192a 28-30

the text, and the previous discussion, suggests: the underlying nature is a general term and a conceptual entity found in the conceptual schema of change. The analogy is meant to shed light on this concept in its relationship to the concept of substance; it is aimed at illustrating the relationship between two pivotal concepts in the analysis of change. The left hand side of the analogy provides concrete, particular examples, as well as particulars considered generally, but all components of the proportions of the left are metaphysical entities and so on the left actual existents are compared while on the right concepts are compared. The analogy seeks to provide an understanding of the relationship of two pivotal concepts by means of the more readily accessible relationships between physical entities. The analogy may be considered as saying something more along the lines of: 'as material is to the existing enformed things so is the concept of underlying nature, or the hypokeimenon, to the concept of substance'. There is no need to elaborate the issue any further if the context provided above is kept in mind.

The reading of the analogy presented above divorces the concepts of primary matter and substantial change, but it does not give insight into the nature of these concepts. The problem of the role of primary matter in change or even the question of whether it exists at all persists. The difficulty with substantial change, how

it is possible and what underlies it have yet to be tackled. The only certainty is that the two are not as closely connected as they seem, but if and how they are related remains to be explained. The first of these issues to be discussed is primary matter.

Primary matter (prime matter) has been at the centre of a controversy which ranges from the Thomistic position that primary matter underlies all substantial change (a version of this view was presented above) to the position of Hugh R. King[55] who argues that the concept of primary matter is not to be found in Aristotle's philosophy at all. These extreme positions will not be addressed, but the interpretation which will be presented here is somewhere between the two (and its development will serve as an indirect refutation of the extreme positions). Primary matter does have a place in Aristotle's natural philosophy, but it is very much a restricted role. The domain of primary matter does not extend beyond the realm of the four sublunary elements and the discussion of primary matter in Aristotle's text is largely contained in On Generation and Corruption and On the Heavens.

The sublunary world consists of the four elements. These four elements are the 'stuff', the material out of which the physical, perceptible bodies are constituted. These constitute the primary bodies which combine to form the complex bodies which dominate the sublunary world. These are the nuts and bolts of Aristotle's system

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[55]Hugh R. King, "Aristotle Without Prima Materia", J. Hist. Ideas, 17 (1956) pp. 370-389

and they constitute, in today's terminology, the chemical elements, the building blocks of the natural world. They are the foundations of all matter. Thus their proper presentation is crucial.

Aristotle tells us that the elements are four and what they are, but the elements are not simple:

> "...It is evident that the couplings of the elements will be four: hot with dry and moist with hot, and again cold with dry and cold with moist. And these four couples have attached themselves to the apparently simple bodies (Fire, Air, Water and Earth)..."[56]

Thus the elements are in fact a complex mix of two powers or qualities and are only apparently simple bodies. Fire, for example, is a combination of hot and dry, while Earth is a mix of cold and dry. The bodies fire and earth encountered in the sublunary world are the empirical fire and earth which are tangible, perceptible and lacking in purity. The bodies differ from the elements or the simple bodies in the same way that a piece of cobalt on a table differs from the element Cobalt:

> "fire and air and each of the bodies we have mentioned are not simple but combined. The simple bodies are indeed similar in nature to them, but not identical with them. Thus the simple body corresponding to fire is fire-like not fire; that which corresponds to air is air-like..."[57]

The simple bodies are the pure elements and as such they are not bodies per se, but rather theoretical, logical, entities. The bodies in the empirical world are 'similar' though not identical, as no body can be purely elemental, without trace impurities of other elements.

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[56] Gen. Corr., 330a 33 - 330b 3

[57] Gen. Corr., 330b 21-25

The elements may change one into the other: "all of them are by nature such as to change one into one another; for coming-to-be is a change into contraries and out of contraries, and the elements all involve a contrariety in their mutual relations because their distinctive qualities are contrary"[58]. This account of the change of elements one into the other, employs the same terminology as all other accounts of change studied thus far. The talk of contraries and the identification of the elements as involving contraries is reminiscent of the previous discussion of privation, form and hypokeimenon. The contraries mentioned can be plausibly compared to the contraries of changes discussed in the Physics, but thus far it is not clear what the nature of the underlying substratum which supports the contraries might be.

Aristotle is very careful to point out that the four elements are not all generated from a single element nor is there some fifth element from which all the others are generated and into which they all are destroyed: "there is no single one of them out of which they all originate. But neither is there anything else beside these four..."[59]. The four elements are basic; "since there is nothing perceptible prior to these, they must be all"[60]. There is no looking beyond the elements to 'see' another perceptible entity which

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[58] Gen. Corr., 331a 13-16

[59] Gen. Corr., 332a 19-21

[60] Gen. Corr., 332a 27

supports them and out of which they are generated. The very nature of change in the case of the elements rules out such a primitive entity because of the cyclical nature of the change: one element is changed into another and as one is destroyed another comes to be. This is merely the application of a more general observation on the nature of generation and destruction: "..The passing away of this is a coming-to-be of something else, and the coming to be of this a passing-away of something else"[61]. The important aspects of the Aristotelian position, as far as this inquiry is concerned, have been presented: the four elements are the most fundamental perceptible entities; they are not generated nor destroyed into a more fundamental entity; they are not all generated from one element; the elements change easily from one to the other in a cyclical fashion; the elements are a combination of two powers and change one into the other by altering one of their powers, but not both, at a time; no one element is a principle for any other element.

The nature of the elements has been discussed, but the discussion of change between the elements has been superficial and other than the fact that it does occur and that it occurs in a certain way, i.e. cyclically by a change in one of the elemental powers, no other explanation has been given. The issue of particular interest for us is the nature of the change between the elements, as it is there that the substratum is most likely to be required, if

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[61] Gen. Corr., 318a 23-25

Aristotle is to remain true to to his schema of change. This is indeed the case as Aristotle writes, "Matter, in the most proper sense of the term, is to be identified with the substratum which is receptive of coming-to-be and passing-away"[62] and "the substratum is the material cause of the continuous occurrence of coming-to-be, because it is such as to change from contrary to contrary"[63]. Thus matter is the substratum, that which we have also called the hypokeimenon in the analysis of the Aristotelian schema of change. The problem that still remains is the exact determination of the nature of this hypokeimenon. In cases of change, including cases of substantial change, which are other than cases of elemental change the matter may be identified as a perceptible entity. When the lump of gold becomes a statue the matter which underlies the change is the gold, a material which is perceived. In the change of air to water the substratum is not perceived. Aristotle has clearly stated that there is not another perceptible entity from which the elements come to be. This leaves only one possible answer to the question of the nature of the matter of the elements:

> "...although there is a matter of the perceptible bodies (a matter out of which the so-called elements come-to-be), it has no separate existence, but is always bound up with a contrariety.... we must reckon as a principle and as primary the matter which underlies, though it is inseparable from, the contrary qualities:

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[62] Gen. Corr., 320a 3-4

[63] Gen. Corr., 319a 19-22

> for the hot is not matter for the cold nor the cold for the hot, but the substratum is matter for them both."[64]

This passage is crucial and it is one of the rare occasions in which Aristotle uses the term 'primary' in association with the term 'matter' ('primary matter' is an innovation and an interpretative wrinkle introduced by subsequent scholars, particularly,Thomas Aquinas, as was mentioned previously). The schema of change presented in the Physics is to be found in this excerpt: the contraries which constitute the elements cannot act as material for each other and a third element which underlies the contraries is needed. This third element, the primary matter, according to the passage, 'has no separate existence'. Primary matter is thus established by Aristotle as a logical entity which is postulated by the schema of change, but it has an uncertain role outside the logical realm. Primary matter has no perceptible existence, unlike secondary matter which does have perceptible manifestations. It is also significant to keep in mind that primary matter was presented by Aristotle in the context of an analysis of the most primary perceptible entities, the elements, and no reference was made to primary matter being present in cases of change involving more complex substances.

Thus my interpretation of primary matter leads to the conclusion that primary matter is a theoretical concept which

Aristotle is pressured into accepting by the force of his own model of change. The replacement model dictates that the two contrary powers must have a third principle on which to act, but at this very basic level there is no hypokeimenon which can exist or be conceived other than as connected to one of the basic powers. The sense of primary matter that my analysis suggests is closely paralleled by Hugh R. King's description when he writes that primary matter is "not a part of Nature's body but an abstract concept of the restless, infinite and eternal potentialities within Her"[65]. King, of course, argues against this position to ultimately claim that the concept of primary matter is read into Aristotle by the subsequent tradition and it is not one that Aristotle uses himself. My own analysis from the perspective of change strongly suggests that Aristotle accepts primary matter as a necessary concept to account for elemental change and a similar conclusion is reached by Solmsen[66]. (An examination of the arguments would be too lengthy to undertake here.) But the concept of primary matter has a long history and clearly neither my word nor that of Solmsen is the last on the issue. A case in point is Robert Sokolowsky, who presents the challenging possibility that primary matter "has extension in itself. The powers of hot and cold, fluid [wet] and solid [dry] modify the state of the matter, but they do not give it its primary

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[65]Hugh R. King, "Aristotle Without Prima Materia", J. Hist. Ideas, 17 (1956) pp. 370

[66]Friedrich Solmsen, "Aristotle and Prime Matter: A Reply to Hugh R. King", J. Hist. Ideas, 19 (1958) pp. 243-252

extension."[67]. A full examination of Sokolowsky's thesis is beyond the scope of this chapter, but it indicates that the concept of primary matter is very much to be found in the writing of Aristotle. The exact nature of that concept needs to be further refined, but for the purposes of this paper it is enough to demonstrate its possibility and to present at least one plausible interpretation of its nature: primary matter as a necessary logical entity, an abstract possibility dictated by Aristotle's model of change.

The discussion, however, though limited to the realm of the elements, does deal with the substantial changes of the elements, one into the other, and as such it does leave the door open for speculation that primary matter may have a role to play in all instances of substantial change. It is with this in mind that we must now turn to a discussion of substantial change in general (excluding cases of elemental change which have been already referred to) and dispel this notion of the necessity of primary matter for any instance of substantial change.

The discussion of substantial change has benefitted from the analysis of primary matter in at least one important respect: as was revealed above, "in substances, the coming-to-be of one thing is always a passing-away of another, and the passing-away of one thing

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[67]Robert Sokolowsky, "Matter, Elements and Substance in Aristotle", J. Hist. Phil, 8 (1970) pp. 277

is always another's coming-to-be"[68]. This being said, there are two questions that remain to be answered. First, primary matter the mediating substratum in non-elemental kinds of changes? Second, if primary matter is not involved in such substantial change, what is the mechanism of the change? The first question is easier to answer than the second, since the material thus far discussed is enough to provide a qualified negative answer.

The answer to the first question is a qualified no; primary matter is not a mediating substratum in cases of non-elemental substantial change for the simple reason that the complex substances are themselves composed of simpler perceptible material which may act as the hypokeimenon of the change, but which is, however, more complex than the elements. To expand on this answer it is necessary to consider the connection between substantial change and alteration presented by Aristotle in Book one, chapter four of On Generation and Corruption. Aristotle distinguishes between alteration and substantial change in the following way:

> "The substratum is one thing and the affection whose nature is to be predicated of the substratum another, and either of them can change. So it is alteration when the substratum remains, being something perceptible, but change occurs in the affections which belong to it, whether these are contraries or intermediates. For example, the body is well then ill, but remains the same body; the bronze is now round, now a thing with corners, but remains the same. When, however, the whole changes without anything perceptible remaining as the same substratum, but the way the seed changes entirely into blood, water into air, or air entirely into water, then,

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[68] Gen. Corr., 319a 21-23

> when we have this sort of thing, it is a case of generation (and corruption of something else); particularly if the change takes place from what is imperceptible either by touch or by all senses...."[69]

Alteration is a case of secondary change in which there is a persistent, perceptible hypokeimenon and the change consists in changing the affections, or accidental predicates, of the subject. Thus alteration falls in the broader category of secondary change which I discussed previously. (The reason Aristotle picks alteration as the change with which to contrast his view of substantial change, or generation, is connected to the metaphysical positions on change of his predecessors, which is an issue far too complex to be dealt with here.) Generation, or substantial change, is comprised of those changes in which the substratum is changed. Gill very concisely explains: "...within the subject, there are two factors, a factor corresponding to the formula and a factor corresponding to the matter; when the change occurs in these intrinsic features, features that contribute to what a subject is, there is generation and destruction..."[70]. In the case of substantial change the substratum which acts as hypokeimenon in cases of accidental change is changed. That substratum for accidental change is part of the intrinsic features of the substance and since substantial change is precisely the change in these intrinsic features it involves a change in that substratum as well.

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[69] Gen. Corr., 319b 8-18

[70] Mary Louise Gill, Aristotle on Substance, Princeton University Press, Princeton, New Jersey. c. 1989. pp 54

Aristotle's schema of change, however, still applies to substantial change even though the substratum of accidental change is itself changed in the process. The substratum of substantial change, the hypokeimenon that supports the change in substantial form, is the matter that is immediately below, or before the substratum of secondary change. Thus for all non-elemental substantial changes the simpler, perceptible materials which underlie the substratum of secondary change will act as the hypokeimenon in cases of substantial change. Primary matter is not the hypokeimenon of non-elemental substantial change.

It is only in cases of elemental substantial change that the primary matter enters into the schema of change as the hypokeimenon. The elements are themselves the most basic existing entities and the primary matter is what underlies them, in the manner I described previously. Primary matter is the logical construct which underlies the elements and acts as substratum allowing for the cyclical changes between the elements. Primary matter does not have a perceptible, tangible, existence and it is only found in connection with the pairs of contraries which comprise the elements. Thus primary matter has no role to play, except in so far as it is a part of all matter as the hypokeimenon of the elements, in non-elemental substantial change. The view that primary matter underlies all cases of substantial change is comparable to resorting to an explanation at

the atomic/nuclear level to account for the evaporation of water which may be explained with reference to molecular bonds and hence with reference to a larger level of reality. Although encompassed in it the primitive nuclear aspect is not directly relevant in this larger scale.

The question regarding the connection of primary matter to substantial change has been addressed, but the problem of the exact nature of non-elemental substantial change still requires further attention. In the previous discussion of primary change a general observation on the nature of substantial change was introduced: "in substances the coming-to-be of one thing is always the passing-away of another, and the passing-away of one thing is always another's coming-to-be"[71]. There is a continuity in the process of change, and the destruction of a substance is not possible without some other substance being created. The process of unqualified passing-away is not the terminal point of change in the sense that something simply goes out of existence without leaving some residue in the form of another something. Conversely, unqualified coming-to-be is not the coming into existence of something without there being another something which preceded it and which became the new substance. The process of substantial change is in fact a process of change (not one of absolute creation or complete annihilation), but it is a process of change in regard to substantial forms. We have substantial form

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[71] Gen. Corr., 319a 21-23

when one substantial form ceases to exist and is replaced by another, as I described above. The forms change from one to another because of the special nature of the substratum which supports and makes possible the succession of one by another.

The process of substantial change depends, as I mentioned above, on the replacement model of change which has been the focus of the discussion thus far. Like all change, substantial change is supported by a hypokeimenon. In cases of qualified change the hypokeimenon can easily be identified as a substance, in cases of unqualified change the hypokeimenon is not the substance, but the matter: "All things that come to be either by nature or by art have matter; for each of them is capable both of being and of not being and this capacity is the matter in both."[72] It is this capacity of the matter which allows for substantial change:

> "The matter comes to be and ceases to be in one sense, while in another it does not. As that which contains the privation, it ceases to be in its own nature; for what ceases to be --the privation-- is contained within it. But as potentiality it does not cease to be in its own nature, but is necessarily outside the sphere of becoming and ceasing to be."[73]

Matter persists and takes on another form though the substantial form, or the privation, in the case of coming to be, is destroyed; the matter as potential is unaffected. 'Matter' as used in this sense is referring to 'matter' as principle and the material in a

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[72] Meta., 1032a 20-22

[73] Physics, 192a 25-29

change may in fact undergo some qualified change.

The destruction of a house for example, or the growth of a seed into a plant are two cases of substantial change. The first example is a case of change due to art, made possible through the agency of man, while the second example is a case of natural change where the agent of change is nature.

> "Now every thing that comes to be comes to be by the agency of something and from something and comes to be something. And the something which I say it comes to be may be found in any category; it may come to be either a 'this' or of some quantity or of some quality or somewhere"[74]

In the case of a house the material consists of the bricks while the 'matter' as principle corresponds to the material. The destruction of the house does not destroy the bricks; they, that is the material which in this case is the 'matter', simply assume a 'not-house' shape, or form, and so ceases being a house. The resulting pile of bricks has undergone a change and the bricks have changed position, the material has moved and as such it has undergone a change, but the matter, the bricks qua bricks have not been affected. They as potential could very simply have assumed the shape of a house or of the resulting pile. Now if the bricks were smashed this is not a destruction of 'matter', but a substantial change where the bricks, formerly the material of the house, are now being considered as a

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[74] Meta., 1032a 12-15

substance with a particular substantial form and a material, clay, which also corresponds to the principle 'matter'. The clay is the matter which persists and which has the potential to be both brick and to not be brick but clay dust. The clay is the material of the brick which is the material of the house and so the clay is indirectly material and 'matter' for the house. All reference to the destruction of the house, however, can be made simply in terms of the rearrangement of the bricks (allowing that no bricks are smashed as the house is destroyed). This is a case of substantial change mediated by a material hypokeimenon, or matter as principle, which is not primary matter and which need make no reference to primary matter. The primary matter is in a position analogous to the clay in the destruction of the house; it is there and it is necessary that it be present, but it is not a player in the analysis of the particular substantial change.

The analysis of the house has shown how, in the case of substantial change by art, such change can occur. A very similar analysis may be given in the case of substantial change in which the agency of the change is natural. The example of the seed changing into a plant or an animal follows the same pattern as the change of the house into rubble. In the case of growth, however, the food taken in by the seed is changed into bark, or flesh and bone, and the corresponding underlying materials are more difficult to point out as

there are more and more subtle changes which take place. The process though more complex is not different since "natural comings to be are the comings to be of those things which come to be by nature; and that out of which they come to be is what we call matter..."[75].

Further, substantial change is not random, and something cannot become anything whatsoever since "in a sense everything is produced from another individual which shares its name (natural products are so produced), or a part of itself which shares its name (e.g. the house produced by reason is produced from a house; for the art of building is the form of the house)"[76]. The acorn will produce an oak and the pine cone will yield a pine and the house builder, in so far as he has the form of a house in his mind, will build a house.

The nature of substantial change has been accounted for above and it has been shown to be distinct from, and not connected to, primary matter except in cases of substantial change involving the four elements. Yet this discussion of substantial change has employed the concept of matter as potential and it is this aspect of matter which allows it to take on various forms. This dimension of matter has not been explored in this chapter, yet it is crucial for a full accounting of matter as well as for providing additional insight in the process of change both qualified and unqualified. It is to this other dimension, to matter as potency, that I turn next.

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[75] Meta., 1032a 16-18

[76] Meta., 1034a 21-24

CHAPTER 4: POTENCY, POTENTIALITY AND ACTUALITY

Until this point in our discussion one schema of change has been examined. The schema that Aristotle introduces in the Physics with its three components of form, privation and hypokeimenon has dominated the examination of change and matter that I have presented thus far. There is, however, another approach and another schema of change that Aristotle introduces in the Metaphysics. This second perspective on change revolves around the two principles of 'potency' and 'actuality'. This chapter will examine this schema of change, focusing on its two central principles, but the main thrust of the inquiry will be to gain new insight into the concept of matter. The difficulty that has to be resolved in this case is three-fold. The connection of this second schema of actuality and potency to matter is only one problem; there are the two additional problems: first, resolving the ambiguities that Aristotle's schema is plagued with, especially with regard to how 'potency' is used, and, second, determining whether the two schemas of change are compatible. This last problem is relevant because it is important to establish whether Aristotle has two descriptions of the same phenomenon, each capturing some of its relevant characteristics and together forming a whole, or whether he has changed his mind about change and matter itself and

only one of the two schemas of change is to be considered as his considered view. Before any of these difficulties are to be dealt with Aristotle's new perspective must be presented.

The pivotal concepts of this schema are those of 'potency' (potentiality and its relationship to potency will be discussed in due course) and 'actuality'. Aristotle discusses these core concepts in the Metaphysics, beginning with potency:

> "(1) 'Potency' then means [a] the source, in general, of change or movement in another thing or in the same thing qua other, and also [b] the source of the thing's being moved by another thing or by itself qua other....(2) The capacity of performing this well or according to intention; for sometimes we say of those who merely can walk or speak but not well or not as they intended, that they cannot speak or walk. The case of passivity is similar. (3) The states in virtue of which things are absolutely impassive or unchangeable, or not easily changed for the worse are called potencies; for things are broken and crushed and bent and in general destroyed not by having a potency but by not having one and by lacking something, and things are impassive with respect to such processes if they are scarcely and slightly affected by them, because of a 'potency' and because they 'can' do something and are in a positive state."[77]

The above excerpt covers a lot of ground by giving three broad aspects of the concept 'potency' and each covers a markedly different area.

The first aspect of potency distinguishes between [a] an 'active' and [b] a 'passive' sense of potency. The active potency is that which is in the agent of change while the passive potency is the

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[77] Meta. V, 1019a17 - 1019a33

potency of that which is being acted upon. Whereas the first aspect is of a descriptive character, the second is of an axiological character; it applies to both active and passive senses of potency. Aristotle's third position on potency draws attention to a certain condition which is characterized as a positive state because the entity possessing this kind of potency will be impervious, or hardly susceptible, to certain kinds of activities performed on it, e.g. bending, crushing, etc.. The flip side to this, which is not explicitly stated by Aristotle, is that the correlative active potency will flower into that for which it was a potency, given the absence of resistance in that upon which it acts.

The accounts of potency that Aristotle provides in the passage presented above are three, but the first is further subdivided into two. It is this first aspect, introduced above, that is most readily connected with a schema of change. Aristotle's description of this potency facilitates this conclusion by referring to what I have called the active potency as the 'source, in general, of change', and to the passive potency as the source of a thing's being changed. Thus the first aspect of potency may be called its causal aspect as its two subdivisions are two powers that must be present if change is to take place. Now, the two senses of potency, active and passive, are quite disparate and yet they are connected to each other and to the larger[78] sense of potency. Aristotle recognizes this problem

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[78] Meta. IX, 1042a 2-4

when he writes: "Obviously, then, in a sense the potency of acting and of being acted upon is one (for a thing may be 'capable' either because it can be acted on or because something else can be acted on by it), but in a sense the potencies are different"[79]. The relationship is described in a manner analogous to the way the various senses of 'being' are related, namely the senses of potency are related to each other by a pros hen relation. This kind of relationship is described by Mary Louise Gill as:

> "a device that has come to be known as 'focal meaning'. If several items are called by the same name or by related names (as 'medicine' and 'medical'), he [Aristotle] looks for the the central application and explains the others with reference to that one."[80]

In the case of potency the central, or focal, meaning is the first definition given above. Aristotle confirms this interpretation by repeatedly referring to active potency as primary: "all potencies that conform to the same type are starting points, and are called potencies in reference to one primary kind of potency which is a starting-point of change in another thing or in the thing itself qua other"[81] and "In all these definitions is implied the formula of potency in the primary sense..."[82].

Clearly the focal meaning is rooted in active potency as the starting point of change. Yet, Aristotle does not restrict the range

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[79]Ibid., 1046a 19-21

[80]Mary Louise Gill, Aristotle on Substance, pg 172

[81]Op. Cit., Meta. 1046a 9-11

[82]Meta., 1046a 15

of potency to motion "For potency and actuality extend further than the mere sphere of motion."[83]. This extends the range of the concepts beyond the 'active/passive' distinction that was pointed out above. The analysis of the concept is complicated not just because there is the added range of potency into fields beyond that of change or because of the duality of active and passive potencies within the realm of change. The analysis is complicated because Aristotle uses the same term, 'dunamis', to mean all of the above senses of potency. Gill points out the problem in this way: "however the term is translated, it is important to recognize that he [Aristotle] uses the same word to indicate both active power and passive responsiveness"[84]. This additional difficulty requires that the inquiry that is to follow must make explicit the various senses of potency to avoid ambiguity or equivocation. The main concern of this investigation is restricted to the realm of change and the role of matter within change, thus not all aspects of potency will be explored.

The aspects that need illumination have already been broadly introduced as active and passive potency and a tentative distinction was drawn between them. A more precise distinction is presented by McMullin:

> "Aristotle distinguishes between active potency or power (the original sense of dunamis) which is the ability to

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[83]Ibid., Meta. 1046a 1

[84]Op. Cit., Gill, pg. 173

> act upon something else, and passive potency which is the capacity of being acted upon by something else. The two are clearly correlative: each is conceptually related to the other. Each is relative to a specific "something else"; thus we do not simply say that A is in passive potency, but that it is in passive potency to being acted upon in a specific way by a specific entity, B."[85]

McMullin, in the above passage, reiterates some of the points I made earlier, but he also points out that potency is always "relative to a specific something else". Potency is in relation to a specific entity and as such is never completely indeterminate or pure. For McMullin there is no entity which is completely indeterminate as far as its potency is concerned; it cannot become anything whatever. This is due to the hidden assumption that the entity is precisely that, an entity, which implies it has a form already. The form determines the entity and necessarily limits its possibilities or potencies. This discussion, as it is set up by McMullin, concerns passive potency, in so far as something is capable of becoming something definite, involving an agent acting upon the entity in a specific way, and does not deal with active potency directly.

The discussion of potency is linked, as are all metaphysical discussions in Aristotle's corpus, to that most basic ontological unit, substance. The physical substances with which we are concerned in this discussion are necessarily a union of form and some

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[85]Ernan McMullin, "Four Senses of Potency", in The concept of Matter in Greek and Medieval Philosophy, ed. E. McMullin, (Notre Dame University Press, 1963), pp. 296

underlying matter. This I have discussed previously. The substance, seen as a combination of matter and form, cannot be completely indeterminate with regard to what it may become because it is already determined to some degree by its form, by the kind of thing that it is. The passive potency of a substance, an acorn for example, is limited by its present determination. Thus potency, passive potency at least, is limited by the present determination of the substance. The acorn may be crushed and changed in various ways but it does not have the potential to become a refrigerator.

This consideration of passive potency has revealed, among other things, that potency is limited and that it rests within the realm of future possibilities. That is to say, it considers the present state of affairs and determines a set of parameters of future contingencies, given the right circumstances. Active potency does not much differ in these respects from passive potency. Active potency is, in a sense, more narrowly defined than passive potency. The acorn has a passive potency to be thrown through the air, to be eaten by squirrels, to be pushed into the earth, etc., but its active potency is to become an oak ("or to cause a stomach-ache if swallowed whole"[86]) given that the right conditions prevail (e.g. that squirrels don't get it first). The active potency is goal oriented. The acorn is an oak seed and qua 'oak seed' its active potency to 'become an oak', which is found in itself (as opposed to the art of

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[86]Op. Cit. McMullin, pp. 305

building which is not found in bricks but in the builder), will be fulfilled, given the right conditions, and the end result will be an oak. The active potency is 'active' because it is pointed to a definite goal and it entails a certain "motive principle" [87]. In living things this active/motive principle is internal to them while inanimate things only have external motive principles (e.g. the bricks need a builder before they may become a house).

This distinction between the potency of animate versus inanimate entities is elaborated by Gill as follows:

> "The important difference between artifacts and organisms is that, in living things, user and implement are the same individual. As Aristotle says in Metaphysics IX.8, a nature is an active principle of change, not in another thing, but in the thing itself qua itself. The individual acts on itself qua itself, as like on like, it acts and suffers in respect of the same properties. But unlike the axe, [or the bricks] which has merely a passive capacity for the activity of chopping [the bricks: passive capacity for being a house] and depends upon an external user with an active capacity for that activity [in the case of the bricks the active capacity, or power, for building is found in the builder], an organism is both the user and the implement."[88]

In the living organism, the acorn, for example, there is present the active potency, or the power, to become an oak as well as the passive power that allows the acorn to realize its active potency. In the case of the bricks there is only the passive potency to be arranged in the shape of a house, but it requires the active potency of the builder to build. The bricks cannot, of their own power, become a

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[87] Op. Cit., Meta., 1046a 23

[88] Gill, Op.Cit., pp 219

house; they need the active power of 'being capable of building' which is provided by the builder. The acorn, on the other hand, has the capability to become an oak and requires no other external influence, other than the proper environment.

Up to this point I have worried about a more precise understanding of the two senses of potency and have made some progress towards that end. Potency clearly has a bearing on the model of change that Aristotle is building, but potentiality is also relevant in this case. Potency has been shown to be a power or a capability, that is manifested in causal interaction. Potentiality, as I indicated in the opening chapter, is a way of being and can be understood without reference to the power of affecting or being affected which is characteristic of potency. Aristotle introduces this sense of potency in Metaphysics IX, 7,:

> "....when we call a thing not something else but 'of' that something (eg....), that something is always potentially (in the full sense of that word) the thing which comes after it in this series. E.g. a casket is not earthen nor earth, but wooden; for wood is potentially a casket and is the matter of the casket..."[89]

Potentiality emerges as an existential state of one kind, which becomes manifest when compared to an existential state of another kind. This other existential state is actuality, which will be discussed in more detail in the following pages. What is important to notice about potentiality and its relationship to

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[89] Meta. IX, 1049a 21-23

actuality is that, in this analysis, potentiality is temporally prior to actuality. To say that something is potentially X is to say that at some future time it will actually be X, but it is not X at the present time. Aristotle also indicates, in this passage, that that which is potentially X is the matter for X.

This connection of matter to potentiality needs further exploration since Aristotle has a very specific meaning in mind. Earth, for example, though potentially wood is not potentially a casket and it is the wood that is the matter for said casket, not the earth. Aristotle's use of the concept matter does not match our modern understanding of the term and this example clearly illustrates that. (In modern, common usage, earth could be considered the matter of the casket.) For Aristotle, something is matter for the casket if it is potentially a casket, i.e. if it is the entity that is immediately prior to being actually a casket. This is an ambiguous concept. Aristotle is careful to point out that wood in general is matter for caskets in general and that this wood is matter for this casket[90], but he does not point out the precise level of priority that is required. For example, is the tree matter for the casket, is the log, are the planks, or is the matter only the properly cut and measured pieces ready to be assembled? This ambiguity crosses over in the case of organisms as a seed is not potentially a man "for it must undergo a change in a foreign medium" where "through its own

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[90] Meta. IX, 1049a 24

motive principle it has got such and such attributes, in this state it is potentially a man"[91]. Precisely what 'this state' is, is unclear. In the case of the acorn, can it be considered potentially an oak, or must it be a sapling before that may be said of it?[92]

I will not pursue these problems since my concern is with a formulation of the concept of matter in the actuality/potentiality model of change and the outline of potentiality that has been developed thus far is sufficient for my purpose, though the view of matter that will emerge will be correspondingly limited by Aristotle's ambiguity. Potentiality is identified with matter in the sense that matter is that which is immediately prior to some X; matter in this case is that out of which X comes to be. It is not simply that out of which X is made, though that is the case in the casket example; it is not the case in the examples of the seed becoming man, or the acorn becoming oak. The problem that carries over from Aristotle's failure to more precisely point out the required proximity to X that qualifies something as 'potentially' X, is that one cannot say with precision what constitutes the matter, taken in this way, of any X, though one may generally state what that matter is.

Thus matter has emerged as potentiality according to the limitations and conditions presented above. Potentiality is

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[91] Met. IX, 1049a 13-14

[92] Aristotle does address this issue, but does not fully resolve the ambiguity, at Met. IX, 7.

connected to potency in that what is potential, will become actual. Potency, both active and passive, is the source of that becoming. The question that has to be addressed is how matter is related to potency? Before that question may be answered there is one concept essential to Aristotle's schema of change which has not been examined yet: actuality. Actuality must be positioned appropriately, in relation to the already discussed concept of potentiality.

As with everything in Aristotle there is a problem with connecting the view of potentiality developed thus far directly with a straightforward account of actuality. In Metaphysics IX, where Aristotle presents his schema of actuality and potency, he writes:

> "First let us explain potency in the strictest sense, which is, however, not the most useful for our present purpose. For potency and actuality extend further than the mere sphere of motion. But when we have spoken of this first kind, we shall in our discussion of actuality explain the other kinds of potency."[93]

Our interest of course is limited to the 'sphere of motion' and the accounts of potency given thus far fall within that sphere. Yet the scope of potentiality extends beyond change; it is an existential state with other metaphysical considerations attached which do not impact on change. The complementary concept of actuality which is needed to complete this schema of change is, seemingly, discussed by Aristotle in a context outside of the sphere of change[94]. This is

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[93]Ibid., Meta. 1046a 1-4

[94]This interpretation, its difficulties and a criticism, are discussed by McMullin in Op. Cit., The Concept of Matter..., pp 297-298.

seemingly so, but that is not the case. The concept of actuality is related to both potency and potentiality and so its domain includes change, but it is not limited only to considerations of change. Just as potentiality as a way of being need not be considered purely in the context of change actuality need not be considered exclusively in the context of change either. This is a more plausible interpretation of Aristotle's text because it frees Aristotle from the criticism (see McMullin) of using examples of change in a discussion which falls outside that sphere.

Aristotle does not give a definition of actuality directly. He uses an analogy to explain what he means and to establish this contrast between actuality and potentiality. We have already encountered an Aristotelian analogy earlier in this paper within the context of the other schema of change. In that case the analogy was establishing the nature of the substratum, which was later identified with matter and which in this case we are trying to identify with the potential/potency. Juxtaposing the two analogies, there is a curious reversal since in this case the analogy employs the presumably established meaning of potency to establish the meaning of actuality. (I discussed this issue, briefly, in the introductory chapter.)

The analogy is presented by Aristotle in the following way:

> "Our meaning can be seen in the particular cases by induction, and we must not seek a definition of everything but be content to grasp the analogy, --that as

> that which is building is to that which is capable of building, so is the waking to the sleeping, and that which is seeing to that which has its eyes shut but has sight, and that which is shaped out of the matter to the matter, and that which has been wrought up to the unwrought. Let actuality be defined as one member of this antithesis, and the 'potential' by the other."[95]

To understand the analogy there is a need to determine the sense of 'potential' Aristotle uses in this case: does he mean potency, if so is it active or passive, or does he mean potentiality? (The possibility of Aristotle introducing another sense of potency into the discussion is unlikely at this point since he has just finished a discussion of potency and his use of the term in this case is likely to refer back to that discussion.)

A closer examination of the analogy does not clarify which sense of potency is being used. The first set of proportions that are presented, 'that which is building to that which is capable of building', may be interpreted as contrasting an active potency, the potential to build, to the activity of building or the realization of that potential. This interpretation may be extended to the next two proportions (in this case the activities are internal rather than external) which contrast waking to sleeping and having one's eyes shut but being capable of sight to seeing. Thus the first three illustrations of the analogy present a contrast which shows the

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[95]Ibid., Meta. 1048a 35 -- 1048b 5

potency to be what I called earlier active potency. The actuality is the realization of that active potency and as such it is an action or activity.

The remaining two illustrations of the analogy do not have as actualities an activity nor do they refer to an active potency. The last two proportions deal with the relationship of that shaped out of the matter to the matter, and of that which has been wrought up to the unwrought, respectively. The potency in both these cases may be interpreted as passive: they do not indicate an ability to act upon something else, but they do demonstrate the capacity of being acted upon in a specific way, which is a passive potency. The actuality that corresponds to this potency is the specific realization of the potential: the shaping of the matter (this of course would involve a specific material and a specific shape, but at this point Aristotle is talking generally) or the delivering of the unwrought to its finished state. Thus the two senses of potency are described by two, somewhat different, senses of actuality.

There is, however, another plausible interpretation of the last two illustrations, from the left side, of the analogy. The relationship of that which is shaped out of the matter to the matter, and that of the wrought to the unwrought, are reminiscent of the relationship of the casket to the wood discussed in the examination

of the concept of potentiality. The case for this connection is in fact very strong. There is the same language of priority, of matter being immediately prior to the shape that it is about to take: of matter being potentially the shaped matter and the potentially wrought, the unwrought, becoming actually the wrought. This interpretation is very compelling as it introduces into the analogy the existential sense of potentiality and places it in its proper context against an existential sense of actuality.

In the analogy, three senses of actuality are thus drawn together and are differentiated by the respective potency or potentiality they are paired with. The double interpretation of the last two proportions on the left side, namely taking these proportions to plausibly include a sense of both passive potency and potentiality, may be doubted and even rejected, but one thing is certain: active potency and potentiality are present in the analogy. Aristotle reinforces this reading of the analogy by writing: "But all things are not said in the same sense to exist actually, ...; for some are as movement to potency, and others as determinate substance to some sort of matter."[96]. The reference to movement confirms the interpretation of potency in the analogy, and the first two proportions certainly deal with active potency. The reference to substance and matter, coupled with the statement that 'actuality' is an equivocal term opens the door for a reading of potentiality, as

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[96]Ibid., Meta. 1048b 6-8

described above, in the analogy. The two general concepts of potency and potentiality are certainly to be found in the analogy, opposite two senses of actuality. As for passive potency, it is associated with active potency, and the presence of the root meaning of potency, coupled with the possible double interpretation of the last two proportions makes a strong case for accepting it as part of the analogy as well. Yet throughout his explanation of actuality Aristotle does not explicitly distinguish between the various senses of potential and of actuality even though his examples strongly suggest such a difference.

The two senses of potency and their accompanying actualities which have been described thus far are of primary interest as they deal specifically with change. McMullin provides a shorthand way of talking about these potencies, both together and individually:

> "When X is capable of taking on a determination Y that it presently lacks, X is said to be in "in potency" to Y. This is Aristotle's main usage of the term. Since it is always correlative to possible future change, let us call it C-potency. Thus an acorn is in C-potency to becoming an oak, or as we more familiarly put it, has the capacity to become an oak. C-potency involves privation: if X is in C-potency to Y, then X is not now characterized by Y. It may be either active or passive (CA or CP). The acorn has a CA-potency to becoming an oak ....; it has a CP-potency of being stepped on or being soaked by rain.[97]

The C-potency designates the general usage of potency dealing with change and it has the two facets of active, CA-potency, and

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[97]Op. Cit., McMullin, pp. 304-305

passive, CP-potency.

Given C-potency, its two aspects, potentiality and the corresponding actualities, nearly all the pieces of this schema of change are present. The missing pieces can be filled in once the model is described as a whole. So far I have been assembling together the pieces of the model, what is needed is to determine how the model describes change. Some of the examples have, to a certain degree, illustrated what Aristotle envisioned in this model of change. From these examples and the accounts of potency and actuality we can now try to make sense of Aristotle when he writes that: "The fulfillment of what exists potentially, in so far as it exists potentially, is motion..."[98].

Change according to this model is simply the actualizing of potential. Therefore change takes place between two existential states, the first is the state that obtains before the change and the second is the state after the change. Obviously change is not simply the change of one entity into any entity whatsoever, but into that for which it has a CP-potency. The existential state of the entity before the change is a state of potentiality for the actuality that will obtain after the change, which is realized through the agency of CA-potency.

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[98]Op.Cit., Physics, 201a10-11

Before the change there is a potency and a potentiality for a certain determination, or actuality, and the change realizes that determination, or actuality. The determination may be something as simple as 'brown', in the case of the acorn which becomes brown. The determination can also be very radical and destructive for the present subject which possesses the capability for the determination, such as 'oak' in the acorn case. In the first case the acorn continues to exist and the change was one of qualities. In the second case the change results in the destruction of the acorn and the generation of the oak. Thus the model accounts equally well for both accidental and substantial change and so covers the same range of change as the first model examined earlier in this thesis.

Another aspect of this model of change which needs to be reiterated is the requirement that the change occurs only between two proximate or immediate existential states. Change is possible only if the actuality may be reached directly from the stage which is in potentiality to it. Aristotle describes this stipulation thus:

> "...the seed is not yet potentially a man; for it must further undergo a change in a foreign medium. But when through its own motive principle it has already got such and such attributes, in this state it is already potentially a man; while in the former state it needs another principle, just as earth is not yet potentially a statue for it must change in order to become brass."[99]

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[99] Op. Cit., Meta., 1049a15-18

The potency is such only if the actuality is realized without intermediate potentialities. This aspect was discussed in the context of potentiality.

This completes the exposition of the potentiality/actuality model of change. Potentiality and matter have been connected and discussed and how change comes about has been explained. There remains the question of C-potency and its connection to matter that needs to be explained. Is C-potency to be associated with matter as potentiality was associated with it earlier? The initial answer to this question is a qualified 'yes'.

Aristotle uses the term 'matter' very loosely and it refers in different ways to different entities. To anchor this discussion in already familiar ground and to avoid ambiguities, matter will be discussed from the perspective of the replacement model as well as from the perspective of potentiality, where needed. This will serve the additional purpose of either establishing continuity between the replacement model of change and this model of change, because of a compatible understanding of matter, or it will show that the two models are not compatible because the view of matter of one is not in agreement with the view of matter of the other.

It can be taken for granted that matter plays a role in this model of change, as Aristotle specifically connects matter to potentiality. Using the previously acquired conceptual framework, or

the replacement model of change, which considers matter as substratum in contrast to both privation and form, and as substratum including privation in contrast to form, where does C-potency fit in?

McMullin provides an answer:

> "Quite commonly, the answer given to this question is that C-potency resides in the matter-substratum of the acorn. This is incorrect, or at least incomplete. C-potency resides in the matter-form composite. It is not simply the matter of the acorn that gives it the capacity to grow into an oak or to be squashed, it is the fact that it is an acorn here and now, and not for instance a drop of water."[100]

When McMullin talks of the matter-form composite he means the substance. The C-potency to be either an oak or to be brown depends, according to McMullin, on the kind of thing, on the substance of the entity which is in potentiality to some determination. This answer does not seem to place C-potency within the realm of the replacement model. A careful analysis will show that C-potency does <u>not</u> fit that schema because Aristotle extends and makes explicit in his act/potency model aspects of change which are not fully explored by the replacement model. To see how McMullin's answer applies and illustrates Aristotle's view of change it will be useful to compare an analysis of change as described by both models.

First it should be recalled that the matter that is of concern is proximate matter and not primary matter (both these concepts were discussed in previous chapters of this work). The proximate matter,

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[100]Op. Cit., McMullin, pp. 309

considered as substratum of change, is already a compound entity of matter and form and in fact (as was shown in the previous discussions of this subject) matter completely without form is merely an abstraction. The entity that enters into change and which is modelled by both schemas of change is a matter-form composite. In the case of non-substantial, or accidental, change, the matter-form composite simply acquires new qualities and it is substantially unchanged, as in the case of the acorn turning brown. According to the replacement model the matter-form composite, the acorn in this case, may be considered singly as the substratum of change or taken together with the privation. In the acorn example, the acorn is the substratum and the 'not-brown' is the privation, and together they are the 'not-brown acorn'. The change occurs and the 'brown acorn' results. In the replacement model the privation 'not-brown' is replaced by the form 'brown'. In the actuality/potentiality model the C-potency consists of the capacity of the acorn to turn brown. It is the acorn (specifically the 'not-brown acorn' in so far as it is not-brown) which is a matter-form composite which has the C-potency (C-potency contains the notion of privation, the lack of the determination, as McMullin pointed out and which I indicated above) to become brown.

Thus both models of change have accounted for the change and certainly there are some parallels between the two, but the

actuality/potentiality model cannot be reduced to the replacement model. The reason lies in the comparative coarseness of the replacement model that does not provide a fine enough analysis of the change. This is partly due to the dual nature of the C-potency which is a complex concept incorporating both CA-potency and CP-potency. It is also due to the new perspective that Aristotle takes in relation to the two contraries of change. In the actuality/potentiality model the contrary poles of change are replaced with contrary but connected states of being, potentiality and actuality. As for matter, it is understood under the banner of potentiality as explained above. It is also connected to CP-potency as McMullin points out:

> "the roles played by the matter-substrate and by form, relative to C-potency, are different. It is matter which has the capacity to "take on" different forms; in this sense matter is basic to CP-potency..."[101]

The two models of change have been examined and matter has emerged as a common thread tying the two models together. Matter and the relationship of the two models to each other, however, require further exposition, which I provide in the next chapter.

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[101] Ibid., pp. 308

CHAPTER 5: CONCLUSION

The two models of change, the replacement model and the actuality/potentiality model, have been discussed in the previous chapters and a certain perspective on the concept of matter has crystallized in the course of the discussions. In the introductory chapter I likened the concept of matter to a unifying thread that joins the two models together. This image, though fitting, needs to be expanded. The common thread of matter exists as much outside of the realm of change, as an independent and foundational metaphysical principle which the models of change draw upon for their needs, as it exists because of the models of change which help to define, or make explicit, this foundational metaphysical principle in the context of change. The thread is, in a sense, woven by the two models of change as much as they use the thread which is already present. In this final chapter I want to bring together the various senses of matter which have been brought up by the previous examinations of the models of change and examine them to see if they are indeed a unified thread. I will also focus on these two models of change to examine more closely their relationship to each other: are they two distinct but compatible accounts of change, or as I suggested at the close of the previous chapter, does the actuality/potentially model absorb and transcend the replacement model? The first issue to be addressed is

that of the various senses of matter and their connection, or lack thereof.

In the context of the replacement model of change matter was associated with the hypokeimenon, with that which underlies the change and which persists in the result. The schema of privation, form and hypokeimenon is applicable to all changes, both accidental and substantial. There is the sense of matter associated with the production of artifacts, which is resolvable to the proximate or secondary matter. This sense of matter is that of the material of the change and Owens was quoted in chapter two, above, defining this 'materia secunda' as the individual materials, with a definite shape, out of which other things are made. There is, however, a more general sense of matter, which falls outside of the concept of 'materia secunda'.

This sense of matter is that suggested by the very use of the term hypokeimenon, as the underlying substratum. This 'matter' is that which was discussed in chapter three as part of a controversy over primary matter: "...for by 'matter' here we mean the primary underlying subject in a thing, from which, as something present but not as an attribute, something else is generated"[102]. As the discussion in chapter three concluded, there is a possible

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[102]Physics, 192a 32-34

equivocation on 'primary' and it is more plausible to read 'primary' in the given context as 'immediately prior', and not 'foundational'in opposition to secondary matter. Thus the sense of 'matter' that Aristotle develops and associates with the hypokeimenon is of that which is immediately below, or before the change, and which underlies the change. According to this reading the 'man', in the musical example, is the hypokeimenon of the change, it is the matter of the change. Similarly the materials of the change are the hypokeimenon of the change. This may be illustrated by considering the case of the 'man' in the musical example. 'Man' is the hypokeimenon, and the matter of the change, which becomes the 'musical man', but it is not the material in the same way that the wood is the material for the casket.

The traditional view of the underlying matter of change holds that secondary matter underlies accidental changes, but in the case of substantial change the underlying matter is the primary matter. This view was shown, in chapter three, to be too strong. Primary matter has a very restricted domain and to use primary matter as the hypokeimenon of all substantial changes is unwarranted.

Primary matter is limited to the realm of elemental change. The very concept of primary matter may be interpreted as the ultimate application of the replacement model to the ultimate substances in the world, the four elements. Aristotle allows for cyclical change

between the elements, but at the same time there is nothing that exists which is simpler than the elements. Thus, there is no independently existing hypokeimenon to underlie the change. There is nothing prior, or below the elements, or other than the elements, that actually exists. Primary matter is a logical requirement in cases of elemental change. If the replacement model is to apply to all cases of change, then there must be hypokeimenon for elemental substantial change. That hypokeimenon is the primary matter. Without the primary matter at the elemental level there is a breakdown of the replacement model and the elements, comprised of two contraries, would not be able to change one to the other and at the same time preserve Aristotle's model of change, since the contraries would have no substratum to act on. Aristotle would then be guilty of the criticism he makes of his predecessors: of providing contrary principles of change which are unable to act on each other because they are contraries and require a neutral medium in which to act.

Thus the spectre of primary matter is removed from non-elemental change and restricted to the elemental level. This leaves the problem of the hypokeimenon for non-elemental change. The account of the hypokeimenon that is provided by Aristotle, however, does accommodate non-elemental substantial change. The very concept of substantial change involves change that affects the essence of the subject under consideration and so it necessarily affects that which

was the underlying substratum of secondary change. The readily perceptible substratum of secondary change cannot be the substratum of substantial change, since the change involves a change in that perceptible substratum. The hypokeimenon, however, plays a role in every change and there is a hypokeimenon in substantial change, only it is not readily perceptible as in the case of secondary change. The hypokeimenon of substantial change is that which immediately underlies the perceptible substratum of secondary change. The matter of substantial change is the imperceptible matter which is a part of the perceptible matter immediately above it, or of that for which it is the material.

The replacement model accounts for change as described above and one of its principal concepts is that of the hypokeimenon. It refines matter as a concept and expands its range as was shown above, by going beyond matter as material. This model also introduces the abstract notion of matter as a logical requirement for change at the elemental level. It is the very model that postulates the necessity for this theoretical primary matter.

The second model of change, the actuality/potentiality model, introduces a new schema, a new approach to change. It takes over some of the notions of matter that the replacement model has used and provides and examines them in a new light. The principal use of the concept of matter in this model is in conjunction with the principle

of potentiality. Potentiality emerged, in my discussion of the concept in chapter four, as an existential state. This is a concept with metaphysical implications which include, but are not restricted to, change. In the context of change the potentiality is one of the poles of the change with actuality forming the other. Here potentiality refers to the matter in relation to that which is shaped out of the matter[103]. The potentiality is compared to the material about to be changed. The matter as potentiality is in an existential state which is contrasted to the actualized state it will reach at some time in the future. This positive way of being 'potentially' X is a refinement and an addition that the concept of potentiality brings to the concept of matter.

In addition the actuality/potentiality model of change introduces the concept of potency, or what I have called, after McMullin, C-potency with its components of CA- and CP-potency. C-potency, as both the power to act and the power to be acted on, is to be found in the matter-form composite, but, as McMullin points out, 'matter is basic to CP-potency'. CP-potency is the power or capacity to be acted on (in a specific way), and as such it is connected to the concept of potentiality. To be potentially X means that there is something about the entity that is potentially X that will allow it, given the right agency, to become X actually. This

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[103] Meta. IX, 1048b 3

'something' is the CP-potency. Thus matter, seen from the perspective of CP-potency, is endowed with this power to be acted on. Clearly this is not simply dependent on the material, since the form determines the kind of agency that is needed for the potential to be realized, but it is the matter that has the capacity to be acted on in a certain way. C-potency must be placed in the matter-form composite, but the locus of the CP-potency is the matter-substratum; it is CP-potency's scope that is determined by the composite. (This C-potency, however, passive or otherwise, enters the consideration of potentiality only within the schema of causal interaction and change. The potency is distinct from the existential state of potentiality.)
the consideration of potentiality only within the schema of causal interaction and change. The potency is distinct from the existential state of potentiality.)

Matter, initially as material, is taken over by Aristotle's models of change and its meaning is expanded. First the replacement model introduces the concept of matter as hypokeimenon and so matter is the substratum of change. The replacement model also breeds out of the concept of matter any reference to material, in its introduction of 'primary' matter, or 'first' matter. Matter considered as primary matter is only matter according to the logical requirement for a hypokeimenon in the case of elemental change and

has no other role to play in the replacement model of change. The actuality/potentiality model of change takes the concept of matter and further adds to and refines it. Potentiality is matter understood as material before it takes on a given actuality and the CP-potency is the capacity of the matter-substratum to become that actuality.

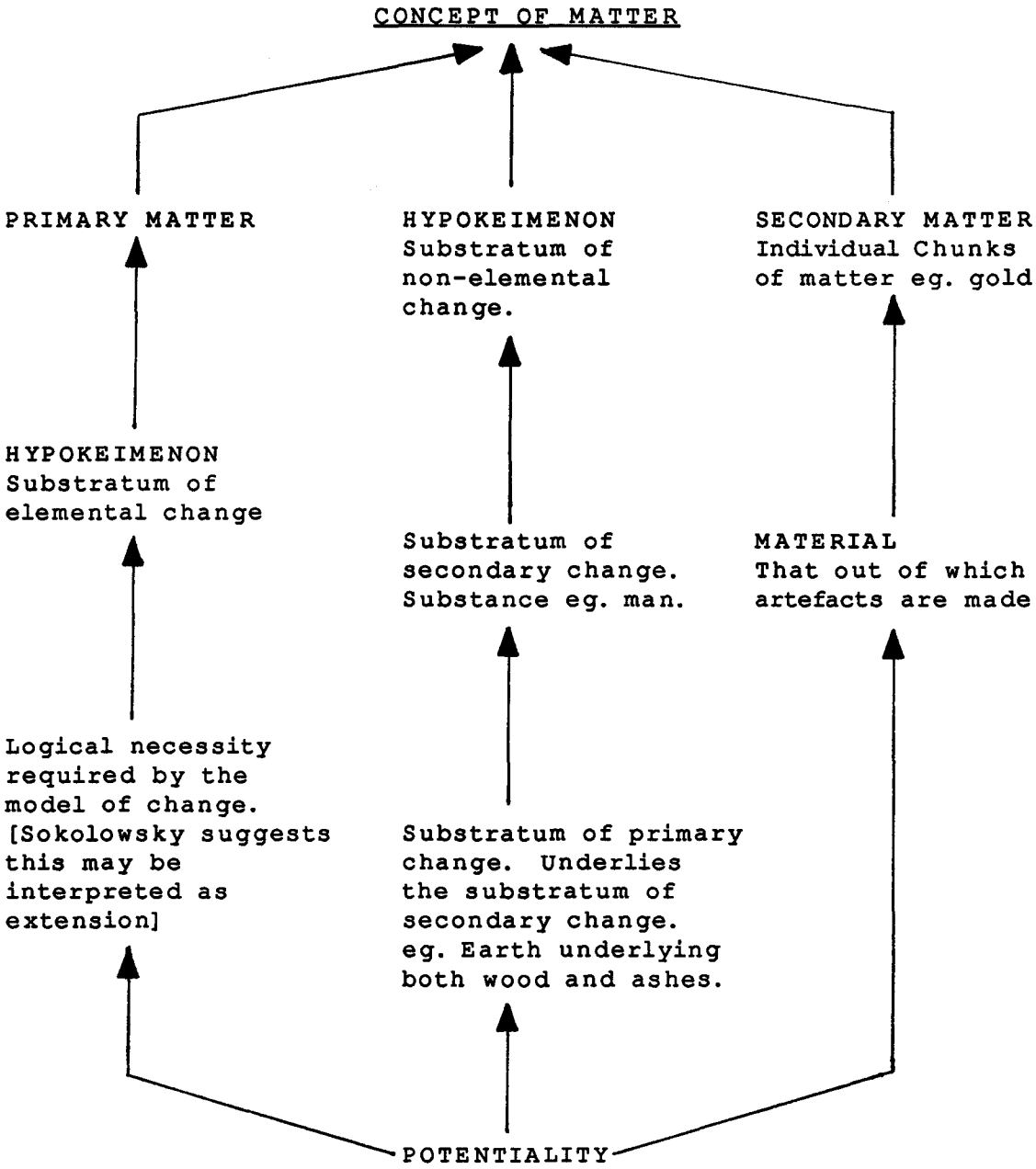
Matter in the two models of change is progressively enlarged upon. The potentiality/actuality simply enhances the understanding of matter that made the replacement model of change possible. The two models of change that have been presented are not merely compatible; one is an enlargement and improvement of the other and the new perspectives on the concept of matter made that possible. These new perspectives do not invalidate the old; the actuality/potentiality model does not deny the insights that the replacement model brings to an analysis of change. The actuality/potentiality model is simply more comprehensive as it includes, and improves on, the replacement model.
replacement model brings to an analysis of change. The actuality/potentiality model is simply more comprehensive as it includes, and improves on, the replacement model.

This assimilation of one model to the other was shown in terms of one of the foundational concepts, hypokeimenon in the replacement model, and potentiality and potency in the actuality/potentiality

model, to be a progressive development of the concept of matter. This assimilation is noticeable in terms of the the other foundational concept of the replacement model, namely that change occurs between two contrary poles. In the replacement model these poles are provided by the principles of privation and form. In the actuality/potentiality model the poles are the existential states which bracket the change: potentiality and actuality. This parallel extends beyond this mere formal, structural, similarity of the two models. The actuality can arguably be identified with the concept of form just as the potentiality is identified with the matter which has a potency for that form. Thus all the foundational elements of the replacement model have a place in the actuality/potentiality model, but they are incorporated into other concepts which go beyond them.

Thus the two models of change are very intimately connected: one, in a very real sense, incorporates the other, and extends beyond the latter's limitations. The actuality/potentiality model account of change has advantages over the replacement model. It captures aspects of change that are missing from the replacement model. What these aspects are discussed extensively in the context of the concept of matter.

The thread, the concept of matter, has been followed through the two models of change and and the following is a schematization of what that process achieved:


CONCEPT OF MATTER
PRIMARY MATTER
HYPOKEIMENON
Substratum of
non-elemental
change.
SECONDARY MATTER
Individual Chunks
of matter eg. gold
HYPOKEIMENON
Substratum of
elemental change
Substratum of
secondary change.
Substance eg. man.
MATERIAL
That out of which
artefacts are made
Logical necessity
required by the
model of change.
[Sokolowsky suggests
this may be
interpreted as
extension]
Substratum of primary
change. Underlies
the substratum of
secondary change.
eg. Earth underlying
both wood and ashes.
POTENTIALITY

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