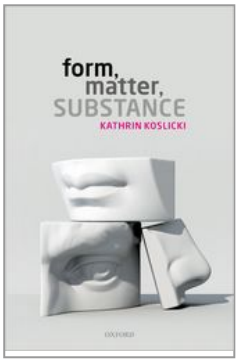

Form, Matter, Substance
Kathrin Koslicki

Print publication date: 2018
Print ISBN-13: 9780198823803
Published to Oxford Scholarship Online: September 2018
DOI: 10.1093/oso/9780198823803.001.0001

Matter

Kathrin Koslicki

DOI:10.1093/oso/9780198823803.003.0003

Abstract and Keywords

This chapter examines the question of how hylomorphists should conceive of the matter composing concrete particular objects. It considers three conceptions of matter: the traditional Thomistic doctrine of prime matter, as developed by David Oderberg; the matter-as-stuff hypothesis, as defended by Jeffrey Brower and Ned Markosian; and the hylomorphic conception of matter, according to which the matter of a concrete particular object is nothing other than its material parts and these are themselves conceived of as matter–form compounds, unless or until we reach an empirically confirmed level in the compositional hierarchy at which the hylomorphic analysis no longer applies. The chapter argues that the prime-matter hypothesis and the matter-as-stuff hypothesis give rise to a number of difficulties and concludes that the third, hylomorphic, conception of matter is therefore preferable to the previous two.

Keywords: matter, prime matter, Thomistic approaches to matter, stuff, hylomorphic conception of matter

2.1 Introductory Remarks

In response to the various desiderata and decision points discussed in Chapter 1, it emerged that a hylomorphic analysis of concrete particular objects can be developed in a variety of ways, depending on how hylomorphists conceive of the *matter* composing a concrete particular object: the *form* that is associated with a concrete particular object; and the *relation(s)* which hold between a concrete particular object, its matter, and its form. In this chapter, our focus is on the first of these questions, viz., how should hylomorphists conceive of the matter

composing matter–form compounds? The three main options, as I see it, which are open to hylomorphists in connection with this question, are as follows:

(i.a) *Matter as Prime Matter*: The matter of which matter–form compounds are composed is prime matter.
(i.b) *Matter as Stuff*: The matter of which matter–form compounds are composed is stuff.
(i.c) *Matter as Hylomorphic Compounds*: The material parts of matter–form compounds are themselves matter–form compounds.

In what follows, I examine representative versions of the first two approaches—(i.a) and (i.b)—in detail and argue that both give rise to serious difficulties. As a result, I opt for the third approach—(i.c)—which conceives of the matter composing a concrete particular object as belonging to the same ontological type as the concrete particular object itself which it composes. A concrete particular object, on this approach, is analyzed as a matter–form compound; the matter composing it, in cases in which an object is composed of more than a single material part, as a plurality of matter–form compounds.[1] This approach does not immediately put to rest *all* of the difficult questions **(p.33)** hylomorphists face as they weigh up different possible responses to the question of how best to conceive of the matter composing matter–form compounds. Moreover, as will emerge, the hylomorphic approach to matter also gives rise to several explanatory challenges of its own. Overall, however, I will argue that (i.c) should nevertheless strike hylomorphists as the most promising option for the purposes of developing an analysis of concrete particular objects that is compatible with our best scientific theories concerning the natural world.[2]

2.2 Matter as Prime Matter

2.2.1 Prime Matter in Aristotle

There is some controversy in the scholarly literature as to whether Aristotle should be interpreted as being committed to prime matter.[3] According to those who read him in this way, the commitment to prime matter emerges primarily from the following positions Aristotle endorses in connection with his analysis of change. Firstly, as was noted in the previous chapter (see Section 1.5), Aristotle proposes to solve the Parmenidean puzzle concerning change by positing that something always persists through any change that occurs (viz., the matter or subject underlying the change) and something else does not persist through the change (viz., the form or privation). Secondly, Aristotle subscribes to the Empedoclean doctrine that everything in the sublunary sphere is ultimately composed of the four elements (viz., earth, air, fire, and water) in different **(p. 34)** ratios. Third, he held that it is possible for the four elements to transform into one another and that, when they do, these processes constitute substantial changes, rather than mere alterations (i.e., qualitative, non-substantial changes). To illustrate, air comes into being and water ceases to exist, in Aristotle's view, when the combination of wet and cold (the so-called "primary qualities" or

"contrarieties" which are characteristic of water) is replaced with the combination of wet and hot (the primary qualities characteristic of air). These three positions together seem to require that something must also underlie these elemental transformations and, furthermore, that it cannot be part of the essence of the subject persisting through these substantial changes to exhibit any one of the four pairs of primary qualities in particular (viz., wet/hot, wet/dry, moist/hot, moist/dry). Since Aristotle also believes that all the other perceptible qualities can in some way be explained by appeal to these primary qualities, it follows that the subject which persists through these elemental transformations has only accidentally whatever other perceptible qualities are associated with it (if any). The combination of views Aristotle endorses thus seems to lead to the result that he is committed to what is traditionally identified as *prime matter*: a kind of matter which, among other things, is capable of persisting through substantial change even at the most basic elemental level and which has no perceptible qualities essentially.

Certain passages in Aristotle's *Metaphysics* can also be interpreted as referring to prime matter, such as the following remarks from *Met*. Z.3:[4]

> By matter I mean that which in itself is neither a particular thing nor of a certain quantity nor assigned to any other of the categories by which being is determined. […] Therefore the ultimate substratum is of itself neither a particular thing nor of a particular quantity nor otherwise positively characterized; nor yet negatively, for negations also will belong to it only by accident.
>
> (*Met*. Z.3, 1029a20–6)[5]

According to these remarks, matter in the sense of the ultimate substratum is that which underlies all other determinations, while none of them apply to it essentially. Immediately following the passage just cited, the kind of matter under discussion is also characterized as not *separable* (*chōriston*) and not a *this* (*tode ti*) (*Met*. Z.3, 1029a26–30).[6] **(p.35)** Furthermore, in *Met*. Z.10, Aristotle speaks of matter as in itself *unknowable* (*agnōstos*), since nothing can be said of it *kath' hauto*, i.e., in virtue of itself or essentially (*Met*. Z.10, 1036a8–9). In order to know each thing fully, in Aristotle's view, we must grasp its essence, as stated by the definition (see, for example, *Met*. Z.1, 1028a36–1028b7).

In sum, Aristotelian prime matter (if there such a thing) can be described as follows: it is what underlies the elemental transformations; it is in itself neither a particular thing nor of a particular quantity, nor assigned to any other of the categories by which being is determined; it lacks an essence, since neither positive nor negative characterizations apply to it *kath' hauto*; it cannot exist on its own; and, since it lacks an essence, it is in itself unknowable. Prime matter, so characterized, is thus even more "bare" than the substratum posited by bare

particularists (see Section 1.4): for, in addition to lacking an essence or intrinsic nature, prime matter is also said to be devoid of all particularity.[7]

2.2.2 Thomistic Prime Matter

While commentators disagree strongly over whether a commitment to prime matter should even be ascribed to Aristotle, there is much less scholarly controversy in the case of Aquinas over *whether* he was committed to prime matter, though the question of how best to interpret Aquinas' notion of prime matter has generated heated discussion among Thomists (see, for example, Pasnau (2014)). In what follows, I will consider the Thomistic version of hylomorphism defended in Oderberg (2007) in detail, as a representative formulation of the view stated earlier in (i.a) according to which the matter composing a hylomorphic compound is prime matter. Oderberg, moreover, is engaged in a project very similar to my own, since he takes himself to be putting forward a position which is intended both as a contribution to the historical scholarship and as a contribution to the contemporary debate concerning the metaphysics of concrete particular objects. In Section 2.3 we turn to a different understanding of the Thomistic doctrine of prime matter, viz., that developed in Brower (2014), whose hylomorphic account is also put forward in the spirit of contributing a **(p.36)** position that is viable both on historical grounds as an interpretation of Aquinas, and on philosophical grounds as a plausible contribution to the contemporary debate concerning the metaphysics of concrete particular objects. Brower's interpretation of Thomistic prime matter is inspired by a conception of stuff developed by Ned Markosian, which will be examined here as well as a representative version of (i.b), viz., the matter-as-stuff hypothesis.

According to Oderberg's Thomistic hylomorphism, those concrete particular objects which he calls "material substances" are compounds of prime matter and substantial form:[8]

> In its primary application, the distinction between form and matter applies in a quite literal way to material substances. Every material substance is a literal compound of two elements—prime matter and substantial form. Prime matter is the underlying substrate, itself wholly undifferentiated, which form actualizes to produce a material substance, be it inorganic, such as a lump of rock or a molecule of water, or organic, such as a bacterium, a tree, or a cow.
>
> (Oderberg (2014), p. 164)[9]

Oderberg conceives of the matter composing a matter–form compound as something that is not already itself a matter–form compound or composed of matter–form compounds:

> … [T]he soul is the form of something else, something not itself shot through by the very soul to which it is united—and this is what the hylemorphist calls *primordial matter*, or prime matter.
>
> (Oderberg (2007), pp. 71–2)
>
> [Prime matter] is a pure passive potentiality, without any form whatsoever, nor subject to any privation (i.e., it does not lack some form that it *needs*, in the way that a blind person is deprived of sight), but it is wholly *receptive* of any form whatsoever. It is the completely undifferentiated basic material of the physical universe. It is not *something*, in the sense of something or other, but it is not nothing either. It is the closest thing there is in the universe to nothingness without being nothingness, since it has no features of its own but for the potential to receive substantial **(p.37)** forms. It is changeless, but is the *support* of all substantial change, and as such is subject to numerical identity, so that prime matter is conserved throughout substantial change.
>
> (Oderberg (2007), p. 72)

As these passages indicate, among Oderberg's main motivations for positing prime matter is to help explain how matter–form compounds can come into existence and cease to exist, as stated in the second set of desiderata, "Causation, Explanation, and Change," identified in Section 1.6. He argues that prime matter is needed to account for the fact that something always persists through any kind of substantial change; and this something, in his view, cannot itself be a matter–form compound or composed of matter–form compounds. In addition to the role ascribed to prime matter as the ultimate subject of substantial change, Oderberg allows that "loosely speaking" we can ascribe a certain nature to prime matter, though "strictly speaking" prime matter has no essence:

> [T]here is nothing wrong with speaking of the *nature* of prime matter as pure passive potency, as long as we take 'nature' loosely and not as meaning essence in the strict sense. Strictly, prime matter has no essence. Loosely, it has the nature of being pure potentiality unmixed with any determining form, substantial or accidental. […] [P]rime matter … has no appearance and does not of itself come in arrangements. It is […] radically disposed to dimensionality, but this is manifested wholly through the forms that prime matter takes on.
>
> (Oderberg (2007), p. 76)

In sum, Oderberg ascribes the following characteristics to prime matter: it is wholly undifferentiated; pure passive potentiality; without any form whatsoever; not subject to any privation (since it does not lack a form that it requires); wholly

capable of receiving any accidental or substantial form whatsoever; without features of its own, except for its capacity to receive forms; in itself changeless, but the support of all substantial change; and subject to numerical identity, since prime matter is conserved while matter–form compounds come into and go out of existence.

2.2.3 Difficulties for Oderberg's Thomistic Prime Matter Hypothesis

In what follows, I argue that the Thomistic doctrine of prime matter, as it is developed by Oderberg, is subject to serious difficulties, among them at least the following six:

(1) *Potential Metaphysical Overreaching:* The doctrine of prime matter, even though it is not intended to be put forward as an empirical hypothesis, has the potential to lead to overreaching on the part of the metaphysician into the scientific terrain of fundamental physics.

(2) *Non-hierarchical Conception of Matter:* The Thomistic conception of matter is problematically non-hierarchical: prime matter can receive *any* substantial form *directly*, without requiring any actual matter–form compounds acting as compositional intermediaries.

(3) *Threat of Contradictions:* Like bare particularism, the doctrine of prime matter threatens to give rise to contradictions; prime matter is said to lack an essence and yet **(p.38)** various characterizations are attributed to it which do not appear to be merely accidental to prime matter.

(4) *Other Possibilities:* Alternative possibilities for what might underlie substantial change even at the most basic micro-physical levels have not yet been ruled out and therefore should be considered.

(5) *Non-particularity:* Given the non-particularity of prime matter, we cannot appeal to it to help us resolve difficult questions concerning the numerical identity or distinctness of matter–form compounds.

(6) *Material Constitution, Unity and the Grounding Problem:* The Thomistic doctrine of prime matter allows for an eliminativist solution to the Problem of Material Constitution, the Problem of Unity, and the Grounding Problem, but only when combined with unitarianism about substantial forms (see n. 8) and a distinction between actual and so-called "virtual" parts. If both of these positions are rejected, as I think they should be, then no solution to these problems is, as of yet, readily available.

Due to these difficulties, I take the Thomistic doctrine of prime matter, as it is developed by Oderberg, to be not sufficiently well-motivated to warrant taking it on board over competing conceptions of matter. Moreover, in the course of our evaluation, we will find that alternative conceptions of matter prove to be more

successful in meeting the desiderata identified in Chapter 1 than Oderberg's doctrine of prime matter.

(1) *Potential Metaphysical Overreaching*. Oderberg's doctrine of prime matter is intended to be put forward as a metaphysical postulate, rather than as an empirical claim. Nevertheless, one might be concerned that, in advancing the prime-matter hypothesis, Oderberg is guilty of metaphysical overreaching into the scientific terrain of fundamental physics. For one thing, Oderberg's account assumes that all concrete particular objects are ultimately composed of a single type of matter, which is not in turn composed of anything more basic that is also material.[10] Secondly, Oderberg's approach requires that the single type of ultimate matter in question, which allegedly constitutes the bottom layer of the compositional hierarchy, has the characteristics **(p.39)** he ascribes to prime matter. For example, as noted earlier, the single type of ultimate matter in question is described as "wholly undifferentiated;" "pure passive potentiality" or "potency;" "wholly receptive of any form whatsoever;" "not something, in the sense of something or other," but "not nothing either;" "in itself changeless," but "conserved throughout substantial change;" "subject to numerical identity;" something which "has no appearance and does not of itself come in arrangements;" and is "radically disposed to dimensionality." Some of these characteristics are formulated in terms that would be considered alien from the point of view of contemporary physics. This disconnect in itself should give us pause, since it stands in the way of our ability to adjudicate or even recognize potential conflicts between what metaphysicians and scientists, respectively, are saying about processes of generation and destruction which take place at micro-physical levels. In those instances, however, in which Oderberg's ascriptions are interpretable from the point of view of contemporary physics, his commitments would need to be checked against the predictions of our best current scientific theories of matter. Since Oderberg regards his doctrine of prime matter as a contribution to metaphysics rather than science, he does not attempt to provide empirical support for the claim that the material universe ultimately bottoms out in a single type of basic substratum that answers to the characteristics he ascribes to prime matter. As the following passage indicates, however, Oderberg nevertheless at least leaves open the possibility that the metaphysical prime matter hypothesis might converge with the postulates of fundamental physics:

> […] [M]ight prime matter be energy? It is an intriguing question that I cannot pursue here. One problem is that the hylemorphist has a better grasp of what prime matter is than the physicist has of what energy is, and since metaphysics has to be informed by science there will be severe limits to what the former can say about the possible identification of prime matter with energy. If there are substantial energy transformations (e.g. heat to sound, chemical to light) by which a wholly new kind of thing comes into existence, there will have to be prime matter distinct from energy as a support […]. But if such transformations are but phases of an

> underlying pure energy that has no determinate form in itself, then *perhaps* one might venture the thought that they are one and the same.
>
> (Oderberg (2007), p. 76)

(2) *Non-hierarchical conception of matter*. Our current empirically supported conception of matter is (or at least appears to be) *hierarchical*: atoms are said to be made up of protons, neutrons, electrons, etc.; molecules are said to be made up of atoms; proteins are said to be made up of molecules; etc. According to Oderberg, however, the very same type of matter, viz., prime matter, which is capable of receiving, say, the form of a quark (thereby giving rise to a quark), is also capable of receiving the form of a human being (thereby giving rise to a human being). In order to reconstruct the appearance of a compositional hierarchy, Oderberg supplements his non-hierarchical notion of prime matter with a distinction between *actual* and merely *virtual* parts of a matter–form compound. To illustrate, quantities of water, in Oderberg's view, contain H_2O molecules as actual parts, while hydrogen and oxygen atoms are **(p.40)** present within them merely as virtual parts (as are the parts of hydrogen and oxygen atoms and their parts, viz., electrons, neutrons, protons, quarks, neutrinos, etc.). This distinction between actual and virtual parts allows Oderberg to hold that less complex concrete particular objects (e.g., atoms) maintain at least some kind of presence, viz., by way of their surviving features, within more complex concrete particular objects (e.g., molecules) into which they are "absorbed." Strictly speaking, however, Oderberg is committed to claims for which we appear to lack independent empirical evidence, e.g., that atoms (or their parts) cease to exist when they enter into chemical bonds with other atoms to form molecules. I take it that, other things being equal, a more straightforwardly hierarchical conception of matter which allows that less complex matter–form compounds can maintain an actual presence within the more complex matter–form compounds they compose is preferable to a non-hierarchical doctrine of prime matter, supplemented with a distinction between actual and virtual parts.

Brief Interlude: Metaphysics and Science. Both of the objections just raised against Oderberg's conception of prime matter rely on the invocation of empirical evidence, which raises difficult questions concerning the relationship between metaphysics and science. A proper discussion of these complex issues would take us too far afield for present purposes, but a few clarifying comments are nevertheless in order. Firstly, one might worry, among other things, that it is dialectically inappropriate for me to appeal to empirical evidence against competing conceptions of matter, unless I also address apparent ways in which my own views might be taken to conflict with contemporary science. A second concern, which arises specifically with respect to (2), is that it is not obvious whether a hierarchical conception of matter is even supported by contemporary science, since (so one might think) such a picture is in fact incompatible with quantum mechanics. Thirdly, when Thomistic prime matter is properly

interpreted as a metaphysical postulate, rather than as an empirical claim, then (as in other cases in which competing metaphysical postulates are intended to capture the same set of phenomena) one might expect that this position need not be directly supported by, but only consistent with, empirical evidence from contemporary science.

All three of these concerns raise serious and important general questions about how metaphysicians should respond to challenges from contemporary science, and my replies in what follows will unfortunately have to be brief. In response to the first point (viz., the dialectical appropriateness of invoking evidence from contemporary science against competing conceptions of matter), I take it that my own account does in fact fare better than the alternative approaches considered in this chapter in at least the following respects. As will become evident, the hylomorphic conception of matter, in its amended formulation offered later in this chapter, explicitly leaves open (a) whether there is a fundamental level in the compositional hierarchy; and (b) if so, what matter is like at this fundamental level. In this way, my own account incorporates an element of openness and deference to science, familiar from Kripke/Putnam-style accounts of the semantics of natural kind terms, which I find to be absent from the competing conceptions of matter considered here. Moreover, as I argue in Section 2.4, I take the hylomorphic approach to be more readily compatible with a hierarchical conception **(p.41)** of matter. Of course, whether this feature is in fact an advantage of my account over competing approaches depends on how we respond to the second concern, to which I now turn.

This next concern calls into question precisely whether a hierarchical conception of matter is even compatible with contemporary science, in particular, quantum mechanics.[11] In response to this point, I want to make clear that, in my earlier appeal to such a conception of matter, I had in mind not only apparently hierarchical compositional claims which concern the domain of entities posited by a single science, but also those which appear to span across the domains of entities posited by distinct sciences, e.g., physics, chemistry, biology, and so on. There are lively and ongoing debates over whether the special sciences should be recognized as autonomous or whether the entities posited by them should be regarded as, in some way, reducible to those invoked by fundamental physics. But these are highly controversial issues with respect to which I would like to remain as neutral as possible for present purposes. I take it, though, that even those who do adopt a hard-line reductionist approach will need some account of why it *seems* to be the case that less complex entities compose more complex entities not only within a particular scientific domain, but also across such domains. Such apparently hierarchical compositional claims surface even within the domain of fundamental physics, as when, for example, atoms are said to be composed of electrons, protons, and neutrons.

Finally, according to the third concern raised above, the Thomistic prime matter hypothesis, when properly interpreted as a metaphysical postulate rather than as an empirical claim, should only be expected to be consistent with, but not directly supported by, empirical evidence from contemporary science. When the prime matter hypothesis is regarded in this light, the consistency requirement demands, at the very least, that the Thomistic prime matter hypothesis be formulated in such a way that it can be evaluated for possible conflicts with scientific postulates. In my earlier comments, however, I voiced some reservations as to whether, in its present formulation, the consistency requirement could even be enforced, given the characteristics Oderberg ascribes to Thomistic prime matter. Moreover, some of Oderberg's remarks certainly suggest that he has in mind a stronger reading of the prime matter hypothesis than mere consistency with scientific evidence: otherwise, it is difficult to see how Thomistic metaphysics and fundamental physics could somehow converge on the very same ultimate substratum by different routes, as is suggested by the possible identification of prime matter with energy.

(p.42) (3) *Threat of Contradictions*. In addition to the empirical observations discussed in (1) and (2), Oderberg's conception of prime matter also appears to be subject to many of the same difficulties as the notion of a bare particular. Specifically, prime matter is said to lack an essence, and yet various characterizations are attributed to prime matter which do not appear to be merely accidental to it. For example, Oderberg describes prime matter as something that is capable of receiving any substantial form whatsoever, and as that which is conserved throughout substantial change. But this characterization, together with the other conditions cited earlier, does seem to amount to at least a partial positive description of what prime matter is in itself, i.e., essentially: given the theoretical role played by prime matter, it cannot be assumed that it is merely accidental to prime matter that it has the capacity to persist through substantial change or the capacity to receive any substantial form whatsoever. Thus, the attempt to characterize prime matter in positive or negative terms, while at the same time denying that any such characterization applies to prime matter in its own right, appears to give rise to contradictions.[12]

(4) *Other Possibilities*. Next, it seems that other possibilities for what might underlie substantial change even at micro-physical levels have as of yet not been ruled out and therefore should be considered. These alternative possibilities, moreover, do not lead to the conclusion that the compositional hierarchy bottoms out with a single type of ultimate substratum which meets the characteristics Oderberg ascribes to prime matter. Firstly, we might countenance the possibility of infinitely descending chains consisting of ever smaller matter–form compounds whose material parts are themselves matter–form compounds. Secondly, we might eventually reach a point at which matter–form compounds are composed of material parts which are not themselves matter–form compounds.[13] At this point, we have reached a level in the

compositional hierarchy to which the doctrine of hylomorphism no longer applies. The second type of possibility might be realized, for example, in a scenario in which the material parts composing matter–form compounds are (ii.a) simples, i.e., material objects that do not have any material parts; or (ii.b) portions of stuff. (Both of these options will be discussed in more detail later in this chapter.) What matters most for present purposes **(p.43)** is that none of these possibilities, as far as I can see, has been explicitly excluded either on empirical or on conceptual grounds, by the considerations Oderberg brings to the table; and none of them requires embracing his doctrine of prime matter.

(5) *Non-particularity*. As outlined in Section 1.6, hylomorphists must confront the question of whether, and how, their central piece of apparatus, viz., the distinction between matter and form, can be used to help resolve questions concerning the numerical (synchronic, diachronic, and cross-world) identity and distinctness of matter–form compounds. To illustrate, these include questions of the form: what, if anything, makes Socrates the very concrete particular object that he is at each time at which he exists? What, if anything, makes Socrates at a time, t_1, numerically identical to Socrates at a distinct time, t_2? What, if anything, makes Socrates in a world, w_1, numerically identical to Socrates in a distinct world, w_2? What, if anything, makes Socrates and Callias numerically distinct at a single time at which they both exist?

Contrary to what is often assumed by Thomists, Oderberg does not take prime matter to be a principle of individuation for matter–form compounds:

> […] although prime matter is one of the basic constituents of material substances, it is—perhaps surprisingly, one might think, given hylemorphism—*not* the principle of individuation. The reasons are: (1) it is common, i.e. multiply instantiable (wherever there is actuation by a substantial form), and it is a hallmark of individuality, including that of material substances, that it is, to use the traditional term, incommunicable. […] (2) Prime matter is indivisible, being mere potentiality, so it cannot serve as the basis of the division of a species or nature into individuals. We cannot say “Here is some prime matter, and there is some more,” but we can say, “Here is Socrates, and there is Callias,” or in other words “Here is prime matter informed by the nature of Socrates, and there is prime matter informed by the nature of Callias.” (We can call these ‘Socrateity’ and ‘Calliaeity’, but must not confuse them with haecceities or individual essences as postulated by Duns Scotus; these I reject as at least unwarranted. Socrateity is just general human nature as particularized in Socrates. The particularizing is done by matter, not by “thisness.”)
>
> (Oderberg (2007), p. 109)

Given Oderberg's conception of prime matter, it cannot play any role in his theory in settling questions concerning the numerical identity or distinctness of matter–form compounds. We cannot say, for example, that Socrates owes his synchronic, diachronic, or cross-world identity to the prime matter which composes him at any given time, across times, or across worlds, since Socrates' prime matter cannot be identified independently of Socrates. For similar reasons, the fact that Socrates and Callias are numerically distinct at a single time cannot be traced to the numerical distinctness of the prime matter which composes them at that time.[14]

(p.44) (6) *Material Constitution, Unity, and the Grounding Problem*. The Problem of Material Constitution challenges hylomorphists to explain how a matter–form compound can be so similar to, and yet nevertheless numerically distinct from, its constituting matter. The Grounding Problem poses a challenge in particular for those who opt for a coincidence–theoretic response to the Problem of Material Constitution, since these philosophers then face the question of what grounds the apparent modal differences between numerically distinct but spatiotemporally coincident objects. Finally, the Problem of Unity raises the question of how a plurality of parts can give rise to a unified whole.

The following remarks suggest that Oderberg might be sympathetic towards an eliminativist solution to all three of these problems:

> Another way of putting the point is to say that substantial form *permeates* the entirety of the substance that possesses it, not merely horizontally in its parts—there is as much dogginess in Fido's nose and tail as in Fido as a whole—but also *vertically*, down to the very chemical elements that constitute Fido's living flesh. To use the traditional Scholastic terminology, the chemical elements exist *virtually* in Fido, not as compounds in their own right but as elements fully harnessed to the operations of the organism in which they exist, via the compounds they constitute and the further compounds the latter constitute, through levels of compounds—DNA, the proteins coded for by that DNA, the organelles that make up the cells, the organs made up of the cells, and so on.
>
> (Oderberg (2007), pp. 70–1)

According to the proposal outlined here, both the Problem of Material Constitution and the Grounding Problem simply go away, since each region of space-time (including its subregions) can be occupied by at most one matter–form compound. The region of space-time that is occupied by the dog Fido, for example, does not contain an additional matter–form compound, viz., Fido's body, that is numerically distinct from, but spatiotemporally coincident with, the dog it constitutes. Rather, only a single substantial form, viz., that associated with the dog Fido, brings with it a single (non-derivative) essence, which

“permeates” the whole region of space-time that is occupied by Fido and all of Fido’s actual parts (e.g., Fido’s nose and tail). All other “parts” (viz., the cells, proteins, organs, etc.) maintain a merely virtual presence within Fido and hence do not require the recognition of a separate substantial form or (non-derivative) essence within the region of space-time (or its subregions) that is occupied by Fido. The proposal at hand furthermore generates a response to the Problem of Unity: since none of Fido’s parts (actual or virtual) are regarded as matter–form compounds in their own right, no account is needed for how a plurality of matter–form compounds, each with its own substantial form, could ever give rise to a single unified whole.

The eliminativist solution to the three problems just outlined requires the acceptance of the following two positions which Oderberg endorses: unitarianism about **(p.45)** substantial forms, according to which only a single substantial form is ever present in any region of space-time (including its subregions) that is occupied by a matter–form compound; and the doctrine of virtual parts, according to which matter–form compounds (e.g., atoms) cannot survive the process of becoming “absorbed” into other matter–form compounds (e.g., molecules). It already emerged above in connection with (2), however, that the doctrine of virtual parts appears to conflict with our current empirically supported hierarchical conception of matter. Once the doctrine of virtual parts is abandoned, any motivation to accept unitarianism about substantial forms disappears as well. Assuming that an eliminativist solution along the lines indicated here is not available, the difficulties in question will have to be confronted in some other way. As I will argue in what follows, however, this price is worth paying, since alternative responses to these challenges are available and the objections we have identified in this section in connection with Oderberg’s doctrine of prime matter can thereby be avoided.

2.3 Matter as Stuff

2.3.1 Thomistic Prime Matter as Stuff

I now turn to an examination of (i.b), the second conception of matter mentioned in the beginning of this chapter, according to which the matter composing a hylomorphic compound should be construed as stuff. As a representative formulation of this approach, I consider the approach to matter developed by Jeffrey Brower, in his recent exposition of Aquinas’ hylomorphism (see Brower (2014)). Brower uses as a backdrop for his interpretation of the Thomistic doctrine of prime matter the category of stuff as described by Ned Markosian (see Markosian (1998, 2004a, 2004b, 2015)). Although Brower does not take the two conceptions of matter to coincide in every respect, he nevertheless finds Markosian’s notion of stuff to be a useful interpretive tool with which to approach Aquinas’ doctrine of prime matter.

Thomistic prime matter, according to Brower's characterization, has the following five main characteristics. Firstly, prime matter is a type of being which can be compounded and divided. Thus, portions of prime matter can enter into part–whole relations with other portions of prime matter; the portions and subportions into which prime matter can be divided are its parts (Brower (2014), pp. 10–11, 115). In addition, portions of prime matter, along with substantial forms, constitute matter–form compounds; but the relation of constitution or hylomorphic composition here is a distinct relation from that of mereological composition (i.e., the relation between a whole and its parts), although Brower (following Aquinas) uses the language of parthood and composition to describe both relations. For example, the prime matter associated with a given concrete particular object, e.g., a bronze sphere, is a certain portion of prime matter which partly constitutes (i.e., hylomorphically composes) the bronze sphere in question; and **(p.46)** this portion of prime matter is itself (mereologically) composed of smaller portions of prime matter, which are (mereological) subportions of the original portion of prime matter.[15] Every portion or subportion of prime matter is a part of all the prime matter that exists in the world.

Secondly, portions of Thomistic prime matter, according to Brower's reading, can be identified and reidentified over time as well as distinguished from other portions of prime matter, independently of the matter–form compounds with which they are associated throughout their careers. For example, in Brower's view, we can make sense of claims of the form "a's prime matter at t_1 is identical to b's prime matter at t_2," where a and b are matter–form compounds which may or may not be numerically distinct.[16] Brower argues that the possibility of such reidentifications follows directly from the role that Aquinas assigns to prime matter in substantial change: this role requires us to be able to say, for example, that the portion of prime matter composing Socrates immediately after he comes into existence is identical to the portion of prime matter composing the zygote from which Socrates is generated, even if the zygote in question is taken to be numerically distinct from Socrates (Brower (2014), pp. 20, 103–5, 113–14).

Thirdly, Brower interprets Aquinas as being committed to unrestricted mereological composition for portions of prime matter (Brower (2014), pp. 116–17). Thus, any plurality of portions of prime matter itself composes a portion of prime matter. Brower proposes to make sense of Aquinas' puzzling claim that "prime matter is said to be numerically one in all things" (*De Principiis Naturae*, 2.97–108) by interpreting him as making reference to the mereological sum of all portions of prime matter in the universe. Brower construes Aquinas' remark concerning the numerical oneness of prime matter in all things as a claim about composition, rather than identity: " … that there exists a single sum or portion of prime matter *composed* of all the distinct, smaller portions existing in the world" (Brower (2014), p. 117).[17]

Fourthly, Thomistic prime matter, in Brower's view, is infinitely divisible as well as atomless and hence comparable to what contemporary metaphysicians call "atomless gunk" (Brower (2014), p. 118). There are no restrictions concerning the ways in which portions of prime matter can be divided into subportions of prime matter, **(p.47)** and, given Aquinas' rejection of atomism, no portions of prime matter are composed of indivisible parts.[18]

Finally, when Aquinas says of prime matter that it is "a being which exists only in pure potentiality" (Brower (2014), p. 119), Brower interprets him as having in mind the non-individuality of prime matter: portions of prime matter, in Brower's view, are best construed not as things, but as portions of stuff (Brower (2014) pp. 120–2). Thus, when Aquinas describes prime matter as a type of being which lacks actuality, Brower reads him not as saying anything against the reality or existence of prime matter; nor, according to Brower, does Aquinas mean to be denying that prime matter has a distinctive character or nature of its own.[19] Rather, the best way to think of Thomistic prime matter, so Brower argues, is along the lines of the category of stuff, particularly as it has been described in the recent literature by Ned Markosian (Brower (2014), pp. 125ff).[20]

Markosian's notion of stuff is similar to Thomistic prime matter, according to Brower's reading, in the following five main respects (Brower (2014), p. 126). Firstly, like Thomistic prime matter, stuff, in Markosian's view, comes in only one fundamental type for all material things.[21] Secondly, stuff is divisible into portions, which can enter into part–whole relations with one another. Thirdly, the domain of stuff satisfies the axioms of classical mereology (see n. 17). Fourthly, Markosian denies that portions of stuff can enter into part–whole relations with things; rather, portions of stuff *constitute* things, where constitution here is to be understood as a primitive *sui generis* relation distinct from the part–whole relations governing portions of stuff. Fifth, portions of stuff cannot exist apart from the things which are constituted by them.[22] And, finally, **(p.48)** since portions of stuff can be identified and distinguished from other portions of stuff, they are countable, and not merely measurable.

In other respects, however, the category of stuff, as characterized by Markosian, behaves differently from Thomistic prime matter, according to Brower's reading. For one thing, Brower takes Markosian's stuff to be ultimately composed of point-sized portions of stuff, i.e., simple indivisible but non-individual "atoms" of stuff.[23] For another, as we will see shortly, the motivations behind Markosian's recognition of a distinct ontological category of stuff are, not surprisingly, quite different from those which guide Brower's interpretation of Thomistic prime matter.

2.3.2 Difficulties for Brower's Thomistic Prime Matter as Stuff Hypothesis

Among the main advantages Brower claims for his approach is its ability to yield an account both of substantial change and of the distinction between substantial and non-substantial change (Brower (2014), pp. 174–83). In addition, Brower's Thomistic hylomorphism generates solutions to the Problem of Material Constitution, the Grounding Problem, and the Problem of Unity (Brower (2014), pp. 165–74).[24] In contrast to Oderberg's approach, however, Brower's construal of the Thomistic doctrine of prime matter also promises to be of help in settling at least some of the difficult questions concerning the numerical identity and distinctness of matter–form compounds, since **(p.49)** Brower takes portions of prime matter to be identifiable and reidentifiable independently of the matter–form compounds with which they are associated. Brower's Thomistic doctrine of prime matter thus speaks directly to the following sets of desiderata identified in Section 1.6: (2) "Causation, Explanation, Change"; (4) "Identity and Indiscernibility"; (5) "Material Constitution"; (7) "Unity," and (8) "The Grounding Problem."[25]

From the point of view of the considerations raised in Section 2.2.3, then, the main question which arises when comparing the conceptions of matter proposed by Oderberg and Brower is how well the latter fares when it comes to the fifth objection raised earlier, which asks to what extent prime matter can help resolve difficult questions concerning the numerical identity or distinctness of matter–form compounds. In Brower's view, questions concerning the numerical identity and distinctness of matter–form compounds (and their forms) *can* be settled derivatively by appeal to the portions of prime matter which hylomorphically compose them. But in order for portions of prime matter to be able to play this role, so Brower reasons, they in turn must have their identity and distinctness primitively:

> Indeed, on [Aquinas'] view we might say that, whereas the portions of prime matter associated with distinct material substances are primitively distinct, the substances themselves, as well as their substantial forms, are derivatively distinct—that is to say, distinct solely in virtue of their relationship to the primitively distinct portions of prime matter that serve as their substrata or individuators.
>
> (Brower (2017), p. 141)

Thus, in contrast to Oderberg, Brower assumes not only that it makes sense to speak of the identity and distinctness of portions of prime matter at a particular time or over time independently of the matter–form compounds with which they are associated at any given time, but, in addition to that, he takes facts about the numerical identity and distinctness of portions of prime matter to be the primitive source from which matter–form compounds (and their forms) derive their identity and distinctness. We might thus describe portions of prime matter,

given their role in Brower's Thomistic ontology, as themselves particulars or individuals in their own right, although Brower himself does not characterize them in this way.[26] Importantly, though, if portions of prime matter are recognized as particulars or individuals in their own right, the ontological category to which they belong must be sharply distinguished from that occupied by other entities which count as particulars or individuals within Brower's Thomistic ontology. For unless portions of prime matter are awarded a status that is **(p.50)** irreducibly distinct from that of other particular or individual entities, two commitments which, on Brower's reading, are absolutely central to Aquinas' metaphysics would be threatened: the ability to distinguish between substantial and accidental unity; and the ability to distinguish between substantial and non-substantial change.

To see why, suppose for a moment that both Socrates and Socrates' matter are particulars of the same type. In that case, so Brower reasons, Socrates would lose his status as a "basic particular" in Aquinas' system and would instead be demoted to an "accidental unity," i.e., a "non-basic particular" which is composed of other particulars (Brower (2014), pp. 24–6).[27] Secondly, if Socrates and Socrates' matter were both particulars of the same type, then one would expect Socrates' substantial form to bear the same relationship to both Socrates and Socrates' matter (see especially Brower (2014), Sections 4.1, 5.5, 7.2). But Socrates' substantial form does not bear the same relationship to both Socrates and Socrates' matter: Socrates is essentially human, but Socrates' matter is not human at all, neither essentially (since portions of prime matter function as the substratum for substantial change), nor accidentally (since nothing is ever accidentally human). To capture these different ways in which a substantial form or property can be related to an entity, Brower introduces a distinction between mere "possession" and "characterization": while Socrates' matter "possesses" but is not "characterized by" Socrates' substantial form, Socrates not only "possesses" but is also "characterized by" Socrates' substantial form (see especially Brower (2014), pp. 76–8). The best explanation for this difference in how Socrates' substantial form is related to Socrates and Socrates' matter, in Brower's view, is that Socrates and Socrates' matter belong to two irreducibly distinct ontological categories, only one of which contains entities of the right type to be "characterized by" Socrates' substantial form. Socrates, as a matter–form compound, is of the right type to be a human being, i.e., to be "characterized by" the substantial form of being human, while Socrates' matter, as a portion of prime matter or stuff, is not of the right ontological type to be a human being, i.e., to be "characterized by" the substantial form of being human (see especially p. 127).

As the preceding remarks indicate, Brower's account treats portions of prime matter as the primitive source by means of which questions concerning the numerical identity and distinctness of matter–form compounds are to be settled. But Brower's ability to do so comes at a steep price: it is methodologically and

ontologically costly in that it requires a commitment to an irreducibly distinct ontological category of stuff, occupied by portions of prime matter, accompanied by a distinction between two different ways in which substantial forms or properties may be exhibited by entities (viz., mere “possession” vs. “characterization”). Other things being equal, then, if the same range of phenomena can be explained by an account which carries fewer ontological and methodological commitments than Brower’s, such an alternative account should be **(p.51)** preferred on grounds of parsimony. We will see in Section 2.4, that the hylomorphic conception of matter is in fact more economical in this respect, since it matches or exceeds the explanatory power of its competitors without having to take on board an irreducible thing/stuff distinction. In addition, as we will discuss in detail in Chapter 3 (see Section 3.4.3), a theory like Brower’s which treats matter as the primitively individuated source of facts concerning the numerical identity and distinctness of matter–form compounds is in fact not able to match the explanatory of a theory which locates the source of these facts elsewhere. In the end, then, I will conclude that my own package of views is preferable to those of my competitors on grounds of both economy and explanatory power. At this point, however, until this stronger position can be properly justified, we are licensed to conclude only that, other things being equal, a conception of matter which does not require a commitment to an irreducible ontological category of stuff, along with its accompanying apparatus of relations, should be preferred over its competitors on grounds of ontological and methodological parsimony. Given the particular historical setting in which Brower’s account is embedded, we may wonder, in addition, whether an irreducible thing/stuff distinction can be motivated by appeal to considerations not related to Brower’s particular interpretive goals of offering a plausible reading of Aquinas. To this end, I now turn to an examination of the conception of stuff developed by Ned Markosian.

2.3.3 Difficulties for Markosian’s Matter as Stuff Hypothesis

Markosian (2015) cites a variety of reasons in support of his “mixed” or “dualist” ontology, which includes distinct and irreducible ontological categories for both stuff and things.[28] Some of Markosian’s reasons derive from what he would classify as *pre-theoretic intuition*; others, in contrast, are based on *philosophical analysis*. Markosian’s endorsement of stuff as an irreducible ontological category is not supported by *empirical* considerations. In fact, as will emerge in what follows, it is doubtful whether we could find out anything about stuff, as Markosian conceives of it, by consulting a chemist or a physicist. In what follows, I argue that, since Markosian’s pre-theoretic or philosophical arguments fail to create sufficient pressure to take on board an irreducible category of stuff, and his position is furthermore not corroborated by empirical evidence, his case for a mixed ontology, as it stands, can and should be resisted.

In Markosian's view, our common-sense way of talking and thinking supports a mixed ontology. In fact, judging from his examples, Markosian is committed to the claim that we typically make reference to stuff when (i) we either use nouns in their *mass-occurrences* (e.g., "more ice-cream," "two liters of water," etc.) or when (ii) the expression, "stuff" (or "matter"), explicitly occurs in a statement we utter (as when we use phrases like "the stuff," "this stuff," "some stuff," and so on). I assume he would accept **(p.52)** an analogous claim for reference to things, viz., that such reference typically takes place when (i) we either use nouns in their *count-occurrences* (e.g., "many chairs," "two bicycles," etc.) or when (ii) the expression, "thing" (or "object"), explicitly occurs in a statement we utter.

But there are good reasons for thinking that our pre-theoretic commitments and our ordinary ways of talking are not philosophically fine-grained and stable enough to support the philosophical weight Markosian wishes to place on them. In particular, if we want to avoid being thrown into a Whorfian relativism, according to which different language communities conceptualize the world in radically different and possibly incommensurable ways, we must give up the hope of finding a direct link between the mass/count distinction and any single metaphysical distinction, such as Markosian's distinction between things and stuff.[29] Firstly, given ordinary usage, our terms, "stuff" and "things," are often interchangeable without any significant distortion in meaning, as in "the stuff/ things you've written," "the things/stuff in your attic," and so on. (Similarly for related terms, such as "matter" and "object.") Secondly, the classes of nouns under discussion are strikingly *heterogeneous*. For example, "asparagus," "traffic," "jewelry," and "poetry" are like "mud" in that they are standardly used primarily in mass occurrences; "cloud," "virus," "hurricane," and "mistake" are like "tree" in that they are standardly used primarily in count occurrences; "carrot," "pain," and "justification" are like "hair" in that they are standardly used in both ways. Thirdly, actual language use is extremely *flexible* in permitting existing nouns to acquire new uses ("A BMW 300-series is not much *car* for the money"; "I just sent you another *email*"). Fourthly, there is significant *cross-linguistic variation* in how or even whether different languages mark the mass/count distinction grammatically at all. For example, the English noun, "hair," standardly has both mass and count occurrences, while the German noun, "Haar," standardly has count occurrences and has a mass use only in poetic contexts (as in "*Rapunzel, Rapunzel, lass mir Dein Haar herunter*"). Furthermore, Asian classifier languages, such as Mandarin Chinese and Japanese, have been thought to represent *all* nouns as having mass occurrences, since all nouns in these languages must be preceded by a classifier phrase, as in "*a long/thin unit of* pencil/cigarette/ … " . I take these and other similar observations to indicate that language and our use of it are much too tolerant and varied to take either occurrences of the terms, "stuff" ("matter," etc.) and "thing" ("object," etc.), or the mass/count distinction in general as a reliable

indicator of a deep ontological distinction of the sort Markosian is trying to motivate. As a result, the best way to proceed, for the purposes of the present discussion, is to leave aside our ordinary ways of talking and thinking, and to focus instead on those of Markosian's arguments which derive from philosophical analysis.

Suppose for a moment, however, that Markosian was right in thinking that our ordinary ways of talking and thinking support a thing/stuff distinction. This in itself would establish very little of philosophical significance, for we would still need to **(p.53)** know whether we are *correct* in being pre-theoretically committed to such a distinction. Since we are (or were at one time) pre-theoretically committed to all sorts of bizarre entities and distinctions, a special story would be required to establish that this particular piece of alleged folklore should be taken so seriously by ontologists. As will emerge below, however, it is not at all obvious, given Markosian's account, how we would be able to confirm whether a thing/stuff distinction, which he sees as being part of our common-sense ontology, is on the right track.

I turn next to Markosian's philosophical reasons in favor of accepting a thing/stuff distinction, viz., in particular those connected to his argument from the possibility of spatially extended simples.[30,31] Markosian considers and rejects a rival view of simples he calls "The Pointy View of Simples" (PVS): according to this approach, an object is a simple just in case it occupies exactly one point in space (Markosian (1998), pp. 216ff). Markosian accepts the right-to-left half of PVS, viz., that if something is a pointy object, then it is a simple; but he does not accept the left-to-right half of PVS, viz., that if something is a simple, then it is an extensionless point-sized object. Markosian's main argument against PVS is based on the following scenario:

> Imagine a possible world in which there is only one physical object, a perfectly solid sphere made of some homogeneous substance, floating in otherwise empty space. If you can imagine such a world—and I think you can—then the Pointy View of Simples is false. For the Pointy View of Simples entails that any extended object that occupies a continuous region of space must be composed of an infinite number of parts.
>
> (Markosian (1998), p. 218)

According to PVS, any world which contains at least one spatially extended physical object in fact contains an infinite number of objects, viz., the simples which occupy the extensionless points included in the region of space in question. This entailment strikes Markosian as unacceptable, since he believes that, in the scenario specified above, only a single physical object exists and this physical object is spatially extended (Markosian (1998), p. 219).[32]

(p.54) According to the approach Markosian favors, "MaxCon," simples are maximally continuous objects, i.e., objects which occupy maximally continuous regions of space.[33] The intuitive idea behind MaxCon, as described by Markosian, is that "simples are objects that occupy the largest matter-filled, continuous regions of space around" (Markosian (1998), p. 222). MaxCon allows for a description of the scenario cited above as one which contains only a single spatially extended physical object. By MaxCon's lights, the perfectly solid homogeneous sphere we were asked to imagine would count as a simple, provided that it occupies a maximally continuous region of space. In addition, however, given Markosian's views, it is also revealed to us as a result of philosophical analysis that, when we were asked to imagine a world which contains a single perfectly solid homogeneous sphere floating in otherwise empty space, we were in fact imagining a world which contains a single sphere *and the stuff* that constitutes the sphere *and the parts* (i.e., *the subportions*) *of the stuff* that constitutes the sphere. Thus, while it is true to say, according to Markosian's account, that the scenario in question contains only a single spatially extended physical *object*, it is not true to say that it contains *nothing but* a single spatially extended physical object. For Markosian is also committed to holding that the world in question contains *additional physical content* besides the single sphere we thought we were imagining; only the additional physical content in question belongs to the category of *stuff*, rather than to the category of *things*.[34]

Markosian's description of the scenario in question thus not only relies heavily on certain modal intuitions (viz., that the world we are asked to imagine is in fact possible); it also requires a rather fine-grained interpretation of the modal intuitions which are supposed to be elicited by his thought experiment.[35] But now consider the following **(p.55)** alternative description of the scenario outlined earlier: when we were asked to imagine a world that contains a single sphere, we were in fact imagining a world that includes not only the sphere, but also *the proper parts* of the sphere. Since the sphere, by hypothesis, is spatially extended, and any spatially extended physical object has proper parts (or so the competing interpretation maintains), we could not help but imagine the sphere along with its proper parts, whether we were aware of it or not. The proper parts of the sphere were not explicitly mentioned in the description of the scenario provided earlier, but neither was the portion of stuff which, if Markosian has his way, constitutes the sphere, or its subportions. While the alternative interpretation of the scenario just provided is incompatible with Markosian's position, it is compatible with other rival ontologies (e.g., ones that include a commitment to PVS). Given the availability of such alternative interpretations, we should therefore conclude that Markosian's account, which favors MaxCon, provides merely one, but by no means the only possible, coherent description of the thought experiment in question. Consequently, insofar as MaxCon is intended to provide support for Markosian's dualist

ontology, we need not feel compelled to embrace a distinct and irreducible ontological category of stuff on the basis of the argument for the possibility of spatially extended simples.[36]

So far, my aim has been to argue that Markosian does not succeed in providing pressing pre-theoretic or philosophical reasons for taking on board a distinct and irreducible category of stuff. I want to end my examination of Markosian's approach by bringing out why I am deeply puzzled by what stuff is really supposed to be, given **(p.56)** Markosian's characterization, and how we could ever find out anything about it. According to Markosian's particular brand of stuff theory, there are no ontologically significant subdivisions within the category of stuff; rather, in his view, stuff comes in only one fundamental type, viz., "generic stuff," and all the other more familiar "stuff kinds" (e.g., water, bronze, etc.) are just "generic stuff" arranged in a particular way (see, for example, Markosian (2015), p. 2). To illustrate, quarks, in Markosian's view, are made of "quark stuff," which is described as "*the kind of matter that quarks are made of*, and not, say, *collections of quarks*" (Markosian (2015), p. 2, n. 2). But "quark stuff," for Markosian, is not a fundamentally different kind of stuff from, say, water, since he describes the latter as "generic stuff arranged in subportions that constitute H_2O molecules" (p. 22, n. 47). Thus, the difference between, say, "quark stuff" and water, according to Markosian's account, is just that the former is "generic stuff" arranged in subportions which constitute quarks, while the latter is "generic stuff" arranged in subportions which constitute H_2O molecules.

As far as I can see, Markosian's remarks concerning "generic stuff" and its relation to the more familiar "stuff kinds," such as water, can be interpreted in two ways; neither interpretation, however, leaves him in a good place. Consider Markosian's characterization of water cited above as "generic stuff arranged in subportions that constitute H_2O molecules." Presumably, the "generic stuff" in question, which is arranged in H_2O molecule-constituting subportions, includes "generic stuff" arranged in subportions which constitute hydrogen atoms. We can assume, further, that this "generic stuff" in turn includes "generic stuff" arranged in subportions which constitute electrons, protons, and neutrons, and so on. Suppose we live in a world in which there is a bottom level of subatomic stuff or particles, which are not composed of anything more basic; and let's call these "boson stuff" and "bosons," respectively. "Boson stuff," I take it, would be characterized by Markosian as "generic stuff" arranged in subportions which constitute bosons. Is this "generic stuff" different in any way from the "generic stuff" which we assumed at any other level in the constitutional hierarchy? If not (and this seems to be the reading preferred by Markosian), then it seems that his view at this point collapses into either a "bare substratum" or a "prime matter" approach of the sort discussed in Sections 1.4–5 and 2.2. According to this reading of Markosian's "generic stuff," the very same kind of stuff can simultaneously give rise to something as different as a boson, a quark, an

electron, a proton, a neutron, and an H_2O molecule, merely by virtue of having its subportions arranged in different ways. I have already voiced my concerns that this conception of matter appears to lack empirical support.

According to the second interpretation, the stuff which constitutes, say, hydrogen atoms, is viewed as belonging to a different kind from the stuff which constitutes, say, electrons. Let's refer to the former as "hydrogen stuff" and to the latter as "electron stuff"; and let's assume further that neither one of them would warrant the title, "generic stuff." This, I take it, is what Markosian has in mind when he speaks of the Anaxagorean picture he opposes: a view which conceives of the world as consisting of different kinds of stuff and which does not regard these different stuff kinds as reducible to a single **(p.57)** fundamental type of "generic stuff" whose subportions can be arranged in different ways. The challenge that now arises for the Anaxagorean stuff theorist, however, is to tell us what this supposed "hydrogen stuff" really is other than just pluralities of hydrogen atoms. Certainly, we do not encounter any empirical evidence from chemistry that creates pressure to posit a separate kind of "hydrogen stuff," in addition to pluralities of hydrogen atoms. Rather, chemistry tells us that hydrogen atoms are entities whose nucleus contains a single proton and a single electron in the orbit of the nucleus (ignoring the isotopes). Thus, as far as our empirical evidence is concerned, we have reason to believe that hydrogen atoms are composed of a single proton and a single electron; but we have no reason to believe that hydrogen atoms are constituted of a special kind of "hydrogen stuff." No mention of this special kind of "hydrogen stuff" is required in order to account for the behavior of hydrogen in chemical reactions and the like.

When all is said and done, then, I find myself in the same position I was in to begin with, before being presented with Markosian's characterization and defense of stuff as a distinct and irreducible category: I still fail to understand what stuff is supposed to be, if it is not simply things or pluralities of things; how we could find out anything about it; and why we are supposed to need this alleged ontological category in the first place. Our ordinary ways of thinking and speaking, in particular our use of terms such as "stuff," "matter," "thing," or "object," and the mass/count distinction more generally, do not support anything as philosophically weighty as the thing/stuff distinction Markosian is trying to motivate. Physicists and chemists do not seem to find it necessary to appeal to anything like Markosian's category of "generic stuff," or to a more Anaxagorean picture, in order to account for the behavior of those entities with which they are concerned. Since Markosian's version of the stuff theory in any case has some troubling features (e.g., his mysterious notion of "generic stuff" as well as his, to my mind, unappealing views concerning constitution), I propose that, unless other considerations surface, we should stick with a thing ontology, which is really all we need to satisfy our philosophical and empirical needs. The

hylomorphic conception of matter, with which we will be concerned in the final section of this chapter, serves this purpose very nicely.

2.4 The Hylomorphic Conception of Matter

The third approach to matter, (i.c), outlined at the beginning of this chapter, holds that matter–form compounds and their matter belong to the same ontological type: the matter of a concrete particular object, according to the hylomorphic conception, is nothing other than the material parts which compose it. So long as these material parts are themselves structured wholes, the hylomorphic analysis applies to them to the same extent as to the concrete particular object whose material parts they are. As I will illustrate, the third approach preserves many of the advantages of alternative conceptions of matter as prime matter or stuff, while avoiding their main disadvantages. This conception of matter does leave us with several challenges, but these can be addressed **(p.58)** by clarifying further in subsequent chapters, how hylomorphists should conceive of form and the relation(s) between a concrete particular object, its matter, and its form.

Like its competitors, the hylomorphic conception assigns an important role to matter in explaining substantial change, viz., the coming to be and ceasing to be of matter–form compounds (see Section 1.6: (2) “Causation, Explanation, Change”). In a typical case, a newly created concrete particular object (e.g., an H_2O molecule) comes to be from some pre-existing ingredients (viz., two hydrogen atoms and an oxygen atom) which are themselves structured wholes, i.e., matter–form compounds, according to the hylomorphic analysis. In cases in which the pre-existing ingredients persist through the substantial change in question, these matter–form compounds become the material parts of the newly created concrete particular object. In other cases, in which the preexisting ingredients do not persist through the substantial change in question (e.g., when some eggs are combined with other ingredients to bake a cake), whatever lower-level material parts do persist through the substantial change in question (e.g., the proteins which were previously among the material parts composing the eggs) in turn take on the role of serving as the material parts of the newly created concrete particular object. (Cases of substantial change which appear to fit neither of these two models will be considered shortly.) Either way, there is something which persists through the substantial changes in question, viz., the pre-existing ingredients or some of their lower-level material parts, and these persisting subjects become the material parts or matter of the newly created concrete particular object.

The hylomorphic conception of matter does not require that the matter which underlies substantial change at micro-physical levels lacks an essence (regardless of whether the term, “essence,” is used here in a strict or in a loose sense), since both a matter–form compound and its material parts are taken to be concrete particular objects, and hence belong to the same ontological type.

Whatever reasons motivate us to ascribe an essence to a composite concrete particular object will therefore be equally relevant to the material parts which compose the object in question, since both are regarded as matter–form compounds by the hylomorphic approach. In this way, proponents of the hylomorphic conception are able to avoid the threat of contradiction which arises, as noted earlier in connection with the doctrine of prime matter (see Section 2.2.3: (3) “Threat of Contradictions”), from the practice of ascribing certain characteristics to the ultimate substratum underlying substantial change at micro-physical levels which do not appear to belong to it accidentally, while at the same time denying that this ultimate substratum is of the right ontological type to have an essence.

The hylomorphic approach is compatible with an empirically supported hierarchical conception of matter (see Section 2.2.3: (1) “Potential Metaphysical Overreaching” and (2) “Non-Hierarchical Conception of Matter”). A quantity of water, for example, according to the present approach, is conceived of as a plurality of H_2O molecules (ignoring the impurities that may or may not be present in any given quantity of water) and, as a structured whole, each individual H_2O molecule counts as a matter–form compound; so do its material parts (i.e., the individual hydrogen and oxygen atoms), **(p.59)** and so on down, unless or until we are faced with something that is material, but in itself unstructured. At that point, if such a possibility ever were to obtain, we would have reached a level in the compositional hierarchy at which the hylomorphic analysis no longer applies.

In order to maintain consistency with an empirically confirmed hierarchical conception of matter, the hylomorphic approach must allow that, as a matter of contingent fact, any number of alternative possibilities for what might underlie substantial change at micro-physical levels are, as far as we know, still live options (see Section 2.2.3: (4) “Other Possibilities”): in particular, (i) the possibility of infinitely descending chains consisting of ever smaller matter–form compounds whose material parts are themselves matter–form compounds; as well as (ii) the possibility that we might eventually reach a point in the compositional hierarchy at which matter–form compounds are composed of material parts which are not themselves structured wholes.[37] In order for the hylomorphic conception of matter to be compatible with such alternative possibilities for what might underlie substantial change at micro-physical levels, I amend the official formulation of the third approach with the following proviso:

> (i.c*) *Matter as Hylomorphic Compounds*. The material parts of matter–form compounds are themselves matter–form compounds, unless or until we reach an empirically confirmed level in the compositional hierarchy at which the material parts of matter–form compounds are not themselves structured wholes.

The hylomorphic conception of matter, as stated in (i.c*), is thus committed to the position that the material parts of concrete particular objects are themselves matter–form compounds, as long as we have empirical confirmation that these material parts are themselves structured wholes.

The hylomorphic conception of matter foregoes any commitment to a puzzling category of non-particulars or non-individuals (see Section 2.2.3: (5) “Non-particularity”). Since this approach classifies both concrete particular objects and their material parts as matter–form compounds, so long as the entities in question are structured wholes, these material parts are therefore eligible to figure in an account of the numerical identity and distinctness of the matter–form compounds they help to compose. As we will have occasion to observe in the next chapter, a reference to facts concerning the material parts of a matter–form compound cannot by itself be expected to resolve all **(p.60)** of the difficult questions surrounding the numerical identity and distinctness of matter–form compounds, since some of these responsibilities will also have to be borne by the remaining constituent of a matter–form compound, viz., its form. In addition, suppose an account of the numerical identity and distinctness of a concrete particular object, A, appeals to facts concerning the numerical identity and distinctness of some further concrete particular objects, B and C, which materially compose A. In that case, a further question arises as to how (if at all) facts concerning the numerical identity and distinctness of B and C are determined, and so on down, unless or until we reach a point at which we find ourselves appealing to facts concerning numerical identity and distinctness which can be assumed to be basic, i.e., not open to further explanation. In this way, even if the material parts composing matter–form compounds are of the right ontological type to supply us with some of the facts that are needed for an account of the numerical identity and distinctness of the wholes they compose, further questions concerning the numerical identity and distinctness of matter–form compounds will still be left open. Nevertheless, the hylomorphic conception of matter at the very least constitutes a step in the right direction, by assigning the material parts of matter–form compounds to an ontological category which makes these entities suitable to serve as a partial source for facts concerning numerical identity and distinctness of the wholes they help to compose.[38]

In response to the Problem of Material Constitution, proponents of the hylomorphic conception of matter will presumably point out that the relation of material constitution is just the relation which holds between a matter–form compound and its material parts, i.e., a type of mereological composition, since this approach is committed to the thesis that the matter of a concrete particular object is nothing other than its material parts.[39] And while there is little motivation for proponents of the third approach to endorse a distinction between “actual” and “virtual” parts or unitarianism about forms, the resulting position thereby also creates the need to propose a non-eliminativist solution to the Problem of Unity and the Grounding Problem (see Section 2.2.3: (6) “Material

Constitution, Unity, and the Grounding Problem”). For suppose, on the one hand, that a concrete particular object is composed of a plurality of material parts which, **(p.61)** according to the hylomorphic conception, are themselves matter–form compounds and actually present in the whole they help to compose. In that case, one wonders how a plurality of such actually present matter–form compounds can together manage to give rise to a unified whole. Suppose, on the other hand, that a concrete particular object is composed of only a single material part which again, following the hylomorphic approach, will itself count as a matter–form compound that is actually present in the whole it helps to compose. In this case, the hylomorphic conception appears to be committed to the possibility of numerically distinct but spatiotemporally coincident objects and therefore owes us an account of what grounds their apparently different modal profiles. A proper treatment of the Problem of Unity and the Grounding Problem, both of which will concern us in more detail in subsequent chapters, requires additional apparatus in addition to what is supplied by the hylomorphic conception of matter developed in this chapter.

2.5 Conclusion

Our focus in the current chapter was on the question of how hylomorphists should conceive of the matter composing a concrete particular object. Three main options were considered: (i.a) the doctrine of prime matter as developed by David Oderberg; (i.b) the matter-as-stuff hypothesis defended by Jeffrey Brower and Ned Markosian; and (i.c) the hylomorphic conception of matter, which I argued should be the preferred choice for hylomorphists. The doctrine of prime matter, which is popular among Thomists, comes out of a certain interpretation of Aristotle’s views concerning substantial change and the possibility of elemental transformations, though whether Aristotle in fact held this doctrine is a matter of scholarly controversy. We found that the representative competing approaches to matter we examined give rise to a number of difficulties. As far as our evidence is concerned, then, hylomorphists should opt for the third approach to matter, (i.c), according to which the matter composing concrete particular objects is nothing other than their material parts and these are themselves construed as matter–form compounds, unless or until we reach an empirically confirmed level in the compositional hierarchy at which the hylomorphic analysis no longer applies.

Notes:

([1]) Option (i.c) is compatible with the possibility of infinitely descending chains of matter–form compounds whose material parts are themselves matter–form compounds. In the face of other possibilities, however, which we will consider in more detail later in this chapter, I adopt a more precise formulation of the third approach which contains the following important additional proviso: “ … unless or until we reach an empirically confirmed level in the compositional hierarchy at which the material parts of matter–form compounds are not themselves

structured wholes." If we ever were in possession of empirical evidence which indicates that, at some level in the compositional hierarchy, the material parts of a concrete particular object are not themselves structured wholes, then proponents of (i.c) should concede that, at that point, hylomorphism no longer applies. Such a possibility should not be interpreted as a counterexample to the doctrine, but rather as a reason to restrict its scope. Other reasons for restricting the scope of the hylomorphic analysis are already known to us, e.g., in the case of domains (e.g., that of set theory) consisting of complex entities which are not structured wholes. Even so, the doctrine of hylomorphism still finds plenty of application with respect to complex entities that are independently recognized as structured wholes. If the proviso ever did come into effect, however, we should not immediately conclude that, in these circumstances, either of the alternative conceptions of matter— (i.a) or (i.b)— should be favored. In fact, we will encounter reasons for thinking that the representative formulations of (i.a) and (i.b), which will be examined in this chapter, should in any case be rejected on independent grounds. For reasons of simplicity, I will, for the time being, use the simpler formulation of (i.c) given above, without the important qualification just specified.

([2]) In this chapter, I address some, but not all, of the desiderata outlined in the previous chapter. This selective attention is to be expected, since some of the issues in question more naturally fall under the purview of the responsibilities assigned to form or the relation(s) between a concrete particular object, its matter, and its form, while others are more likely to be settled by the contributions of matter. In particular, the following will figure prominently in this chapter: (2) "Causation, Explanation, and Change"; (4) "Identity and Indiscernibility"; (5) "Material Constitution"; and, perhaps somewhat surprisingly, (7) "Unity" and (8) "The Grounding Problem." Many of these topics will continue to be of concern to us in subsequent chapters as well. The remaining desiderata will receive closer attention when we turn to the discussion of form and the hylomorphic relations in the next two chapters: (1) "Property Possession and the Problem of Universals"; and (3) "Essence and Accident." (6) "Mereological Composition" will mostly stay in the background in the present study, since I have already dealt with these issues extensively in Koslicki (2008a).

([3]) The attribution of prime matter to Aristotle is challenged, for example, by King (1956) and in W. Charlton's commentary on Aristotle's *Physics*, Books I and II (see especially the Appendix in Charlton (1970), pp. 129–45). For rebuttals of King's and Charlton's arguments, see Robinson (1974) and Solmsen (1958). Further discussion of the controversy, as it pertains to *On Generation and Corruption*, can also be found in the Appendix to C. J. F. Williams' commentary on this work (see Williams 1982, pp. 211–19). Williams sides with Solmsen and Robinson, over King and Charlton.

([4]) Bostock (1994), for example, reads the so-called “striptease” argument in *Met*. Z.3 as beginning with the perceptible matter of a concrete particular object, e.g., the bronze which constitutes a statue (Bostock (1994), pp. 76ff), and then proceeding to “strip away” conceptually all of the attributes, including the dimensions (viz., length, breadth, and depth), which are associated with whatever entity forms the starting point of the thought experiment in question. What remains, in thought, according to Bostock, is prime matter which is not perceptible. Only prime matter, so Bostock argues, can survive the “striptease” Aristotle performs in his *Met*. Z.3 thought experiment, since nothing belongs to it essentially. Other commentators, however, read the “striptease” argument in *Met*. Z.3 differently. Gill (1989), for example, takes Aristotle to be objecting to a competing conception of matter which he rejects (most likely the conception of matter that is operative in Plato’s *Timaeus*).

([5]) This and all subsequent quotations from Aristotle’s *Metaphysics* come from the translation by W. D. Ross (see Barnes (1984)).

([6]) An engagement with the exceedingly difficult question of how to make sense of Aristotle’s notions of separability and thisness would take us too far afield for present purposes. If the kind of matter under discussion in passages such as those from *Met*. Z.3 just cited is in fact prime matter, then presumably the denial of separability can be understood at least to entail a modal existential claim, viz., that prime matter cannot exist on its own, without being affiliated with some particular matter–form compound which it composes. The denial of thisness can be construed, for example, in terms of either particularity or determinateness, i.e., as claiming that prime matter lacks a particular or determinate nature.

([7]) Is Aristotelian prime matter (if there is such a thing) a type of *entity*? That depends on what we mean by “entity.” If the term is used very broadly, then I suppose the answer would be “yes” (according to those who read Aristotle as being committed to prime matter), in the sense that prime matter is a type of being, though one to which all the qualifications cited in the text apply. But if the term is used more narrowly, e.g., to apply to those types of being which belong to one of Aristotle’s categories (i.e., substance, quality, quantity, etc.), then the answer would be “no.” If by “entity” we mean “thing,” then the question is difficult to evaluate in Aristotle’s case, since he does not employ a separate term which straightforwardly corresponds to our term, “thing.” Both Oderberg and Brower would answer the latter question negatively for Thomistic prime matter; in Brower’s case, the reason for this assessment is that he assigns Thomistic prime matter to the ontological category of stuff, which he takes to be fundamentally different from that of things. Both, however, would agree that the first two answers correctly describe Thomistic prime matter as well: it is a type of being, broadly construed, but not one which belongs to any of the Aristotelian categories.

([8]) Following Aquinas, Oderberg holds that only a single substantial form is associated with each matter–form compound, a position that is known as "unitarianism" about substantial forms.

([9]) In Oderberg's view, not all concrete particular objects belong to the privileged category for which he reserves the label, "material substances." Among concrete particular objects, Oderberg also recognizes a class he calls "accidental unities" which includes, for example, such objects as fists (i.e., hands that are clenched) and artifacts. Accidental unities, in Oderberg's view, are not compounds of prime matter and substantial form; rather, they are matter–form compounds (or the actual parts of matter–form compounds) "taken together" with some of their accidental modes; e.g., a fist is a hand "taken together" with its accidental mode of being clenched. For the time being, when I speak of "concrete particular objects," I am restricting myself to the privileged class of concrete particular objects which, in Oderberg's view, would count as genuine matter–form compounds (or as actual parts of genuine matter–form compounds). I purposefully do not refer to the privileged class of concrete particular objects in question as "material substances," since the question of whether, and in what sense, these entities should be regarded as substances raises difficult issues which will be examined in detail later. For now, I simply refer to the entities in question as "concrete particular objects" or "matter–form compounds," while leaving open exactly what kinds of entities are to be included in or excluded from this category. Oderberg accepts as examples of the privileged category in question living organisms as well as members of other natural but non-living kinds (e.g., chemical compounds).

([10]) Oderberg is comfortable using the language of parthood and composition when he describes the relationship between prime matter, substantial form, and the concrete particular object which results from their combination. However, he does want to distinguish between hylomorphic composition (i.e., the sense in which a concrete particular object is a compound of prime matter and substantial form) and mereological composition (i.e., the sense in which a whole is composed of its parts), as the following passage for example makes clear:

> Now substantial form is *intrinsic* since it is a constituent solely of the substance. It is a *constituent* because it is a real part or element of it, though not on the same level as a substance's natural parts such as the branch of a tree or the leg of a dog. Rather, substantial form (or 'form' for short) is a radical or fundamental part of the substance in the sense of constituting it as the kind of substance it is. It is a *principle* in the sense of being that from which the identity of the substance is derived … And form *actualizes the potencies of matter* in the sense of being the principle that unites with matter to produce a finite individual with limited powers and an existence circumscribed by space and time.

(Oderberg (2007), p. 66)

See also Oderberg (2012), especially pp. 21–2, for further elaboration.

([11]) I should note here that I am *not* currently concerned with the more general question of how an Aristotelian substance ontology might be compatible with contemporary physics. (But see, for example, Ismael and Schaffer (2016) for recent work on quantum holism, and Tahko (2017) on the compatibility of an Aristotelian substance ontology with quantum holism; in a similar vein, I discuss criticisms raised by Simons (1998) concerning the compatibility of an Aristotelian substance ontology with contemporary science in Koslicki (2015b).) This more general worry would affect hylomorphists of all stripes to the same extent (including those, such as Oderberg and Brower, who favor a Thomistic conception of prime matter), since all of us are in some way committed to the reality of macroscopic concrete particular objects.

([12]) For Oderberg, prime matter is not a *thing* and hence not of the right ontological category to have an essence. He does, however, allow that other entities besides matter–form compounds have essences as well (e.g., accidents which inhere in matter–form compounds). Moreover, in order to perform the roles ascribed to it, prime matter has to be at least sufficiently "thing-like" to be able to persist through substantial change: it must be possible, for example, for the *same* prime matter which was around before a quark, say, came into existence still to be around after the quark has come into existence. Given the roles ascribed to prime matter and the relatively broad application of the notion of essence beyond the category of matter–form compounds, it strikes me as ad hoc not to recognize the characterizations ascribed to prime matter as amounting to at least a partial specification of its essence.

([13]) Different versions of hylomorphism will describe the conditions which would have to obtain in order for the second possibility to be realized differently. According to my own view, as developed in Koslicki (2008a), this possibility would obtain in a scenario in which a structured whole is composed of material parts and these material parts are not themselves structured wholes, i.e., they are not themselves composed of any further material parts which must meet the type constraints and configuration constraints imposed by the kind to which the whole they compose belongs.

([14]) An additional puzzle concerning individuation which arises for Oderberg's approach is that it becomes difficult to understand how something non-particular (viz., prime matter) together with something else that is also non-particular (viz., substantial form) can result in something that is particular (viz., a particular matter–form compound). Since the prime matter composing Socrates cannot be identified independently of Socrates, and Socrates' substantial form is just "general human nature particularized in Socrates," one

wonders why prime matter as combined with general human nature on one occasion results in Socrates, and on another occasion results in Callias. The following remark suggests that Oderberg takes these facts not to be open to further explanation: “ … [E]very material substance is the principle of its individuation by its own proper entity. It is the very union of prime matter to substantial form that constitutes the individual substance … ” (Oderberg (2007), p. 111).

([15]) For Brower’s distinction between constitution, i.e., hylomorphic composition, and mereological composition, see Brower (2014), p. 6, n. 9; p. 10, n. 20; p. 11, n. 21; as well as Sections 5.4 and 8.1.

([16]) In this respect, Brower’s interpretation of the Thomistic doctrine of prime matter contrasts starkly with that developed by Oderberg, as emerged in our discussion of (5), “Non-Particularity.” According to Oderberg, the prime matter composing, say, Socrates cannot be identified independently of Socrates (see Oderberg (2007), p. 109).

([17]) The assumption that there is a *single* such all-encompassing mereological sum composed of all the other portions of prime matter in the universe also requires a commitment to the uniqueness of mereological composition, which Brower accepts for Thomistic prime matter as well. Since in addition he takes parthood for portions of prime matter to be transitive, Thomistic prime matter, according to Brower’s reading, satisfies all three of the axioms that are associated with the system known as “standard mereology” or “classical extensional mereology” (see Leonard and Goodman (1940); Lewis (1991); Simons (1987)): unrestricted composition, uniqueness of composition, and the transitivity of parthood.

([18]) But Brower’s interpretation requires only that Thomistic prime matter is *potentially* infinitely divisible and hence does not conflict with the Aristotelian prohibition against actual infinities (see Brower (2014), p. 118, n. 17).

([19]) Though when the term, “essence” is used in its strict sense, then, so Brower emphasizes, Aquinas would want to deny that prime matter has an essence (Brower (2014), p. 20). In this respect, Brower’s and Oderberg’s readings of the Thomistic doctrine of prime matter agree.

([20]) Other theorists besides Markosian have also argued for the acceptance of an irreducible ontological category of stuff (see, for example, Jubien (1993); Kleinschmidt (2007); Laycock (2006)). In what follows, I focus on Markosian’s defense in particular. For one thing, Markosian’s conception of stuff is the most pertinent for present purposes, since his approach underwrites Brower’s interpretation of the Thomistic doctrine of prime matter. Secondly, to my knowledge, Markosian’s case in favor of accepting stuff as an irreducible category is the most detailed and explicit defense and characterization of this

position in the literature. For critical discussions of Jubien (1993) and Laycock (2006), however, see Sider (1999a) and Koslicki (2007a), respectively.

([21]) According to Markosian, stuff is not divided up into distinct subcategories which have any ontological significance, as it would be according to an Anaxagorean picture, just as, in Markosian's view, there are also no ontologically significant subdivisions among things. Rather, the category of stuff contains only one kind of stuff, "generic stuff," and all the more familiar "stuff-kinds" (e.g., water, bronze, etc.) turn out to be generic stuff arranged in a certain manner. (We will return to these issues in Section 2.3.3.)

([22]) According to Markosian's "Principle of Constitution" (PC), whenever there is a thing, then there is also a portion of stuff which *constitutes* the thing in question; and, by Leibniz's Law, the portion of stuff and the thing it constitutes are never identical. In addition, Markosian holds a kind of qualified *reverse* version of PC as well, which rules out what we might call "free-floating" stuff. The principle in question can be stated roughly as follows: "Every portion of stuff can be partitioned into non-overlapping subportions, such that each of these subportions of stuff constitutes a thing" (see, e.g., Markosian (2004b), p. 409). In particular, Markosian's conception of simples, which will be discussed in more detail in Section 2.3.3, leads him to adopt a specific version of this reverse-constitution principle, according to which every portion of stuff which occupies a maximally continuous region of space constitutes a simple (viz., an object which has no proper parts).

([23]) It is not entirely clear, however, whether Brower is correct in ascribing this last commitment to Markosian. In his earlier work, Markosian claims that it is an advantage of his conception of simples (according to which simples may be spatially extended objects which occupy maximally continuous regions of space) that it is nevertheless compatible with a rival conception of simples (according to which they are non-extended pointy objects) as well as with the possibility of atomless gunk. According to Markosian, if any of these alternative possibilities obtained, it would do so as a matter of contingent fact (see Markosian (1998), pp. 215, 227). Given these earlier views, we should thus expect Markosian similarly to want to leave it open whether stuff is gunky or non-gunky. See Markosian (2015), p. 678, for similar remarks concerning neutrality which suggest that he still agrees with his earlier self on this point.

([24]) According to Brower's exposition, two different types of solutions to the Problem of Material Constitution are open to the Thomistic hylomorphist. The first solution follows the eliminativist line sketched earlier and therefore requires a commitment to both unitarianism about substantial forms and the doctrine of virtual parts (Brower (2014), p. 169, n. 31). (In Brower's terminology, virtual parts are referred to as "integral" or "quantitative" parts; see, for example, pp. 15–16.) The second solution proceeds by drawing a distinction

between *sameness* and *numerical identity* (pp. 168–9). (See also the solution embraced in Rea (1998) cited in Section 1.6.) According to this second solution, a statue and the clay of which it is made, for example, are regarded as the same material object, without thereby also being identified. Brower's distinction between sameness and numerical identity raises many difficult questions of its own. In addition, however, the second solution to the Problem of Material Constitution does not by itself yield a solution to the Grounding Problem and the Problem of Unity. For suppose that the clay counts as a material object that is the same as, but numerically distinct from, the statue. In this case, there is still a further question as to whether, first, the clay and the statue have distinct modal profiles and, if so, what grounds these differences. Secondly, it still remains to be explained how the many statue parts can together manage to give rise to a unified thing, viz., the statue. Thus, unless some other strategy can be found, it would seem to be more methodologically economical for the Thomistic hylomorphist to embrace the eliminativist solution, since it solves all three problems at once.

([25]) Other aspects of Brower's approach, which will not concern us here, are designed to address the remaining sets of desiderata: (1) "Property Possession and the Problem of Universals"; (3) "Essence and Accident"; and (6) "Mereological Composition."

([26]) Although I am using the terms, "particular" and "individual," interchangeably, Brower importantly does not. A "particular," according to Brower, is "a being that is both subsistent and individual" (Brower (2014), p. 23); "subsistence" here contrasts with "inherence," where "inherence is best understood as a type of dependency built into the nature of forms and properties" (p. 8). A being is an "individual" if it satisfies two conditions: first, "it must have actuality through itself; and second, it must belong to some natural kind or species. […] Only forms, substances, and compounds have actuality through themselves" (pp. 19–20).

([27]) A "basic particular," according to Brower, is "[a] particular that not itself composed of any particulars," while a "non-basic particular" is "[a] particular that is composed of at least one particular" (Brower (2014), p. 24).

([28]) For ease of exposition, I will, for the remainder of this section, move back and forth freely between the terminology Markosian uses to state his own views (e.g., "stuff" and "thing") and the terminology hylomorphists of different stripes would use to express Markosian's views (e.g., "matter" or "prime matter" and "matter–form compound").

([29]) I have discussed the mass/count distinction in more detail in Koslicki (1995, 1997, 1999a, and 1999b).

([30]) Markosian (2015) cites nine philosophical reasons for believing in stuff as an irreducible category: some of them are reasons he himself finds convincing, while others are associated with philosophical positions Markosian rejects. In what follows, I focus on Markosian's argument from the possibility of spatially extended simples, since this argument, if it were successful, would in fact provide independent reasons in favor of accepting stuff as a distinct and irreducible ontological category. The remaining philosophical considerations to which Markosian appeals and to which he himself is sympathetic (viz., those concerning constitution and mereology) are only applicable once we have already been persuaded to take on board a category of stuff which is irreducibly different from the category of things. Unless we feel inclined to follow Markosian in adopting a mixed ontology, it is still a live question whether Markosian's stipulated use for the term, "constitution," as well as the axioms of mereology he proposes for the domain of stuff, in fact, apply to anything.

([31]) For a more detailed examination of Markosian's approach to simples than what I can provide here, see McDaniel (2003); responses to McDaniel's objections can be found in Markosian (2004a); a further development of Markosian's position concerning simples is given in Markosian (2004b).

([32]) In addition to PVS, Markosian also considers and rejects a further alternative conception of simples, according to which simples are objects which are either physically or metaphysically indivisible. Markosian finds this rival approach implausible for the following reasons: an object might be physically indivisible without being simple (e.g., a chain which consists of links which are in fact physically unbreakable); and anything that is physically indivisible might still be metaphysically divisible (e.g., an object which is in fact pointy but might become spatially extended). For these reasons Markosian concludes that the simples-as-indivisible approach ultimately collapses into PVS (see Markosian (1998), p. 221).

([33]) A maximally continuous object, x, satisfies the following conditions: x is a spatially continuous object and there is no continuous region of space, R, such that (i) the region occupied by x is a proper subset of R, and (ii) every point in R falls within some object or other (Markosian (1998), p. 221).

([34]) The connection between MaxCon and Markosian's acceptance of a dualist ontology can be brought out, for example, by considering Markosian's response to McDaniel's "Argument from Spatial Intrinsics" (McDaniel (2003), p. 274). Consider an object, "Multi," which by hypothesis occupies a maximally continuous region of space. Hence, according to MaxCon, Multi is a simple; i.e., it has no proper parts. Suppose further that Multi is blue at region R_1 and gold at region R_2. Since, by hypothesis, Multi is a simple, it is not open to the proponent of MaxCon to describe Multi as having a part which is blue and a part which is gold. Markosian agrees that we should resist the idea that relations

such as being blue and being gold should be indexed to regions of space. Instead, his preferred analysis of the scenario is also the one McDaniel recommends: namely that, even though Multi itself does not have parts, the portion of stuff which constitutes Multi has parts, viz., its subportions; and some of these subportions are blue, while others are gold (Markosian (2004a), pp. 338–40). This response to McDaniel's objection, however, requires that MaxCon be supplemented with a thing/stuff distinction.

([35]) Notice also the following further odd feature of Markosian's description of the scenario in question: given MaxCon, the subportions of the portion of stuff which constitutes the sphere cannot themselves constitute anything, since otherwise the sphere in question would have proper parts and therefore would no longer count as a simple (see McDaniel (2003) for further discussion). In the case of a clay statue, for example, we might feel inclined to say that the nose-shaped piece of clay, which is a subportion of the clay that constitutes the statue, itself constitutes a thing, viz., the statue nose. To preserve consistency with MaxCon, however, Markosian is forced to deny that such a possibility could ever obtain in the case of spatially extended maximally continuous physical objects. This raises the question of how, in general, constitution "facts" are determined on Markosian's view: when is it the case that a portion of stuff constitutes a thing and when is it not the case that a portion of stuff constitutes a thing? Markosian's writings suggest, firstly, that he takes constitution "facts" to be *brute*; and, secondly, that it is up to the proponent of the mixed ontology to *decide* how he wants these constitution "facts" to play out. I take both of these commitments concerning constitution to be unappealing. Similar remarks apply to scenarios in which Markosian considers the possibility of atomless gunk instead of simples (see Markosian (2015), Fourth Reason). For one wonders why a world in which there is stuff-arranged-chairwise is not also a world which contains chairs. What prevents the stuff-arranged-chairwise, in such a world, from *constituting* a chair? It appears that these consequences are merely the result of certain *terminological constraints* Markosian imposes on his particular use of the term "constitution." In this case, however, an appeal to alleged "facts" about constitution cannot be used to provide independent motivation for accepting a thing/stuff distinction.

([36]) Perhaps the most serious objection against Markosian's account of simples is the argument from touching, especially in its application to the case of simple people. Suppose (as Markosian is willing to allow) that it is metaphysically possible for people to occupy maximally continuous regions of space; then, by MaxCon, there could be simple people. Suppose further that two such simple people, A and B, come into contact with one another. According to MaxCon, the result of A and B touching is a single object, C, which is itself a simple. Assuming that the scenario under discussion is described in such a way that neither A nor B has a better claim than the other to be identified with C after the contact has taken place, the proponent of MaxCon would presumably want to hold that,

under these circumstances, both A and B cease to exist as a result of their contact and C is therefore numerically distinct from both A and B. (Given that C, according to MaxCon, is a simple, it furthermore cannot be described as having either A or B as proper parts.) By Markosian's own admission, however, the consequence that two people can cease to exist merely as a result of touching seems quite counterintuitive. For more discussion, see Markosian (1998, 2004a, 2004b); McDaniel (2003).

([37]) The second type of possibility might be realized, for example, in a scenario in which the material parts composing matter–form compounds are simples (i.e., concrete particular objects which have no proper parts) or portions of stuff. We saw earlier that there are empirical and philosophical reasons for resisting the particular conception of simples and stuff developed by Markosian. However, other conceptions of simples (e.g., "The Pointy View of Simples") or stuff (e.g., what contemporary metaphysicians call "atomless gunk") might nevertheless turn out to be defensible on empirical and/or philosophical grounds. As a proponent of the third approach to matter, I am not committed to the position *that* any of the possibilities, in fact, obtains; rather, I simply want to leave it open, provided that our empirical evidence points in this direction, that some such possibility might obtain, as a matter of contingent fact, and therefore should not be ruled out on a priori grounds.

([38]) In this connection, the hylomorphic approach also avoids a puzzle which arises for competing approaches (see n. 14), viz., how something which is non-particular/non-individual (prime matter or stuff) can give rise to something that is particular/individual (a matter–form compound), especially if the remaining constituent (form) is also taken to be non-particular/non-individual. Since a matter–form compound and its material parts, according to the hylomorphic conception, are of the same ontological type, there is no mystery as to how a plurality of concrete particular objects (viz., the preexisting ingredients, or their material parts, which come to serve as the material parts of a newly created concrete particular object) can give rise to another object of the same type.

([39]) See Koslicki (2008a), Ch. 7, for a defense of a mereological approach to the Problem of Material Constitution along these lines. Those who assume that constitution is to be conceived of as a one–one relation will no doubt find the response I just outlined surprising, since this strategy would allow that constitution may be a many–one relation, viz., when multiple material parts constitute a single concrete particular object. My reply to this concern is that we should not take it to be obvious that constitution must be conceived of as a one–one relation; rather, this is a question on which competing accounts of constitution may reasonably differ.