

THE FOUNDATIONS OF
ARISTOTLE'S CATEGORIAL SCHEME

BY PAUL STUDTMANN

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CHAPTER I

WHENCE THE CATEGORIES?

SECTION I

THE CATEGORIES: TWO QUESTIONS

Aristotle's categorial scheme had an unparalleled effect not only on his own philosophical system but also on the systems of many of the greatest philosophers in the western tradition. The set of doctrines in the *Categories*, what I will henceforth call *categorialism*, play, for instance, a central role in Aristotle's discussion of change in the *Physics*, in the science of being *qua* being in the *Metaphysics* and in the rejection of Platonic ethics in the *Nicomachean Ethics*. And commentators and philosophers ranging from Plotinus, Porphyry, Aquinas, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, Kant, Hegel, Brentano and Heidegger (to mention just a few) have explicitly defended, criticized, modified, rejected or in some other way commented on some aspect if not the whole of Aristotle's categorial scheme.

Despite its influence, however, categorialism raises two fundamental questions that to this day remain open. The first concerns Aristotle's list of highest kinds. At *Categories* 1b25-2a4, Aristotle provides a ten-fold division of the things that are said, τῶν λεγομένων, which are naturally interpreted as words (*De Interpretatione* 16a1-10). According to Aristotle, words signify the following basic types: (1) a substance, like a man; (2) a quantity, like a line two cubits long; (3) a quality, like the white; (4) a relation, like the double; (5) somewhere, like in the Lyceum; (6) at some time, like yesterday; (7) being in a position, like

lies; (8) having, like is shod; (9) acting, like cuts; or (10) being acted upon, like is cut (*Catg.* 1b25-2a4).

Although impressive for its philosophical insight, Aristotle's list raises the following very natural question: why think that it contains all and only the highest kinds in the world? Indeed, Aristotle gives some reason to suspect the correctness of his list, for even he seems unsettled about it. Only in one other place, at *Topics* 103b22, does he list ten categories, though in that list he replaces substance, οὐσία, with what it is, τί ἐστὶ. In *Posterior Analytics* I, 22, on the other hand, Aristotle only lists eight categories: substance, quantity, quality, relatives, action, passion, where and when (*PA* 83b15). In *Metaphysics* V, 7, he repeats the list from the *Posterior Analytics*, though he again replaces substance with what it is. And less directly, one might interpret Aristotle at *Metaphysics* 1089b18-25 as claiming that there are only four categories: substance, quality, relatives, and being acted upon.

The lack of any justification for his list of highest kinds has not gone unnoticed by critics and in fact has been the source of some famous criticisms. Kant, for instance, just prior to the articulation of his own categorial scheme, says:

It was an enterprise worthy of an acute thinker like Aristotle to try to discover these fundamental concepts; but as he had no guiding principle he merely picked them up as they occurred to him, and at first gathered up ten of them, which he called categories or predicaments. Afterwards he thought he had discovered five more of them, which he added under the name of post-predicaments. But his table remained imperfect for all that ...¹

According to Kant, Aristotle's list of categories was the result of an unsystematic, albeit brilliant, bit of philosophical brainstorming. Hence, it cannot stand firm as a correct set of categories.

Moreover, the troubles for Aristotle's scheme do not end with this list of highest kinds—Kant's criticism extends to Aristotle's intra-categorial divisions of quantity and quality as well. Aristotle divides each of these categories into several distinct species: quantity divides into continuous and discrete quantities, the former of which divides into body, line, surface, time and place, the latter of which divides into

1 Immanuel Kant, *Critique of Pure Reason*, tr. N. Kemp Smith (London: St. Martin's Press 1965), p. 114.

speech and number; and quality divides into habits and dispositions, natural capacities, affective qualities and affections and shape. Aristotle, however, never gives any justification for these divisions and as a result they appear just as arbitrary as his list of highest kinds. J.L. Ackrill, for instance, says about the category of quality:

When Aristotle says that quality is 'spoken of in a number of ways' he does not mean that the word 'quality' is ambiguous but only that there are different kinds of quality. He proceeds to list and discuss four kinds. *He does not 'deduce' them or connect them on any principle*
....²

And no doubt the lack of such a deduction lies behind Ackrill's criticisms of Aristotle a little later in his commentaries:

He [Aristotle] gives no special argument to show that [habits and dispositions] are qualities. Nor does he give any criterion for deciding that a given quality is or is not a [habit-or-disposition]; why, for example, should affective qualities be treated as a class quite distinct from [habits and dispositions]?³

The first great question concerning Aristotle's categorial scheme, then, is this: is there some philosophically cogent way to justify both the highest kinds and the intra-categorial kinds in Aristotle's categorial scheme.

Unlike the first question, the second concerns the way in which categorialism relates to doctrines Aristotle articulates in other works. The question arises as a result of a rather common story that is told about the categories and its apparent deep tensions with hylomorphism.⁴

2 Aristotle, *Categories and De Interpretatione*, trans. J.L. Ackrill, (Oxford: Clarendon Press, 1963), p. 104.

3 *Ibid.* p.104. Ackrill translates the words ἐξίς and διόθεσις as 'states' and 'conditions' respectively. I have interpolated 'habits' and 'dispositions' to provide continuity with my translations.

4 I should say that the view I am presenting is only one among several views about Aristotle's development that have been proposed in the twentieth century. Starting with Jaeger, *Aristotle: Fundamentals of the History of his Development*, trans. Richard Robinson, (Oxford: Clarendon Press, 1925), scholars have proposed theories of Aristotle's development in terms of his gradual acceptance or rejection of Plato's philosophical positions. Jaeger argued that Aristotle originally accepted a Platonic framework and broke from

According to the story, Aristotle wrote the *Categories* during a phase of his thought characterized by logical concerns. The *Organon*, the collection of works to which the *Categories* is generally thought to belong, contains an articulation of Aristotle's logic along with the semantic and ontological foundations of a philosophy motivated by logical inquiry. The *Categories* presents this ontological foundation; and one of its central tenets is that the metaphysically basic entities are primary substances,⁵ which, if we are to judge by Aristotle's examples in the *Categories*, include living members of natural kinds as well as parts of substances, e.g. heads and hands (*Catg.* 3a29-32, 8a13-28), bodies (2b1-2), bits of matter, e.g. logs (8a23), and stuffs, e.g. honey (9a33). All other entities bear some sort of asymmetric ontological relation to primary substances. For example, all accidents inhere in primary substances while primary substances do not inhere in anything (*Catg.*

the framework later in his career. David Ross, "The Development of Aristotle's Thought," in *Aristotle and Plato*, ed. During (Goteborg, 1960):1-17, accepted a modified version of such a theory. Ingemar During, "Aristotle on Ultimate Principles From 'Nature and Reality,'" in *Aristotle and Plato*, ed. During (Goteborg, 1960): 35-55, strongly disagreed with Jaeger's view, arguing that Aristotle was too strong a spirit ever to be so taken with Plato's theories. cf. also, C.J. De Vogel, "The Legend of the Platonizing Aristotle," in *Aristotle and Plato*, ed. During (Goteborg, 1960): 248-256. G.E.L. Owen, "Logic and Metaphysics in some early works of Aristotle," in *Aristotle and Plato*, ed. During (Goteborg, 1960):163-190, "The Platonism of Aristotle," in *Logic, Science and Dialectic*, ed. During (London, 1960): 200-220, reversed Jaeger's position, arguing that Aristotle started out rejecting Plato's views and gradually came to accept them. Daniel Graham, op cit., on the other hand, strongly argues that Aristotle's development should be viewed in reference to the internal dynamics of his own view rather than in reference to his attitudes towards Plato's view. Graham then argues that an inconsistency can be found between hylomorphism and the categorial scheme. On the basis of such an inconsistency, Graham argues that Aristotle wrote the *Organon* early and then developed hylomorphism, an ontology designed to accommodate the possibility of change. As opposed to these developmentalist views, cf. Mary Louise Gill, *Aristotle on Substance*, (Princeton: Princeton University Press, 1989): 3-12.

5 That Aristotle's categorial scheme is a classification of entities is a controversial claim. Evangeliou, *Aristotle's Categories and Porphyry* (Leiden: Brill 1988), pp. 17-33 presents an excellent discussion of the historically prominent interpretations of the subject matter of the categorial scheme.

1a20-1b8). Furthermore, within the categorial scheme primary substances appear to be ontological primitives and hence do not appear to admit of ontological analysis into further constituents.⁶

Aristotle's attention, according to this common interpretation, eventually turned to the physical world. And though Aristotle never lost sight of the categorial scheme, his attempts at physical explanation forced him to a different view about the metaphysically basic entities. In his physical and metaphysical treatises, Aristotle claims that physical entities are composites of form and matter. According to this view, called *hylomorphism*, not only are physical entities ontologically complex but they depend for their existence on form (*Meta.* 1041b29). Thus, while categorialism treats physical entities as ontological bedrock, explaining the existence of all other entities in terms of them, hylomorphism finds a layer of reality below this bedrock. Form, not the composite of form and matter, is ontologically basic.

This apparent disparity between categorialism and hylomorphism is all the more striking in view of Aristotle's development of the categorial scheme without the central concepts he employs in his development of hylomorphism. The Greek word for matter (ύλη) does not appear in the *Categories* or anywhere else in the *Organon*. Furthermore, although Aristotle uses the concept of form (εἶδος) in the *Categories*, his use of it in his physical/metaphysical treatises is far more varied and extensive and is not obviously commensurate with his use of it in the *Categories*.⁷ Thus, categorialism and hylomorphism, far from

6 The ontological simplicity of primary substances in the *Categories* is a controversial claim. In support of such a claim, one can point to the fact that Aristotle says of primary substances that they are indivisible (ἄτομον), unitary (ἐν ἁριθμῷ), and hence a this (τόδε τι) (3b10-13). Cf. Daniel Graham *Aristotle's Two Systems* (Oxford: Oxford University Press 1987), pp.25-27, for a defense of this view.

7 The extent to which form and matter and the closely related concepts of actuality and potentiality are present in the *Organon* is debatable. Although matter is not mentioned in the *Organon*, there is evidence at *Posterior Analytics* 94a20-95a10 that Aristotle had developed his four-cause scheme of explanation by the time he wrote the *Posterior Analytics*. Such a scheme obviously includes both form and matter. Scholars have questioned the extent to which Aristotle's use of four causes in the *Posterior Analytics* is evidence that he had a fully developed four-cause scheme of explanation when

representing two obviously complementary ontologies that permit an easy synthesis into a single coherent system, instead seem to manifest deep tensions both with respect to their fundamental presuppositions and the very terminology used in their construction.

Not surprisingly, the discrepancies between categorialism and hylomorphism have been the source of considerable scholarly speculation about the relationship between the two systems. The resolution of these discrepancies and the articulation of the relationship between the two systems have promised to provide acute insights into the contours of Aristotle's thought. Yet the difference of scholarly opinion about the relation between the two systems, as a brief examination of three prominent scholars' views will reveal, is almost as drastic as the difference between the two systems themselves.

Michael Frede argues that the later Aristotle developed hylomorphism in response to perceived inadequacies of categorialism.

While Aristotle has spoken in the *Categories* as if the claim that substances underlie properties is totally unproblematic, in the *Metaphysics* he begins to draw consequences from this claim as to what really is the object of substance. As one can see in *Met Z* 3 he considers whether to say that substance, that which underlies everything else, is matter or form; by contrast in the *Categories* he had still spoken as if substances were the concrete things of our experience - tables, horses, trees, men - just as we are acquainted with them. How does it come about, we must ask, that Aristotle is no longer satisfied with the answer of the *Categories*?⁸

According to Frede, Aristotle's theory of substance underwent a transformation from the *Categories* to the *Metaphysics*. In the *Categories* he wrote the *Organon*. Some interpret the discussion of the four causes in the *Posterior Analytics* as a later interpolation; some, as a rudimentary and unsatisfactory account of the four-cause scheme that Aristotle uses in his physical-metaphysical treatises. Cf. David Ross *Aristotle* (London: Methuen & Co. LTD 1947), pp.51-2; Jonathan Barnes, tr. and ed., *Aristotle: Posterior Analytics* (Oxford: Oxford University Press 1975), p.215, Graham, *op. cit.*, p. 157. The distinction between actuality and potentiality is clearly in the *Organon* though it seems restricted to contexts in which Aristotle discusses necessity and contingency; Cf., for example, *De Interpretatione* (19a30-19b4, 22b30-23a25) and *Prior Analytics* (25a37).

8 Michael Frede, 'Individuals in Aristotle', *Antike und Abendland* 24, (1978), p.24.

ries, Aristotle thought it unproblematic to view the concrete things of our experience as substances; while in the *Metaphysics*, Aristotle carefully considers whether the form and matter of concrete things are substances. Thus, Frede sees Aristotle addressing the same problems in the *Categories* and *Metaphysics* but developing different and incompatible theories. According to Frede, the discrepancies between categorialism and hylomorphism point to Aristotle's dissatisfaction with the former ontology: Aristotle developed hylomorphism as a response to his own criticisms of categorialism.

In *Aristotle's Two Systems*, Daniel Graham proposes an interpretation that, like Frede's, finds a deep tension between categorialism and hylomorphism. In fact, Graham argues for the radical conclusion that categorialism and hylomorphism contradict each other. Unlike Frede, however, Graham thinks that Aristotle was never critical of categorialism; indeed, Graham thinks that Aristotle, unaware of the contradiction in his own thought, attempted an ill-fated synthesis of the two systems:

What emerges is an Aristotle that is bifurcated into a young philosopher with brilliant logical insights and the energy and organization to work out their implications while astutely applying them to design a priori a programme of scientific research; and a mature philosopher with a powerful and flexible theory which better adapts itself to the more practicable scientific projects which he engages in carrying out. Aristotle's early system [categorialism] was elaborated on a linguistic model that rendered it particularly suitable for generating a logical system of discrete terms in which strict connections could be established. Dependent from the start on the craft model, the later system [hylomorphism] was less rigorous in its articulation but more flexible in application, pluralistic in its outlook but more powerful in scope, less perspicuous in dealing with phenomena but more penetrating in analysis ... The late Aristotle wished to integrate his early principles with his later ones ... [but] he never succeeded, and he could not have, for the gulf between the two systems was a logical one. But in the process of developing his theories he gave us two of the greatest philosophies the world has known.⁹

Graham thus agrees with Frede that Aristotle's hylomorphism is in tension with categorialism. Unlike Frede, however, Graham does not think Aristotle was ever dissatisfied with categorialism. Instead, the

9 Daniel Graham, *op.cit.* p. 332.

mature Aristotle tried to synthesize his two systems, an attempt that was in vain since, unbeknownst to Aristotle, the two systems contradict each other.

Although both Graham and Frede find a tension between Aristotle's two systems, not all scholars think an irreconcilable tension exists. Montgomery Furth advances an interpretation according to which Aristotle's two systems, despite appearances, do not conflict; instead, the *Categories* is a work of limited scope - it does not address the problems hylomorphism does. Hence, it is a self-consciously simpler ontology than hylomorphism, yet one that properly and consistently supplies the basis for a richer hylomorphic ontology.

... the *Categories* is a carefully limited work - possibly an introductory one - which seems determined to contain the discussion at a metaphysical level that is, though in some ways sophisticated, still simple, and especially to block any descent from its own curtailed universe into the much deeper as well as wider universe of the *Metaphysics*. There is also evidence of a notable concern not to get involved in 'causes' - to set out some ontological phenomena . . . without delving - here - into the underlying structure of the nature of things from which these phenomena eventuate. And a critical factor in maintaining that simplicity is the designation of the substantial individuals as ultimate objects, as the 'floor of the world' . . .¹⁰

Furth thus agrees with Graham as against Frede that Aristotle did not see any tension between categorialism and hylomorphism. Unlike Graham, however, Furth thinks that the discrepancies between the two systems are due to a difference in subject matter. Aristotle developed hylomorphism in response to 'deeper' and 'wider' questions than those that were the source of the categorial scheme. Thus, hylomorphism, though more sophisticated than categorialism, is not in tension with it. The difference between the two systems is one of degree, not kind: hylomorphism was not an abandonment or even an implicit criticism of categorialism; rather it was a natural extension of categorialism.¹¹

10 Montgomery Furth, 'Trans-temporal Stability in Aristotelian Substances', *Journal of Philosophy* 75 (1978), pp. 627-32.

11 A notable exception to the dominant trend in contemporary scholarship is Michael Wedin, *Aristotle's Theory of Substance* (New York: Oxford University Press, 2000). Much of what I say in this book is compatible with Wedin's

The second great question concerning the categorial scheme, then, is twofold: (1) how is categorialism related to Aristotle's hylomorphism; and (2) are there irreconcilable differences between the two ontological schemes?

SECTION II

THE DERIVATIONAL THESIS

This book contains a series of interrelated chapters that collectively support an interpretation that provides answers to the two great questions concerning Aristotle's categories. According to the interpretation, Aristotle's categorial scheme is derivable from his hylomorphic ontology, which itself is derivable from very general theses about the nature of being.¹²

general line of interpretation, though I will not try to be explicit about specific points of agreement or disagreement.

12 It should be noted that there have been other attempts to explain the origin of Aristotle's categorial scheme. J.L. Ackrill, *op.cit* pp. 78-79, provides the most well known, and perhaps the most well supported textually—the evidence coming from *Topics* 103b20—104a1—contemporary attempt at generating Aristotle's list of categories. Ackrill proposes two different methods of generation. According to the first, Aristotle arrived at the list of categories by discovering the different types of questions that can be asked about one subject. Of Callias, we can ask: 'What is he?'; 'Where is he?'; 'When is he?'; we can answer, 'A substance', 'In the Agora', and 'Today'; and we can see that an answer to the 'What is he?' question will not serve as an answer to the 'Where is he?' and 'When is he?' questions. Thus, recognizing the different types of irreducible questions that can be asked, Aristotle introduced a category for each type of distinct question. According to Ackrill's other suggestion, Aristotle arrived at his categorial scheme by recognizing the different answers that can be given to a "What is it" question that is asked of different objects. We can ask: 'What is Callias?'; 'What is a square?'; 'What is the Lyceum?'; and we can see that the most general answers to these questions will be irreducible to each other. For example, Callias is a substance; square is a quantity; but a quantity is not a substance. For every irreducible answer, then, Aristotle introduced a category. Julius Moravcsik, 'Aristotle's Theory of Categories', in *Aristotle*, (Garden City: ?? 1967), pp.125-148, on the other hand, proposes an alternative account, one that he traces to Bonitz, 'Ueber die Kategorien des Aristoteles', *Sitzungsberichte der Wiener Akademie* 10 (1853), 591-645 (repr. Darmstadt, 1967). According to Moravcsik, the categories is a list of

Although such an interpretation is rather heterodoxical from a contemporary perspective, at least the first part of the thesis, namely that the categorial scheme admits of a derivation from hylomorphism, has a long lineage. There is a rich tradition of commentators including Radulphus Brito, Albert the Great, Thomas Aquinas, and most recently Franz Brentano, who provide derivations of Aristotle's categorial scheme.¹³ According to the commentators in this tradition, Aristotle's highest kinds are capable of a systematic and arguably entirely *a priori* derivation. The following quotation from Brentano captures nicely the philosophical import of such derivations.

On the contrary, it seems to me that there is no doubt that Aristotle could have arrived at a certain *a priori* proof, a deductive argument for the completeness of the distinction of categories . . .¹⁴

Although Brentano does not note in this passage the connection between the categorial scheme and hylomorphism, an inspection of the various derivations in this tradition reveals that they generally contain hylomorphic terminology. Consider, for instance, the following part of

the types of entities to which any sensible particular must be related. One final attempt at articulating some principles of derivation occur in Michael Baumer's 'Chasing Aristotle's Categorial Scheme Down the Tree of Grammar', *Journal of Philosophical Research* XVIII (1993), pp. 341-449. Inspired by an interpretation that can be found in Trendelenburg, *Geschichte der Kategorienlehre* (Berlin: Verlag von G. Bethge 1846), pp. 23-24, Baumer provides a far less ontological and a far more grammatical method of derivation than Moravcsik by attempting to show that Aristotle's list of categories reflect the fundamental types of grammatical expressions. Needless to say, the interpretation I defend in the book stands in marked contrast to all these interpretations.

13 For excellent discussions of Medieval derivations of the categories, cf. William McMahon 'Radulphus Brito on the Sufficiency of the Categories' *Cahiers de l'Institut du Moyen-Age Grec et Latin* 39 (1987), pp.81-96; 'Aristotelian Categorial Theory Viewed as a Theory of Componential Semantics', *Studies in the History of the Language Sciences* vol. XXXVIII, ed. Hans Aarsleff, Louis G. Kelly and Hans Josef Niederhe (Amsterdam: John Benjamins 1987) pp. 53-64. 'Some Medieval Ideas about Relations' *Proceedings of the Conference on the Ontology and epistemology of Relations* (forthcoming).

14 Franz Brentano *On the Several Senses of Being in Aristotle*, tr. and ed. George, R., (Berkeley: University of California Press 1975), p. 96.

Aquinas's derivation of the categorial scheme in his commentaries on Aristotle's *Metaphysics*.

A predicate is referred to a subject in a second way when the predicate is taken as being in the subject, and this predicate is in the subject either essentially and absolutely and as something flowing from its matter, and then it is quantity; or as something flowing from its form, and then it is quality; or it is not present in the subject absolutely but with reference to something else, and then it is relation.¹⁵

Aquinas claims that the category of quality *flows from* form and that the category of quantity *flows from* matter. Furthermore, although Aquinas does not use the word 'motion' in his derivation in the *Metaphysics* commentaries, it is clear from the following passage that he is talking about motion as Aristotle in Physics III, 2, characterizes it

In another way, that from which a predicate is taken, though outside the subject, is nevertheless from a certain point of view in the subject of which it is predicated. And if it is from the viewpoint of the principle, then it is predicated as an action; for the principle of action is in the subject. But if it is from the viewpoint of a terminus, then it will be predicated as a passion; for a passion is terminated in the subject which is being acted upon ...¹⁶

It is clear, then, that Aquinas not only thinks that the highest kinds in Aristotle's categorial scheme can be derived from hylomorphism but also that the derivation he gives posits connections between various aspects of Aristotle's hylomorphic ontology and certain highest kinds.

If this Medieval thesis is correct, then, we can provide the following answers to the two great questions about Aristotle's categorial scheme. First, if Aristotle's categorial scheme is systematically and *a priori* derivable, then the justification for the list of highest kinds lies in the derivation of them. Second, we could conclude not only that categorialism and hylomorphism are not in tension with each other but that categorialism is derivable, at least in part, from hylomorphism.

Now, in this book, I do not examine the tradition to which Brentano and Aquinas belong. My focus is entirely on Aristotle—the interpre-

15 Aquinas, *Commentary on Aristotle's Metaphysics*, tr. Rowan, J.P., (Notre Dame: Dumb Ox Press 1961), pp. 321-322.

16 *Ibid.*

tations I give are meant to be independently defensible. Moreover, I admit up front that I do not plan to provide an exhaustive defense of the thesis that the categorial scheme is completely derivable from hylomorphism. Indeed, unlike Brentano, I am skeptical that an *a priori* proof of the correctness of the categorial scheme is possible. Moreover, as shall become clear, I focus entirely on, form, matter, substance quantity and quality. Hence, much of the categorial scheme is left unexamined. Nonetheless, each chapter in this book is directed at a topic that in some way or another crucially implicates either Aristotle's categorial scheme, his hylomorphism or the relation between the two. And the unifying theme of each of the chapters is the idea that a deep and interesting derivational connection exists between Aristotle's categories and his hylomorphism. Thus, although I do not try to exhaustively defend the philosophical thesis that underlies the interpretation in question, I do hope to do enough to make the interpretation in question plausible and indeed to make it plausible that someone could have thought that the interpretation in question was a reasonable philosophical thesis.

SECTION III

META-INTERPRETIVE STANCE

One might understandably ask why this sort of interpretation is of interest. My answer to this question is three-fold. First, although contemporary scholarship has moved far away from the synthetic interpretive impulses of the Medieval commentators, I have found those commentators to be remarkably insightful. Although they can perhaps be justifiably criticized for their attempts to synthesize parts of Aristotle's system, I maintain that their attempts to do so forced them to find conceptual connections that are invisible to those who are content to take a much more historical approach to Aristotle's work. Indeed, the very fact that such commentators tried so hard to derive Aristotle's categorial scheme from his hylomorphism points to their conceptual inventiveness. So, in some sense, this book is aimed at those scholars who share something of the Medieval spirit: if you are a scholar that is interested in fleshing out conceptual connections in Aristotle's

thought that are not at first sight obvious, this book might be of interest to you.

Second, the chapters in this book are meant to belong to the tradition of interpretation that provides interesting answers to the two great questions concerning Aristotle's categorial scheme. Now, I have already indicated a certain amount of skepticism that such an *a priori* derivation is possible. Moreover, I do not even address seven of the categories. Nonetheless, I maintain that the general line of interpretation is of interest. The fact that an *a priori* derivation of a list of categories cannot in the end be successfully carried out can hardly suffice in removing the interest in attempts to do so. Much of the interest in logicism, for instance, is its failure; and surely a work investigating the extent to which something like Frege's original plan for logicism could be made to work is worth studying, even if in the end one must admit that the mathematical doctrine cannot succeed. The chapters in this book are thus to be understood as attempts to articulate and defend interpretive doctrines that are part of a larger interpretation, one that aims to provide philosophically and interpretively compelling theses concerning some of the most basic metaphysical questions.

Finally, the interpretation I am offering acts as a kind of interpretive paradigm—it not only places constraints on some of the other fundamental concepts in Aristotle's system but does so in a way that has a satisfying interpretive and philosophical payoff. Supposing, for the moment, that Aristotle's categorial scheme admits of a systematic derivation from hylomorphism which itself follows from theses about the plenitude of being, one can ask: what would Aristotle's metaphysical views end up looking like? For instance, what view of form and its relation to the category of quality would be needed in order to carry out such a derivation? Likewise, what view of matter and its relation to the category of quantity would be needed? As I hope to show, there are interpretations of the main aspects of hylomorphism and the categorial scheme, namely interpretations about the natures of form, matter, quantity, quality and substance that not only facilitate the larger thesis about the relation between the two systems but can also be defended independently of any such larger considerations. Hence, the interpretations of the various aspects of Aristotle's system, if correct, not only stand on their own, but also cohere so as to provide a coordinated

answer to the two great questions concerning Aristotle's categorial scheme.

Ultimately, I intend my interpretation to be what might be called a *rational reconstruction* of Aristotle's philosophy. What I mean by this can be understood by way of an analogy. Aristotle's texts are incomplete and imperfect in well-known ways. They can thus be likened to imperfect and incomplete archaeological evidence of an ancient civilization. Such a civilization, we can imagine, must have been rather impressive – the evidence of various forms of sophistication is undeniable. But, let us suppose that the evidence underdetermines the extent to which the civilization had various desirable institutions. Did it have a just legal system? Did it have the full range of science and the arts? Although various arguments can be made in favor of one hypothesis or the other, let us suppose that the facts as we know them cannot settle the matter.

In the face of such a situation, one might content oneself with a mere statement of the facts about which we can be certain. On the other hand, one might begin to speculate about the civilization. One might speculate, for instance, that the civilization had such and such a legal system; and that if it did have such a legal system, then the evidence we now possess should be interpreted in a certain light. Of course, such speculation, if it were to be satisfying, would have to be grounded in the facts as we know them; but such facts would also be interpreted in light of the speculation. Indeed, such a project would inevitably involve a give and take between a faithfulness to the facts as we know them and an attempt to understand such facts in light of the speculations being made. In this way, one might try to reconstruct from the available evidence the nature of the ancient civilization.

If one is to go beyond mere biography, Aristotle must be approached in this way. Although we have a great deal of evidence concerning his system, the evidence is, in well-known ways, incomplete and imperfect. In this book, therefore, I attempt a reconstruction of Aristotle's system that is guided by a certain set of principles. Most generally, the reconstruction is guided by the view that Aristotle's two metaphysical systems, i.e. categorialism and hylomorphism, can be integrated into a single highly unified system. More specifically, it is guided by the hypothesis that the categorial scheme admits of a systematic deriva-

tion from the various structures latent in Aristotle's hylomorphism and that the latter system is the result of certain general principles concerning the nature of being.

And why are these good reconstructive principles? Well, to repeat what I've already said, they provide a kind of interesting paradigm that has significant interpretive and philosophical payoffs; and given the greatness of Aristotle, it is reasonable to suppose that Aristotle deserves to be treated in such a manner. In the case of the civilization, it is not obvious what advantages there would be to reconstructing the civilization so that it ended up looking like a highly unified one operating in accordance with fully coherent and just principles. But, my aim in this book is to show that in the case of Aristotle the reconstructive principles guiding my interpretation lead to a significant increase in our understanding of the structures in his metaphysical system.

SECTION IV

THE CHAPTERS

Briefly, the contents of the remaining chapters in the book are as follows. In chapter 2, I discuss a problem that at first seems to concern only Aristotle's categorial scheme but that in the end has significant implications for the relation between it and hylomorphism. What I call the *body problem* in Aristotle arises as a result of Aristotle's apparent commitment to the following three inconsistent claims: (1) Body is a genus in the category of substance; (2) Body is a genus in the category of quantity; and (3) No genus can be in both the category of substance and the category of quantity. I shall argue that the correct resolution of this problem requires a certain understanding of Aristotle's views about both the nature of mobile substances and the nature of mathematics. As shall become apparent, these views implicate Aristotle's hylomorphic ontology. Hence, this problem, which at first seems restricted to the categorial scheme, has a resolution that extends beyond the categorial scheme. By the end of the chapter, not only will I have articulated and defended substantive accounts of Aristotle's philosophy of mathematics and his theory of mobile substance but I will also have gone some way toward showing that there are deep conceptual connections between hylomorphism and the categorial scheme.

Each subsequent chapter, then, focuses on the nature of one of the key concepts involved in the larger thesis, namely form, matter, quality, quantity and substance. In chapter 3, I examine the nature of form. I do so by arguing for the following theses: (1) 'form' in Aristotle has over twenty distinct meanings; (2) there are two central meanings of 'form' that correspond to two distinct types of entity; (3) the two types of form, what I shall call *form-m* and *form-c*, are respectively (a) a capacity like entity that is the source of the dynamical activities of a material substance and (b) a species. I also argue that Aristotle accepts a functional determination thesis, which provides a conceptual bridge between the two types of form. Finally, as shall become apparent, the first type of form, *form-m*, is precisely the sort of entity that I invoke in chapter 2 so as to resolve the body problem. By the end of chapter 3, I will have not only gone a considerable way to clarifying what Aristotle means by 'form' but I will also have laid the groundwork for a derivation of the category of quality from the nature of form.

In chapter 4, I address the nature of matter by addressing the difficult question of prime matter in Aristotle. I do so by discussing and criticizing the interpretation according to which prime matter is extension. Such an interpretation is an old one – it goes back at least to Simplicius – and has been defended in recent times by Robert Sokolowski and Richard Sorabji. Although I think that such an interpretation is incorrect, I argue that prime matter nonetheless bears a very intimate relation to extension. By providing a mathematically rich characterization of the nature of extension, I show how one is naturally led to the concept of prime matter. I also thereby show how prime matter so characterized avoids the objections that are typically raised against it. Finally, I show how such an interpretation of prime matter not only can be integrated into Aristotle's philosophy of mathematics but also coheres with the solution of the body problem I give in chapter 2. Hence, by the end of chapter 4, I will have given robust characterizations of form and matter that augment conceptual links I will have already drawn between hylomorphism and the categorial scheme as a result of my resolution of the body problem.

In chapter 5, I argue that the category of quality can be systematically derived from form. According to what I call the *canonical interpretation*, the category of quality divides into four main species. I argue

to the contrary that quality in fact first divides into two main species under which fall the four species Aristotle lists. Furthermore, I argue that such a regimented differentiation unfolds systematically from the very nature of form as I have characterized it in chapter 2. As a result, not only can one give an explanation as to why quality is a highest kind – it is in essence a basic type of hylomorphic entity – but one can also show that its species admit of a principled derivation.

In chapter 6, I argue that the species in the category of quantity admit of a derivation from the nature of matter. I do this by noting and then explaining a discrepancy between the species in quantity that Aristotle lists in *Categories* V and the species he lists in *Metaphysics* V, 7. I argue that the discrepancy can be the source of a derivation of the list in the *Categories* as long as one accepts the thesis that the category of quantity is derivable from matter as I have characterized it in chapter 4. Hence, as in the case of quality, there is both an explanation as to why quantity is a highest kind and a principled way of deriving the species that fall under it.

In chapter 7, I address three issues: (1) the category of substance; (2) the system of Aristotelian sciences; and (3) the plenitude of being. I argue that attributing to Aristotle a certain version of the plenitude of being allows for a systematic derivation of the Aristotelian sciences, which in turn provides a derivation of the main species in the category of substance. In addition, I shall argue that Aristotle's hylomorphism, as I have characterized it in chapters 3 and 4, is derivable from the plenitude of being. In fact, as shall emerge, the main species in the category of substance can be traced to features of form and matter as I have characterized them in chapters 3 and 4. Hence, by the end of chapter 7, I will have shown that general considerations about the nature of being generate the structures inherent in hylomorphism, which in turn generate the main structures in Aristotle's categorial scheme.

CHAPTER 2‡

THE BODY PROBLEM IN ARISTOTLE

In this chapter, I discuss a problem that at first seems confined to Aristotle's categorial scheme. As shall become apparent, however, what I take to be the correct resolution to the problem has several implications for the relationship between hylomorphism and the categories. Moreover, coming to grips with the problem requires substantive views about Aristotle's philosophies of mathematics, motion, substance, form and matter. So this particular issue provides a convenient place to begin the treatment of the topics that will be the focus of the rest of the book.

The problem arises as a result of Aristotle's treatment of body in the *Categories*. Aristotle, it would seem, commits himself to the following three inconsistent theses.

1. Body (σῶμα) is a genus in the category of substance.
2. Body is a genus in the category of quantity.
3. No genus can be in both the category of substance and the category of quantity.

A less precise, but perhaps also less artificial statement of the problem presented by these three theses, what I will call *the body problem*, is simply this: where in the categorial scheme does the genus, body, lie? For, Aristotle at times talks as if body is in the category of quantity, and at times as if it is in the category of substance. But according to the orthodox reading of the *Categories*, a genus cannot be in both the category of substance and the category of quantity.

In this chapter, I shall be primarily focused on resolving the inconsistency in theses (1)-(3). Before turning directly to a resolution of the body problem, however, I first want to indicate briefly why Aristotle

seems committed to theses (1)-(3) in the hope of showing that they really do represent significant aspects of Aristotle's thought and hence that the body problem is a serious and deep one for Aristotle's metaphysical system.

SECTION I

EVIDENCE

Oddly, though (1) seems the most obvious of the triad, overt textual evidence for it is difficult to come by. At *Topics* 130b2, Aristotle does say, 'for a body and substance of such and such a kind are the same thing.' Taken at face value, this quotation requires Aristotle to accept that body is a genus in the category of substance. The quotation occurs, however, within a discussion of the correct and incorrect ways of rendering properties; and one might think that he does not intend the many examples he uses in the discussion to be taken as anything more than examples. And to my knowledge, Aristotle nowhere else directly asserts that body is a genus in the category of substance.

Despite the scarcity of direct textual evidence, however, that body falls in the category of substance is a common though not always fully articulated presupposition amongst Aristotle scholars. This is unsurprising, for Aristotle's general patterns of thinking strongly support such an interpretation. This latter is, of course, a large and rather vague claim. But support for it can be found in the routine acceptance of (1) among Hellenistic and Medieval interpreters who, if not always meticulously scrupulous in their interpretations, nonetheless seemed to have a unique talent for tracking general trends in Aristotle's thought. In the *Isagoge*, for instance, Porphyry asserts without argumentation: 'Substance itself is a genus. Under this is body, and under body animate body, under which animal, under animal rational animal, under which man.'¹ Likewise, in *On Being and Essence*, Aquinas without argumentation places body, at least in one of the senses of 'body', in the category of substance. 'The word 'body' has several senses. As naming a substance it names something of such a nature as to occupy three de-

¹ Porphyry, *Isagoge*, in Paul Vincent Spade (trans. and ed.) *Five Texts on the Medieval Problem of Universals* (Indianapolis: press 1994), 4.

marcated dimensions, the three dimensions demarcated being body-as-quantity.²

That Aristotle accepted (1), however, does not rest entirely on the interpretive insights of Medieval commentators and the one passage from the *Topics*. Two further passages in particular provide strong support. At *De Anima* 434b12, as part of an attempt to argue that every animal must have the faculty of touch, Aristotle says that an animal is an ensouled body. The surrounding context makes it clear that Aristotle is providing a definition—the claim occurs within a scientific syllogism, which is something that, according to Aristotle, must proceed from a definition. To define animal as an ensouled body, however, is to provide a differentia, ensouled, and a genus, body. And because an animal is a substance, body must be a genus in the category of substance.

The evidence from the *De Anima* passage finds corroboration in Aristotle's division of substance in *Metaphysics* XII,1. Aristotle divides substances into immovable and sensible substances the latter of which is divided into eternal substances and destructible substances 'like plants and animals' (*Meta.* 1069a31). Aristotle does not in this passage say that sensible substances are bodies. But it is hard to see what else they could be. Indeed, his mention of animals as a kind of destructible substance immediately calls to mind his definition of animal in the *De Anima* according to which an animal is an ensouled body, a definition which could in light of the *Metaphysics* passage be expanded to ensouled sensible destructible substance. Furthermore, at 1069b38, shortly after his division of substances, Aristotle says that sensible substances are the subject of physics. And at *De Caelo* 268a1-3, he says that physics concerns itself for the most part with bodies, magnitudes and their properties and movements. Because the only item on this list that is a candidate for substancehood is body, it is straightforward to take Aristotle as asserting that sensible substances are bodies.³

2 Thomas Aquinas, *On Being and Essence* in Timothy McDermott (trans.), *Aquinas: Selected Philosophical Writings*, (New York: press 1993) , 95.

3 The 'for the most part' qualification is most plausibly read as a reference to the fact that physics also studies the unmoved mover. But, because the unmoved mover is not sensible, this does not detract from the evidence for the claim that body is a substance.

That body is a genus in the category of substance also dovetails with Aristotle's repeated insistence that individual bodies are substances. For instance, in *Physics* II 1, Aristotle says:

Animals and their parts exist by nature as do plants and the simples among the bodies, for instance earth, fire, air and water ... And all those with such a principle have a nature; and they are all substances, for each of them is a subject, and nature is always in a subject (*Phys.* 192b9-34).⁴

Aristotle here claims that simple bodies are among those things with a nature, and he goes on to say that things with a nature are substances (*Phys.* 193b32-33). It would follow, then, that at least some bodies, according to Aristotle, are substances. In a similar vein, Aristotle says at *De Caelo* III 1, 298a26-31:

Now things that we call natural are either substances or functions and attributes of substances. As substances I class the simple bodies—fire, earth, and the other terms of the series—and all things that are composed of them; for example, the heaven as a whole and its parts, animals again, and plants and their parts (*DC* 298a26-31).

According to Aristotle, not only simple bodies but also those that are from the simple bodies, e.g. plants and animals, are substances as well. And he reiterates such a claim in *Metaphysics* VII 2.

Substance is thought to belong most obviously to bodies; and so we say that both animals and plants and their parts are substances, and so are natural bodies such as fire and water and earth and everything of the sort ... (*Met.* 1028b9-12)

Aristotle does express the need to question whether all the items in the list are substances (*Meta.* 1028b13); but he nowhere argues that bodies are not substances; and his claim that form is primary substance (*Meta.* 1041b7) does not imply that bodies are not substances. Hence, given the explicit acceptance of such a thesis in the passages cited, it is safe to suppose that Aristotle thinks individual bodies are substances.

From the thesis that individual bodies are substances, however, it is a short step to the conclusion that body is a genus in the category of substance. If bodies are individual substances, to infer that body is a

4 All the translations of Aristotle are mine.

genus in the category of substance, one need only suppose that 'body' is part of the answer to the question 'what is it?' asked of some individual body. And though I do not know of a passage in which Aristotle makes this claim, it is extremely plausible to suppose that 'body' is part of the answer to such a question. After all, body is what an individual body such as a fire element or a plant is.

Unlike his acceptance of the first thesis, Aristotle's acceptance of the second thesis is directly and incontrovertibly supported by textual evidence. In two different places Aristotle says that body is a kind of quantity. In *Categories* VI, Aristotle says that body is in the genus of continuous quantities: 'Among continuous quantity are line, surface and body.' (*Catg.* 6a23-4) And in *Metaphysics* V 13, within a discussion of the various senses of quantity, Aristotle says that body is a kind of magnitude and that magnitude falls under the genus quantity. Hence, body, according to the text of the *Metaphysics* is a genus that falls under quantity.⁵

The third thesis, like the first, doesn't have the support of a quotation in Aristotle; but Aristotle's acceptance of (3) follows straightforwardly from features inherent in his classification of entities in the *Categories*. Any genus in an accidental category is said of and present in a subject; while any genus in the category of substance is said of but not present in a subject (*Catg.* 1a20-1b5). Hence, any genus that is in both the category of substance and the category of quantity must be both present in and not present in a subject. In order to avoid such a contradiction, therefore, one must suppose that there is no genus that is in both the category of substance and the category of quantity.

Aristotle, then, is committed to theses (1)-(3). In this chapter, however, I show that, far from revealing a deep contradiction in Aristotle's thought, the body problem admits of a resolution that throws considerable light on several aspects of his metaphysical system. The resolution begins with a thesis concerning Aristotle's philosophy of mathematics and its relation to the conception of science Aristotle articulates in the *Posterior Analytics*. In order to resolve completely the body problem, though, such a thesis must be combined with theses about the relationship between substance, form, motion and quantity.

5 I will discuss Aristotle's definition of quantity in greater detail in section II.

What eventually emerges is an interpretation that not only illuminates Aristotle's conception of bodies, both substantial and non-substantial, but also shows this conception to be an axis around which some of Aristotle's most fundamental metaphysical views turn.

SECTION II

MATHEMATICS, SCIENCE AND BODY

Aristotle characterizes mathematics in slightly different ways in different places. Nonetheless, in each characterization, he emphasizes the idea that mathematicians somehow ignore or abstract away from the physical aspect of material substances. In *Metaphysics* XI, Aristotle says that a mathematician studies his object after leaving out what is sensible, such as heaviness and lightness, and instead studies, *qua* quantities and *qua* continuous, *quantities* that are continuous in one, two or three dimensions.

Now just as the mathematician conducts his investigation of these by abstraction (for he theorizes after leaving out all that is sensible) ... and keeping only continuous quantity, either in one, two or three dimensions, he investigates the attributes of these *qua* quantities and *qua* continuous and not with respect to something else ... (*Meta.* 1061a28-36)

In *Metaphysics* XIII 3, Aristotle says that mathematicians study sensible material substances but in their study ignore or abstract away their physical aspect.

For if the objects of mathematics are among the sensibles but not *qua* sensible, then mathematical sciences are of the sensibles and not therefore concerned with something separate from the sensibles (*Meta.* 1078a1-5).

Later, he says:

On the other hand, the geometer investigates a man neither *qua* a man nor *qua* indivisible, but *qua* a solid (*Meta.* 1078a25-6).

Aristotle makes similar remarks in *Physics* II 2, where he tries to distinguish between the mathematician and the physicist:

The mathematician is concerned with these as well, but not insofar as each is a limit of a physical body; nor does he investigate attri-

butes qua existing in such substances. Consequently he separates them, for in thought they are separable from motion ... (*Phys.* 193b31-4)

Two different characterizations of mathematics plausibly emerge from these passages. In the first *Metaphysics* passage, Aristotle says that mathematics is the study of quantities qua F, where F is some quantitative notion. It is, for instance, the study of quantities qua quantity, or qua continuous, or qua solid, etc. According to such a characterization, quantity is the subject matter of mathematics. The latter passages above, though, suggest that mathematicians study sensible substances in abstraction from motion and sensibility. In the third passage from the *Metaphysics*, Aristotle says that geometers study men; and in the second *Metaphysics* passage and the *Physics* passage, Aristotle argues that mathematicians abstract from sensibility and mobility. The latter three passages thus suggest that mathematics, according to Aristotle, is the study of sensible substances, i.e. the study of bodies. It is not, however, any sort of study of bodies but rather the study of bodies *not qua sensible*, or given the convertibility of sensibility and mobility, *not qua mobile*.

The first characterization of mathematics, unlike the second, is entirely affirmative and so, in virtue of the positive content it contains, is to be preferred. To say in accordance with the second characterization that mathematicians study bodies but not qua mobile is to say in what respect mathematicians do not study bodies, namely not qua mobile. But to say that mathematicians study quantities qua F is to say both what mathematicians study, namely quantities, and how they do it, namely qua F. Nonetheless, for the moment I want to focus on the second characterization. For reasons that will become apparent, the resolution of the body problem I propose is facilitated by a discussion of the second characterization. Furthermore, there is a sense in which the difference between the two characterizations is a manifestation of the body problem; and so, by the end of this paper, an explanation of the first characterization will come into view.

So what does it mean to say that mathematicians study bodies but not qua mobile? One could answer this question by putting a psychologistic spin on Aristotle's philosophy of mathematics. According to some interpreters, Aristotle thinks that mathematicians mentally

abstract mathematical objects and/or features from mobile substances and then go on to investigate these objects and/or features. To study sensible substances but not qua mobile, according to such an interpretation, requires one to abstract mentally from the mobile features of sensible substances and focus on the mathematical features that remain. Abstraction thus becomes a kind of selective attention allowing mathematicians to focus on the mathematical aspects of the material world.⁶ Such an interpretation, however, though not implausibly extracted from Aristotle's remarks, does not pay enough attention to the language that Aristotle uses to characterize mathematics. It does not, as it should, view Aristotle's philosophy of mathematics in light of his discussion in the *Posterior Analytics* of the 'qua' locution.

In the *Posterior Analytics*, Aristotle uses among other examples geometrical hierarchies in order to elucidate what it means to demonstrate that some entity has a feature qua something. For instance, consider the following genus/species hierarchy.

Triangle—three-sided closed plane figure

1. Equilateral—three equal length sides
2. Isosceles—two equal length sides
3. Scalene—no equal length sides

In this hierarchy, triangle is the genus, and it is differentiated in terms of the number of equal length sides a triangle has.

As was known to Aristotle, all triangles have two right angles, i.e. internal angles whose sum is 180° ; and so all equilateral, isosceles and scalene triangles have two right angles. Now, one very natural question to ask of the having of two right angles is: in virtue of what fea-

6 Julia Annas, *Aristotle's Metaphysics: Books M and N* (Oxford: press 1976) .29-30, though she accepts the psychologistic interpretation of Aristotle, puts forward an apt criticism of Aristotle so interpreted. 'Both these characterizations [of mathematics] are somewhat vague, and while they make the point that the nature of mathematics is elucidated by its method and not by its subject-matter, they are not very informative as to the nature of the method ... The theory of abstraction is characterized more by what it avoids (commitment to abstract objects) than by any positive programme. Aristotle has not given it the thorough, dialectically argued treatment that he gives to time, place, etc., and incoherencies are latent in its application both to geometry and to arithmetic.'

ture does an instance of one of the species of triangle, for instance an equilateral triangle, have two right angles? And the correct answer, according to Aristotle, is that an equilateral triangle has two right angles in virtue of its being a triangle (PA. 73b31-38). Why? Because there is nothing peculiar to equilateral triangles as opposed to isosceles or scalene triangles that makes it the case that they have two right angles. Were one to examine the proof that all triangles have two right angles, one would notice that nothing in the proof requires the figure in question to be equilateral, isosceles or scalene, but it does require the figure in question to have three sides, i.e. to be a triangle. In other words, the highest genus whose complete definition is used in a demonstration that any triangle, whether it be equilateral isosceles or scalene, has two right angles is the genus triangle (PA. 74a4-74b4). So it is possible to say that all equilateral triangles have two right angles, not *qua* equilateral triangle, but rather *qua* triangle.

Aristotle ties his use of the ‘*qua*’ locution to his view that a science consists of categorical syllogisms. Consider the following two syllogisms, the first of which is a demonstration of the fact that *triangles* have two right angles, the second of which is a demonstration of the fact that *equilateral triangles* have two right angles.

#1

All triangles are three-sided closed plane figures.

All three-sided closed plane figures have two right angles.

Therefore, all triangles have two right angles.

#2

All equilateral triangles are three-sided closed plane figures.

All three-sided closed plane figures have two right angles.

Therefore, all equilateral triangles have two right angles.

In both syllogisms, having two right angles is demonstrated of the subject of the syllogism via a middle term that is the definition of a triangle. Hence, in both syllogisms the demonstration is *qua* triangle. But, in syllogism #1, the subject is triangles and so is a demonstration concerning *triangles qua* triangles, while in syllogism #2, the subject is equilateral triangles and so is a demonstration concerning *equilateral triangles qua* triangles.

According to Aristotle, only the first syllogism can be part of an ideal scientific demonstration. The second syllogism, because it shows that equilateral triangles have an attribute *qua* triangle and not *qua* equilateral, is not, in Aristotle's terminology, universal (PA. 74a4-74b4). Nonetheless, the second syllogism illustrates the fact that a syllogism can be a demonstration (or perhaps it is better to call it a 'quasi-demonstration') of an attribute that something has not *qua* that thing but only *qua* part of that thing. In syllogism #2, because the middle term is not the complete definition of an equilateral triangle but only the definition of a triangle, it is a demonstration not *qua* equilateral but *qua* triangle.

Although there may be some problems of detail, Aristotle's general use of the 'qua' locution in the *Posterior Analytics*, especially when illustrated with mathematical examples, makes a reasonable amount of intuitive sense. An attribute, P, is demonstrated of subject S *qua* M just in case (1) S, M and P are the subject, middle and predicate terms respectively of a valid categorical syllogism; (2) the premises of the syllogism are true; and (3) M is the reason for S's having P. Furthermore, if M is the full definition of S, then the demonstration is a demonstration *qua* S, since M is what S is. If, on the other hand, a demonstration uses a middle term, M, that excludes part of the definition of the subject term—call such a part 'Q'—then the demonstration can be said to be not *qua* Q. For instance, because the middle term of the demonstration in syllogism #2 excludes part of the definition of equilateral triangles, it can be said to be a demonstration not *qua* equilateral, or alternatively not *qua* equal length sides.

Now, in the *Posterior Analytics*, Aristotle's mathematical examples all concern some particular genus a mathematician may study and not mathematics itself. Nonetheless, the terminology Aristotle uses when he characterizes mathematics itself is the same as his terminology in the *Posterior Analytics*. According to such a characterization, mathematicians study bodies but *not qua* mobile. So, if Aristotle's use of the *qua* locution is consistent in both cases, he must have thought there are syllogisms of the following form.

#3

All bodies are M

All M are P.
Therefore, all bodies are P.

In such a syllogism, P would be a geometrical attribute that bodies have. And it would be demonstrated via a middle term, M, that is both a part of the definition of body but also somehow excludes mobility. In this way, it would be a syllogism of an attribute that bodies have but not *qua* mobile.

So what could M, the feature in virtue of which bodies have their geometrical attributes, be? What, in other words, would a definition of body that somehow excludes mobility be? In *Metaphysics* V 13, Aristotle provides an answer to this question in his discussion of the category of quantity.

At *Metaphysics* 1020a 10-15, he says:

Of magnitudes, that which is continuous in one dimension is called 'length', if in two it is called 'width', and if in three, 'depth'. Of these, a limited plurality is called 'a number', a limited length is called 'a line', a limited width is called 'a surface', and a limited depth, 'a body'.

In this passage, Aristotle defines line, surface and body as follows.

line =df a limited length.
surface =df a limited breadth.
body =df a limited depth.⁷

He also defines length, breadth and depth as follows.

length =df (that which is) continuous μέγεθος in one dimension.
breadth =df (that which is) continuous μέγεθος in two dimensions.
depth =df (that which is) continuous μέγεθος in three dimensions. (*Meta.* 1020a11-12)⁸

⁷ I am translating βάθος as is usual, i.e. by 'depth', though 'volume' might be better.

⁸ I am leaving μέγεθος untranslated so as to avoid an ambiguity in the English. It is naturally translated as 'extension', but 'extension' has a numerical and a technical non-numerical use. An example of its numerical use is: the extension of the rope is ten feet. In its non-numerical use, extension refers to a kind of extended continuum. This is the meaning I intend in the paper.

With the latter three definitions in hand, one can expand the definitions of line, surface and body by replacing 'length', 'breadth' and 'depth' in them with the definiens in the definitions of length, breadth and depth. The resulting definitions are as follows.

line =df (that which is) limited μέγεθος in one dimension.

surface =df (that which is) limited μέγεθος in two dimensions.

body =df (that which is) limited μέγεθος in three dimensions.

And if 'μέγεθος' is replaced with 'measurable quantity' which is the definition Aristotle provides of τὸ μέγεθος just a few lines prior, then these definitions become:

line =df (that which is) limited measurable quantity in one dimension.

surface =df (that which is) limited measurable quantity in two dimensions.

body =df (that which is) limited measurable quantity in three dimensions.

It must be admitted, I think, that these definitions are slightly odd, for they treat lines, surfaces and bodies as quantities rather than things with quantities. It is far more natural to understand a line as something with a measurable quantity, i.e. with some size or other, rather than something that is a measurable quantity.

This oddity, however, can be understood, though perhaps in the end not completely rectified, with a certain understanding of one of the crucial concepts Aristotle uses in these definitions, namely μέγεθος. There is an interpretation of Aristotelian μέγεθος that has been recently defended by Robert Sokolowski and Richard Sorabji but that traces back at least as far as Simplicius according to which μέγεθος is a kind of matter.⁹ According to Sorabji and Sokolowski, μέγεθος is not so much a property, not an amount, but rather an underlying continuum similar to what Descartes calls 'extension'. In Sokolowski's

9 Robert Sokolowski, 'Matter, Elements and Substance in Aristotle', *Journal of the History of Philosophy* 8 (1970), 263-288. Richard Sorabji, 'The Presidential Address: Analyses of Matter, Ancient and Modern', *Proceedings of the Aristotelian Society* 86 (1986) 1-22.

suggestive terminology, μέγεθος is continuous, extended space-filling stuff.

If μέγεθος is interpreted in this way, Aristotle's definitions of body, line and surface take on an intelligible hue. If μέγεθος is a kind of indeterminate three dimensional stuff, then a body, according to Aristotle, is such stuff in three dimensions in so far as it has been limited. And what would the limit of such a body be? A surface, which itself is limited μέγεθος in two dimensions. And the limit of a surface is a line which itself is limited by a point. And here the progression ends, since a point, because it is unextended, is not limited μέγεθος in any dimensions.¹⁰

Because Aristotle's definition of body can be illuminated by focusing on the nature of μέγεθος, in the remainder of this chapter, I will leave 'μέγεθος' in the definition of body rather than what could in principle replace it, namely 'measurable quantity'. Hence, the definition of a body that emerges from book V of the *Metaphysics* is:

body = df (that which is) limited μέγεθος in three dimensions.

And hence we have our middle term in syllogism #3, which now looks like the following.

#4

All body is (that which is) limited μέγεθος in three dimensions.

All limited μέγεθος in three dimensions has P.

Therefore, all body has P.

But, if this is to be a demonstration of an attribute that bodies in the category of substance have but not qua mobile, the middle term here cannot be the full definition of a body in the category of substance. Indeed, this is clear enough from the fact that the definition occurs in Aristotle's treatment of the category of quantity. So what, then, is the definition of body in the category of substance?

The answer to this question is quite simple and has been foreshadowed by the discussion of Aristotle's use of the 'qua' locution. If a demonstration

¹⁰ This understanding of Aristotle's views about geometrical objects is similar to Ian Mueller 'Aristotle on Geometrical Objects', *Archiv Fur Geschichte Der Philosophie* 52 (1970) 156-171.

of bodies is not qua mobile, then 'mobile' must be missing from the middle term. If so, the full definition of body is the definition of body as it occurs in the category of quantity along with the word 'mobile'. Hence, a body in the category of substance should be defined as follows:

body =df (that which is) mobile limited μέγεθος in three dimensions.

The difference between a body as it appears in the category of substance and a body as it appears in the category of quantity is the occurrence of the word 'mobile' in the former definition and its exclusion in the latter.

Aristotle's remarks concerning geometry now admit of a clear and precise interpretation. Abstraction is a logical method of removing parts of the definitions that are used in the demonstrations of attributes.¹¹ To study bodies geometrically requires the removal of 'mobile' from the definition of body as it appears in the category of substance. Geometers, then, study those features of mobile limited μέγεθος in three dimensions that can be demonstrated via the middle term limited μέγεθος in three dimensions. In other words, they study bodies (in the category of substance) but not qua mobile.

SECTION III A DIFFICULTY

The solution to the body problem is in some ways already at hand. Two different conceptions of body have been located—I will call them 'body-s' and 'body-q' for body in the category of substance and body in the category of quantity respectively. Body-s is mobile limited μέγεθος in three dimensions, while body-q is limited μέγεθος in three dimensions. The body problem arises because Aristotle accepts that body is in both the category of substance and quantity. But now, the claim that body is in the category of substance can be understood as the claim that body-s is in the category of substance, while the claim

11 I thus agree with Cleary 'On the Terminology of Abstraction in Aristotle', *Phronesis* 30 1985 13-45, who argues that by ἀφαίρεσις Aristotle generally means a method of logical separation of terms from definitions rather than an act of mental abstraction from particulars to universals.

that body is in the category of quantity can be understood as the claim that body-q is in the category of quantity. So, strictly speaking, no contradiction arises.

A difficulty, however, remains. According to the interpretation I have proposed, body in the category of quantity is (that which is) limited μέγεθος in three dimensions; and the definition of body-s results from adding 'mobile' to this definition. But adding 'mobile' to '(that which is) limited μέγεθος in three dimensions' looks like the adding of a differentia to a definition. But adding a differentia to a genus, like adding 'rational' to 'animal', results in the definition of a species that falls under the genus. So it would seem that mobile limited μέγεθος in three dimensions should be a species under limited μέγεθος in three dimensions. But, because limited μέγεθος in three dimensions falls under the genus quantity, mobile limited μέγεθος in three dimensions, if it really were just a species that results from adding the differentia 'mobile', would likewise fall under the genus quantity. But, mobile limited μέγεθος in three dimensions is supposed to be the definition of body in the category of substance and so should not fall under the genus quantity.

This difficulty can be given the following pictorial representation. It would seem that the following genus/species structure is naturally suggested by the definitions I have proposed.

Quantity
 μέγεθος—measurable quantity
 body-q—limited μέγεθος in three dimensions
 body-s—mobile limited μέγεθος in three dimensions

In this diagram, body-s falls under the genus quantity. But what is wanted is the following:

Substance
 body-s—mobile limited μέγεθος
 Quantity
 μέγεθος—continuous quantity
 body-q—limited μέγεθος in three dimensions

In the latter hierarchy, body-s falls, as it should, under the genus substance, while body-q falls, as it should, under the genus quantity. If the

interpretation proposed so far is correct, this latter diagram represents the way that Aristotle should have been thinking of the genus/species relations involving quantity, substance and body. So, how is Aristotle entitled to accept the latter hierarchical structure rather than the former? How is it that adding 'mobile' to the definition of body-q can, so to speak, create, a genus/species structure that is not subordinate to the genus under which body-q falls?

SECTION IV

THE SOLUTION

The answer to this difficulty requires first an interpretation about the source of mobility and its relation to substantiality and second an extension and precisification of the claims involved in Aristotle's philosophy of mathematics.

According to Aristotle, a mobile body is mobile in virtue of its having a nature, i.e. a principle of motion.

Each of these things [existing by nature] has in itself a principle of motion and of rest with respect to place, increase or decrease and alteration ... Consequently the substance of nature is to be a principle and a cause of being moved or of rest in the thing to which it belongs primarily and according to itself (*Phys.* 192b13-3).

Aristotle locates the source of motion in the world in the natures that substances have—conceptually, the move from immobility to mobility is effected by the introduction of natures. Furthermore, these natures are form, and perhaps—Aristotle wavers about the issue—matter. 'In one way, then, nature is said to be the first underlying matter in those things which have in themselves a principle of motion or of change, but in another it is said to be the μορφή or form according to the formula' (*Phys.* 193a28-21). 'But, the form is nature rather than matter' (*Phys.* 1931b6-7).¹² 'Thus, it is form that is nature' (*Phys.* 193b18).

12 I am taking μάλλον to mean rather, not more. So taken, Aristotle's claim at *Physics* 193b18 is a reiteration of what he has said rather than a change in position. If one insists that μάλλον should be translated as 'more', then Aristotle can be seen as strengthening his position at the end of the chapter in which the discussion takes place.

Suppose, then, that substances are mobile in virtue of having form. Because a body-*s* is mobile, it must have a form, or, to speak adjectivally, be enformed. Form, however, plays a crucial role in Aristotle's theory of substance. In fact, in *Metaphysics* VII, 17, after a long search for substance, Aristotle argues that form is the principle of substance. Crucially, Aristotle claims that form is that which causes matter to be something: 'Thus, we are seeking the cause of matter (and this is the form) by means of which it is something; and this is substance' (*Meta.* 1041b7-8). Now, the interpretive difficulties surrounding book VII of the *Metaphysics* are immense; and I do not intend to enter into the details of scholarly disagreement about it. Instead, I shall simply assert what could in the end be defended by a thorough examination of book VII, namely that Aristotle accepted the following thesis: form is the principle of substance of composites of form and matter.

These two claims—(1) body-*s* must be enformed; and (2) form is the principle of substance of composites of form and matter—end up having an interesting effect. But to see this requires some precisification of Aristotle's theory of abstraction.

Aristotle claims that it is possible to demonstrate some feature of *X*'s but not qua *F*. For instance, geometers demonstrate features of bodies but not qua mobile. To capture this idea formally, let *X* be some concept that contains as a part the predicate *F*. Let *X_not_qua_F* be the concept that results from abstracting *F* from *X*. Now, *X's_not_qua_F* can have properties; but because *F* has been abstracted from them, they cannot have the property *F*. Nor can they have any property that entails that they are *F*. For if they could, then *F* would not have really been abstracted from them but would be implicitly contained in some property they have. Hence, a necessary condition for *X's_not_qua_F* having some property *G* is the following: it is not the case that *Xs* having *G* entails that *X*'s are *F*. This can be stated formally as the following abstraction schema (AS).

(AS) If $G(X_not_qua_F)$, then $\sim [G(X) \vdash F(X)]^{13}$

13 I am in general agreement with Jonathan Lear, 'Aristotle's Philosophy of Mathematics', *Philosophical Review*, XCI, No. 2 (1982) 161-192, about the correct way to understand the qua locution. Lear does not discuss how to interpret Aristotle's claim that one can demonstrate a feature of something not qua *F*; but he does provide the following schema with which I agree for

Now, I have argued that body-q is body-s with 'mobile' abstracted away. In other words, body-q is body-s not qua mobile. Hence, the following is an instance of (AS)

- (1) If Substance (body-q), then $\sim$ [Substance (body-s) $\vdash$ Mobile (body-s)]

Informally, this is to be read as: if body-q is a substance, then body-s's being a substance does not entail body-s's being mobile. In addition to (1), three further principles are attributable to Aristotle as I am interpreting him. Aristotle accepts that form is the principle of mobility and so accepts the following schema,

- (2) Has form (X) $\vdash$ mobile (X)¹⁴

which has as an instance the following principle.

- (2a) Has form (body-s) $\vdash$ mobile (body-s)

Furthermore, Aristotle accepts that among composite substances form is the principle of substance. Hence, he accepts the following schema,

- (3) Composite substance (X) $\vdash$ has form (X)

which has as an instance the following principle.

- (3a) Composite substance (body-s) $\vdash$ has form (body-s)

Finally, Aristotle accepts that body-s, if it is a substance at all, is a composite substance. Hence, he accepts the following principle.

- (4) Substance (body-s) $\vdash$ Composite substance (body-s)
(2a), (3a) and (4), then, entail

what it is for something to have a feature qua F: $G(b \text{ qua } F) \vdash F(b) \ \& \ [F(x) \vdash G(x)]$.

14 That form is a principle of motion in fact supports the stronger biconditional schema: $\text{has form } (X) \vdash \text{mobile } (X)$. But only the conditional schema is needed for the above argument. Similar remarks apply to (3) as well.

(5) Substance (body-s) $\vdash$ mobile (body-s).

And (5) and (1) entail that body-q is not a substance.

And so the difficulty vanishes. Because form is both a principle of substance and of mobility, the removal of mobility from body as it appears in the category of substance does not push one up the genus/species hierarchy; rather, it tears one away from the category of substance, leaving one in the category of quantity. In the other direction, adding 'mobile' to body-q does not, like the mere addition of a differentia would, simply create another species in the category of quantity. Rather, it is tantamount to the addition of a metaphysical principle sufficient to create another genus-species hierarchy not subordinate to the category of quantity; it is tantamount to the creation of the category of substance.¹⁵

The principles in (1) – (5) thus show that the underlying picture about the relationship between substance, form and body can be made precise. But it is really the underlying picture that is of interest. The picture is of a metaphysical principle, namely form, which is connected to two fundamental aspects of the world: substance and motion. The presence of form confers both substantiality and the capacity for motion on a physical body. And its abstraction from body leaves something of a metaphysical shadow, a genus in the category of quantity, which can only have only accidental being.

SECTION V

THE BODY PROBLEM SOLVED

The solution to the body problem is now at hand. The problem arose because body appeared to be a genus in both the category of substance and the category of quantity. But this appearance results from a subtle equivocation. Body-s is in the category of substance; body-q is not. Body-q is in the category of quantity; body-s is not. And how is it that,

15 This view requires interpreting Aristotle as not thinking that being a subject of predication is sufficient for being a substance. Hence, when Aristotle says at *Metaphysics* 1020a17, 'Of things that are quantities by their own nature some are such as substances, e.g. the line is a quantity ... and others are modifications and states of this kind of substance,' he must be taken as speaking of substance analogically to the primary sense of substance.

given the way I claim Aristotle would define these terms, body-s can be in a genus/species structure that is not subordinate to the structure in which body-q occurs? The answer can be found in the conceptual connection Aristotle draws between motion, form and substance. A body-s is mobile and hence has a primary principle of motion, which is a form. Form, however, is also a principle of substance, and so body-s is a substance. When one removes mobility from the definition of body-s, the having of a primary principle of motion, namely form, can no longer be entailed by the remaining part of the definition. Form, however, is a principle of substance and so its removal entails that what remains after the removal cannot be a substance. Hence, body-q cannot be in the category of substance. Rather it is, as Aristotle claims it is, in the category of quantity.

This solution to the body problem also explains how the two characterizations of mathematics that can be gathered from Aristotle's texts are not at odds with each other. To say that mathematicians study bodies but not qua mobile is, as I have argued, to say that mathematicians study limited μέγεθος in three dimensions. But, limited μέγεθος in three dimensions is a quantity. And hence, mathematicians study quantities. Of course, they do not study quantities in any old fashion. Rather, they attempt to demonstrate those attributes of quantities that belong to them in virtue of one or another aspect of the essence of quantities. For instance, because μέγεθος is continuous quantity, a mathematician may demonstrate those attributes that belong to limited μέγεθος in three dimensions qua continuous. And this is precisely the alternative characterization of mathematics Aristotle provides.

SECTION VI

A FINAL AMENDMENT

The proposed solution to the body problem, though perhaps adequate as it stands, admits of a final amendment that will lead to a rather striking result concerning the relationship between the categories of substance and quantity. The opportunity, or perhaps need, for the amendment arises from certain inadequacies in the definition of body-s as (that which is) mobile continuous limited μέγεθος in three dimen-

sions. Although such a definition makes perspicuous the relationship between body in the category of substance and body in the category of quantity, it does not accord well with Aristotle's preferred method of defining kinds in terms of a genus and a differentia. For it is not clear what in the definition serves as the genus and what serves as the differentia. Furthermore, it is at odds with the definition most naturally extracted from the passage in *Metaphysics* XII, 1, a passage that provides crucial evidence for body's location in the category of substance in the first place. In that passage, Aristotle divides substances into immobile and sensible substances. Hence, if mobility and sensibility are convertible, and if sensible substances are bodies, the definition of body as it appears in the category of substance should be: mobile substance.

Suppose then that the definition of body-s is in fact mobile substance. It is nonetheless possible to construct a syllogism which, when supplemented by a subsidiary principle, entails that body-s is informed limited μέγεθος in three dimensions. The syllogism is as follows.

- I. Body-s is mobile substance.
- II. Mobile substance is a composite of form and a first underlying matter.
- III. Therefore, body-s is a composite of form and a first underlying matter.

The first premise is, of course, the proposed definition of body-s. The second premise finds strong support from passages in the *Physics*. At *Physics* 193a28-31, Aristotle says, 'In one way, then, nature is said to be the first underlying matter in things which have in themselves a principle of motion or of change, but in another it is said to be the μορφή or form according to a formula' (*Phys.* 193a28-31). Shortly after this passage Aristotle speaks of that which is from both form and matter, i.e. a composite of form and matter, and he says that it exists by nature (*Phys.* 193b6). But at the beginning of *Physics* II 2, Aristotle says that those things existing by nature are substances (*Phys.* 192b32-33). Hence, Aristotle is committed to the claim that mobile substances have form and a first underlying matter.

Now, a question arises as to the nature of the first underlying matter Aristotle mentions. And I have already alluded to two contemporary scholars, Sokolowski and Sorabji, who have discussed at length

μέγεθος. According to both Sokolowski and Sorabji, μέγεθος is not only a kind of matter but is in fact prime matter. If they are correct about this, the first underlying matter to which Aristotle refers in the above passage from the *Physics* can be interpreted as μέγεθος. And hence, the first underlying matter in the above syllogism would be μέγεθος. So interpreted, the conclusion of the syllogism asserts that body is a composite of form and μέγεθος. But if it is assumed that such μέγεθος is both three dimensional and limited by the form that enforms it, then the conclusion of the syllogism asserts that body in the category of substance, i.e. body-s, is (that which is) enformed limited μέγεθος in three dimensions. And this is precisely the conception of body-s that I have argued is needed in order to fully resolve the body problem.¹⁶

A fairly remarkable result has thus emerged from these considerations. The above syllogism is precisely the sort that belongs in an Aristotelian science. The minor premise contains a definition of body-s; the major premise contains terms necessarily convertible with the middle term; and the conclusion is a characterization of body-s that contains within it the source of at least one species in the category of quantity. Being limited enformed μέγεθος in three dimensions is thus a property, in the Aristotelian sense, of body as it appears in the category of substance and can be shown to be so by an Aristotelian scientific syllogism.¹⁷ Furthermore, if being enformed is removed from the characterization of body-s obtained by the syllogism, body-q results which, because it lacks a principle of substance, cannot fall in the category of substance. Rather, it is a species in the category of quantity. Hence, at least one genus in the category of quantity is derivable in two stages. First, an Aristotelian scientific syllogism concerning the hylomorphic

16 As shall become apparent in chapter 4, I do not think that prime matter is extension. Nonetheless, the connection between extension and prime matter is sufficiently intimate to justify this solution to the body problem.

17 It is worth noting that in the *Topics* Aristotle says that being a composite of body and soul is a correct rendering of a property of living creatures. (*Topics* 131a8-11) This is confirming evidence for the claim that that being a composite of form and prime matter is a property of bodies. For the thesis about living creatures would be a specification of the thesis about bodies; and, given the fact that living creature is a species under the genus body, this is exactly as one would expect.

principles required for the possibility of change is constructed; and second, one of those principles, i.e. form, is abstracted away.

CONCLUSION

In one sense the body problem is not a genuine problem at all for Aristotle; but in another it is perhaps the deepest problem in Aristotle's metaphysical system. It fails to be a problem because it admits of a completely seamless resolution that draws from familiar aspects of Aristotle's views about science, substance, quantity, form and motion. In fact, the resolution is so seamless and flows so gracefully from theses central to Aristotle's thinking that it provides an explanation of his reticence concerning the issue—there is no reason to comment on the perfect convergence of the pieces of a puzzle that one has constructed oneself. The problem is extremely deep, however, precisely because its resolution does depend on as well as draw together theses that are so central to Aristotle's thinking.

In addition to being centrally located in Aristotelian metaphysics, the body problem also illuminates the possibility of deriving the categories from hylomorphism. Though a contemporary heterodoxy, and though underdeveloped in the Medieval derivations, the view that the categories are at least in part derived from hylomorphism is at least somewhat vindicated by the ease with which a very deep connection between the two systems has emerged. For the interpretive theses needed to bridge the gap between hylomorphism and the categories are, especially when viewed in relation to the boldness of the Medieval thesis, reasonable and certainly within the confines of plausible scholarship.

The theses are as follows.

I. Body in the category of substance is mobile substance.

II. Body in the category of quantity is limited μέγεθος in three dimensions.

III. Any mobile substance is a composite of form and a first underlying matter.

IV. If body has a form, then body is mobile.

V. If body is a substance, then body has a form.

VI. Prime matter is μέγεθος.

VII. For any predicate, G, if $G(X \text{ not_qua_} F)$, then $\sim [G(X) \vdash F(X)]$

Thesis I finds support in Aristotle's division of substance in book XII of the *Metaphysics*. Thesis II comes directly from Aristotle's discussion of the category of quantity in the *Metaphysics*. Thesis III comes directly from Aristotle's discussion of change in the *Physics*. Thesis IV comes from Aristotle's claim that form is a principle of motion. Thesis V comes from Aristotle's views that composite substances have forms and that bodies in the category of substance are composites. Thesis VI is, of all the theses, the most controversial. In fact, I shall reject it in chapter 4. Nonetheless, as shall become apparent there, the connection between prime matter and extension is sufficiently intimate that the above solution to the body problem can easily be altered in order to accommodate what is the correct understanding of prime matter. Finally, thesis VII emerges from an examination of Aristotle's understanding of the *qua* locution.

From these seven theses it is possible to construct a syllogism that not only satisfies the criteria for an Aristotelian scientific syllogism but also demonstrates that at least one genus in the category of quantity, namely body, is derivable from theses that belong to Aristotle's theory of change.

CHAPTER 3

FORM

A defense of the thesis that the categorial scheme is derivable from hylomorphism clearly requires some account of the natures of form and matter. Hence, in this chapter I address the nature of form; and in the next, the nature of matter.

What Aristotle says about form presents an initial, and in some ways deep, interpretive difficulty.¹ Simply put, Aristotle seems to contradict himself. Perhaps the most striking such contradiction concerns form's substantiality. In the *Categories*, Aristotle says that form is secondary substance (*Catg.*2b7-30); while in the *Metaphysics*, he says that it is primary substance (*Meta.* 1041b8). Another such contradiction concerns form's universality. Aristotle says at *Metaphysics* 1036a29 that form is universal; and at *Metaphysics* 1049a35-6 he says that it is particular.² Not surprisingly, Aristotle's apparently divergent views about form's nature have not gone unnoticed by scholars. Consider, for instance, Geach's lament: 'there is hardly a statement about form

1 Aristotle uses three words – εἶδος, μορφή, and σχῆμα – that are commonly translated as 'form'. Often enough, he uses – εἶδος and μορφή interchangeably, though he tends to use εἶδος when he means species. Furthermore, he tends to use when he speaks of the figures, i.e. forms, of predication. In this chapter I shall be focusing on his use of the word; but because of the proximity in meaning between—εἶδος and μορφή, much of what I say is applicable to Aristotle's use of μορφή.

2 Interpreting Aristotle as calling form in these respective passages universal and particular requires treating the καὶ in each passage as epexegetical. A close examination of each passage would support such a reading.

in the *Metaphysics* that is not (at least verbally) contradicted by some other statement.³

Clearly, Aristotle's apparently inconsistent statements about form make interpreting his metaphysical views a difficult affair. In the first part of this chapter, however, I shall argue that Aristotle's statements about form present an even starker difficulty that has not only gone largely unnoticed by scholars but that arguably underlies the apparently inconsistent statements Aristotle makes. In the first part of this chapter, I shall argue that Aristotle attaches over twenty different meanings to the word 'form'.

It should be obvious that such a plethora of meanings threatens to make interpreting Aristotle's metaphysical system a hopeless task. For instance, the apparently contradictory statements Aristotle makes about form are not genuine contradictions if he means something different by 'form' in the different statements. But even though this may seem a positive result, it immediately raises the following question: what does Aristotle mean when he says, for instance, that form is primary substance? Well, it depends on which of the twenty or so meanings he has in mind. Indeed, unless there is some way of bringing Aristotle's use of 'form' under control, the statements he makes about the nature of form become almost impossible to interpret. What's worse, as I hope to show, the divergent meanings Aristotle attaches to the word 'form' make it very difficult to know what the nature of form is. As I hope shall become apparent, it is difficult to see what genus could possibly subsume all the various meanings. And so it is difficult to know what a form, according to Aristotle, is.

My aim in this chapter, however, is not simply to point out this difficulty. Rather, I ultimately want to articulate what I take to be the nature of form. Hence, in sections II-IV of this chapter, I try to go some way toward resolving the difficulty. I do not intend my examination of form to be completely exhaustive—such a task is a project for an entire book. Nonetheless, my goal in this chapter, in addition to pointing out the plethora of meanings of the word 'form' in Aristotle, is to bring these meanings under some sort of control. My procedure is as follows. I pick twelve of the meanings, which, I think, are the most

3 P.T. Geach, 'Aquinas' in *Three Philosophers* (Ithaca: Cornell University Press 1961), p. 75.

fundamental notions of form in Aristotle. I then attempt to taxonomize them in a systematic manner. In the end, I shall propose that all the meanings in some way or another fall under the genus – principle of order.

Now, the taxonomy by itself should be of interest; for it shows that Aristotle's use of the word 'form' is not as haphazard as it might at first seem. But, in providing the taxonomy, I make use of several substantive theses about Aristotle's metaphysical system. The theses help provide the contours for the taxonomy; and the taxonomy in turn help justify the theses. So the process of coming to grips with Aristotle's use of the word 'form' should, in addition to creating some order out of an apparent chaos, provide a means for addressing some of the more fundamental aspects of Aristotle's metaphysical system. Furthermore, the taxonomy, because it is a genus/species structure provides a specification of the nature of form. So, by the end of this chapter, we shall be one step closer to a defense of the claim that Aristotle's categorial scheme is derivable from his hylomorphic ontology – we shall know the nature of one of the entities from which the categorial scheme is derivable.

SECTION I

THE MEANINGS OF 'FORM'

Because of the centrality of form in Aristotle's philosophy, and because it is a technical notion, one might think that determining what a form is would be a relatively straightforward task. For surely, one might think, Aristotle would not repeatedly use a technical notion without defining it. So, determining what a form is should only require an inspection of Aristotle's definition. In keeping with this optimistic line of thought, one might turn to Aristotle's definition of form in his lexicon of terms. In *Metaphysics* V, 2, Aristotle says:

Also, the form, i.e. the paradigm, is the formula of the essence, and the genera of this; (for example, in the case of the octave, the ratio 2:1, and in general, number) and the parts in the formula (*Meta.* 1013a27-9).

This passage does provide some insight into the nature of form; but at the same time it also falsifies the belief that Aristotle's views about

the nature of form can be discovered by a mere inspection of his considered definition. In this passage Aristotle disconcertingly identifies form with three different and not obviously commensurate types of entity. In the first instance, Aristotle says that form, which by way of an epexegetical *kaí*—i.e. an 'i.e.'—he takes to be equivalent to a paradigm, is the *lógos* (formula) of an essence. Except for the fact that Aristotle identifies form with the *lógos* of an essence rather than with essence itself, Aristotle's claim here is straightforward enough; and it forges a crucial link between form and essence. Aristotle also says, however, that the genera of essence are forms. But if he thinks, as it is plausible to suppose he does, that the formula of an essence signifies a species, Aristotle in this passage is asserting that a form can be both a species and the genus of a species. Finally, in the last part of the passage, Aristotle identifies form with any of the parts of a formula. The parts of a formula, however, include a genus and a *differentia* the combination of which determines a species; and so Aristotle appears to commit himself to the view that a form can be a species, a genus or a *differentia*.

A bit later in the chapter, Aristotle complicates matters by reformulating his definition of form in a way that brings into view two other notions. After first identifying matter with that of which something consists, Aristotle identifies form with something's essence (*Meta.* 1013b20-5). In saying this he is merely repeating one of the conceptions of form in the previous definition with the difference that he now identifies form with the essence rather than the *lógos* of the essence. But he then goes on to say that the essence is the whole, i.e. the composition, i.e. the form: 'but the other in each case is a cause in the sense of essence, and this is the whole, i.e. the composition, i.e. the form' (*Meta.* 1013b23). Here Aristotle introduces two new notions, whole and composition, which are neither obviously the same as those in the previous definition nor indeed obvious synonyms of each other. A whole, one might think, is something that is a composite of form and matter; and so the identification of form with a whole might look like the odd if not incoherent identification of form with something that has form as a constituent. And something's composition would seem to be something akin to the structure a whole has rather than the whole itself.

The plurality of meanings of 'form' contained in Aristotle's explicit definition in his lexicon presents some difficulty, but the difficulty does not end there. For this definitional multiplicity is a manifestation of a general trend in Aristotle's use of the word 'form'. For in the *Metaphysics* alone, he attaches over twenty different meanings to it. Exhaustively listing and documenting all these meanings, though instructive, would be a lengthy affair, which has for the most part already been adequately done by Bonitz in his *Index Aristotelicum*; and so I provide only the following citations so as to give a feel for the bewilderingly many uses of 'form' in Aristotle.

FORM AS ART

1032b13—'... for the medical art and the building art are the forms of health and of the house ...'

1070b31-33—'... while in things which come to be from thought the mover is the form or the contrary of the form, the causes are in one sense three but in another sense four. For the medical art is in some sense health, the art of building is in some sense the form of the house ...'

FORM AS THAT WHICH, THOUGH NOT GENERATED, IS THE END OF A CHANGE

1015a7-11—'Nature, then, is either the first matter ... or the form καὶ substance, and this latter is the end of generation.'⁴

1034b7-10—'It is not with respect to substance alone that our argument reveals that the form is not generated; the argument is alike common with respect to all primary forms, such as those of quantity, of quality, and of the other categories.'

4 I am leaving καὶ un-translated for the following reason. It could mean 'and', 'or' or 'i.e.' The difference in meaning is stark. In many passages, especially those in which Aristotle is making claims about the nature of form, I think it is appropriate to translate it as 'i.e.' But, I leave it un-translated so as not to gloss over the fact that there are genuine interpretive issues concerning its translation.

1069b35-6—'Next, neither the matter nor the form is generated, and I mean the ultimate matter and form.'

1070a1-2—'That by which it is changed is the first mover, that which changes is matter, and that to which it is changed is the form.'

FORM AS *THAT FROM WHICH GENERATION PROCEEDS*

1055b11-3—'If, then, generations in matter take place from contraries, and if they proceed either (a) from the form or the possession of form, or (b) from some privation of the form ...'

FORM AS *SPECIES*

The instances of this are so numerous that it is not worth quoting passages in which it occurs.

FORM AS *λόγος*⁵

1044b12-3—'The cause as form is the *λόγος*, but this is not made clear unless it includes the cause.'

1069b31-4—'The causes and principles, then, are three; two of them are the contraries, of which one is the *λόγος καὶ* the form and the other is the privation, and the third is the matter.'

FORM AS *THAT WHICH IS SIGNIFIED BY THE λόγος*

1084b9-13—'As matter, then, the acute angle and the elements and the unit are prior, but with respect to form καὶ to substance according to *λόγος*, the right angle and the whole as composite of matter and form are prior; for the composite is nearer to the form καὶ to what is signified by the formula, but it is posterior in generation.'

5 I am leaving *λόγος* un-translated due to the difficulties in interpreting the word throughout Greek philosophy. That being said, I do think that by that Aristotle almost always uses it to mean linguistic account.

FORM AS ESSENCE

1032b1-2—‘by ‘form’ I mean the essence of each thing καὶ the first substance.’

1035b14-6—‘And since the soul of an animal (for this is the substance of an ensouled body) according to λόγος is the substance καὶ form καὶ essence of such a body ...’

1035b31-3—‘A part, then, may be a part of the form (by ‘form’ I mean essence) or of the composite of form and matter.’

FORM AS THAT TO WHICH ESSENCE BELONGS

1043a37-1043b2—‘But, these contribute something to another inquiry, but they do not contribute nothing to the inquiry into sensible substances; for the essence belongs to the form καὶ actuality.’

FORM AS DIFFERENTIA

1038a25-6—‘If then the differentia of the differentia were taken, the last one would be the form καὶ substance ...’

FORM AS SUBSTANCE

1015a7-11—‘Nature, then, is either the first matter ... or the form καὶ substance, and this latter is the end of generation.’

1017b26—‘Substance is said in two ways: it is either the ultimate subject which is not predicated of something else or that which is a this and is separable, such being the μορφή καὶ form of each thing.’⁶

1022a14—“that in virtue of which” is said in many ways. In one way, it is the form καὶ substance of each thing;’

1029a29—‘Accordingly, the form or what is from both would seem to be a substance rather than matter.’

6 I have left μορφή un-translated so that it is not confused with εἶδος.

FORM AS WHOLE

1013b21-3—'but the other in each case is a cause in the sense of essence, and this is the whole καὶ the composition καὶ the form.'

1023b19-20—'Also, it means those into which a whole is divided or of which it is composed, whether this is a form or that which has a form.'

FORM AS THAT WITHOUT WHICH A THING IS NOT A WHOLE

1016b11-13—'Again, in one sense we say that anything is one ... but in another sense we do not say so unless the object is a whole of some kind, that is, unless it has one form.'

FORM AS THE CAUSE OF A WHOLE'S BEING ONE

1016b11-13—'Again, in one sense we say that anything is one ... but in another sense we do not say so unless the object is a whole of some kind, that is, unless it has one form.'

1052a23—'As in the previous case, if the thing is a whole and has some μορφή or form, it is said to be one to a higher degree; and most of all, if it is by nature of this sort and has something in itself which is the cause of its being continuous, and not by force as in things which are glued together or nailed together or tied together.'

FORM AS THAT WHICH MAKES SOMETHING CONTINUOUS

1052a20-5—'As in the previous case, if the thing is a whole and has some μορφή or form, it is said to be one to a higher degree; and most of all, if it is by nature of this sort and has something in itself which is the cause of its being continuous, and not by force as in things which are glued together or nailed together or tied together.'

1075b28-30—'Again, how can magnitude or what is continuous come from things which have no magnitude? For number cannot make what is continuous, either as a mover or as a form.'

Form as *the cause by which matter is a thing*

1041b7-8—‘Thus we are seeking the cause (and this is the form) by means of which matter is something; and this is substance.’

1050a15-6—‘Further, matter exists potentially because it can come to possess a form; and when it exists actually, then it exists in a form.

FORM AS THE FIRST CAUSE OF A THING’S EXISTENCE

1041b8/1041b29—‘Thus we are seeking the cause (and this is the form) through which the matter is a thing; and this cause is the substance of the thing ... And this is the substance of each thing; for this is the first cause of the thing’s existence.’

FORM AS ACTUALITY

1043a18-21—‘But those who combine both, speak of the third substance from these, the one composed of matter and form (for it seems that the formula by means of the differentiae is that of the form καὶ actuality, but the formula of the constituents is rather that of the matter)’

1043a29-35—We should not ignore the fact that sometimes we are unaware of whether a name signifies the composite substance, or the actuality καὶ μορφή, for example, whether ‘house’ signifies the composite, that is, a covering made of bricks and stones laid in such and such a manner or, the actuality καὶ form, that is, a covering, whether ‘line’ signifies two-ness in length or two-ness, and whether ‘an animal’ signifies a soul in a body or a soul.’

1043b1-2—‘for the essence belongs to the form καὶ actuality.’

1050b2 —‘It is evident that the substance καὶ the form is actuality.’

1071a8-9—‘For what exists actually is the form, if separable, and what is from both.’

FORM AS THAT WITHOUT WHICH A THING DOES NOT HAVE A
NATURE

1015a3-5—"Thus in things which exist or are generated by nature, although there is already a constituent in them from which by nature they are generated or exist, we say that they do not yet have a nature unless they have a form or a μορφή.

FORM AS THE LIMIT (OF MAGNITUDE)

1022a4-6—"Limit means ... the form of a magnitude or of that which has magnitude.'

FORM AS THAT IN VIRTUE OF WHICH

1022a14-5—"That in virtue of which' has many meanings. In one sense it means the form καὶ the substance of each thing'

1022a17-9—"That in virtue of which', then, in the primary sense means the form and in a secondary sense the matter of each or the first underlying subject of each.'

FORM AS THAT IN VIRTUE OF WHICH THINGS ARE SIMILAR

1054b7-9—"Things are said to be similar, if having the same form and admitting a difference of degree, they do not differ in degree.'

FORM AS PARADIGM

1013a24-7—"A cause means ... the form καὶ paradigm, this being the formula of the essence.'

1034a2—"Consequently it is clear that there is no need of setting up a form as a paradigm ...'

FORM AS SHAPE/FIGURE

1023a11-3—"for example the bronze has the form of the statue, and the body has the disease.'

SECTION II

FORM: ITS FUNDAMENTAL MEANINGS

Of the meanings of 'form' in the above list, I shall focus on the following.

1. Art.
2. That which, though not generated, is the end of a change.
3. Species.
4. λόγος.
5. That which is signified by the λόγος.
6. The cause of a whole's being one.
7. That which makes something continuous.
8. The cause by which matter is a thing.
9. The first cause of a thing's existence.
10. That without which a thing does not have a nature.
11. Shape.
12. Essence

Already the items on this list, though diverse, contain some obvious family resemblances by which some sense can be made of their being named by a single word. To a contemporary reader familiar with the distinction between use and mention, (4) and (5), i.e. λόγος and that which is signified by λόγος, appear radically different. But Aristotle was not always scrupulous in maintaining the distinction, and so (4) and (5) need not appear at odds with each other. A λόγος, when used, signifies something, i.e. form, whose name, i.e. 'form', is used by Aristotle to mention the λόγος. Furthermore, a λόγος, if it is a true Aristotelian definition in terms of a genus and a differentia, signifies a species. So an obvious connection exists between (3), (4) and (5). And one might contend, though I shall argue that this issue is in fact a difficult one, that an essence is a species. If so, a direct connection exists between (3), (4), (5) and (14).

Making sense of the meanings in this list by noticing family resemblances, however, can only go so far. For some very deep dissimilarities exist as well. (7), that which makes something continuous, does not easily fit into a nest of terms that center around the concept of a species. Nor do (1), art, and (2) that which is the end of a change. And though, (6), the cause of a whole's being one, (8), the cause by which

matter is a thing, (9), the first cause of a thing's existence, and (10), that without which a thing does not have a nature, might be pressed into such a nest, they do not fit into it easily. So injecting more order into Aristotle's use of the word 'form' requires a deeper investigation into his metaphysical system.

SECTION III

TWO TYPES OF FORM

The taxonomy I shall propose has two main starting points. First, in one of its absolutely fundamental senses, 'form' means species. The only real evidence needed for such a claim is the overwhelming number of times Aristotle uses 'form' to mean species. But the fact that several of the meanings in the above list all relate directly to the concept of a species provides whatever further evidence might be needed to establish the claim. Second, a crucial distinction exists between the form of a composite of form and matter and the form of the matter of a composite of form and matter.

Evidence for this latter claim can be derived from Aristotle's distinction between two types of subject. In *Metaphysics* VII, 13, Aristotle says:

For we have discussed two of them: essence and a subject. And being a subject is two-fold: it is either (a) a this, as an animal is to its attributes, or (b) as matter is to actuality (*Meta.* 1038b4-7).

And in *Metaphysics* IX, 7, he says:

The universal and the underlying subject differ insofar as the subject is a *this* and the universal is not; for example, a man is a subject to his affections, as are the body and the soul, and being musical and being pale are affections ... And whenever such predicates are used, each subject is a substance, but if a predicate is instead a form, i.e. (καὶ) a this, each subject is matter and a material substance (*Meta.* 1049a27-36).

In these passages, Aristotle makes a clear distinction between subjects—a subject can be a composite of form and matter, or it can be matter. I will suppose, then, that corresponding to these two types of subject are two types of form, what I shall henceforth call 'form-m', form of matter, and 'form-c', form of the composite. In fact, in the sec-

ond passage, Aristotle provides a clue as to the resolution of the difficulty that results from his calling a form both a universal and a particular. If the 'καὶ' in the last sentence is exegetical, then Aristotle holds that when the subject is matter, the form predicated of it is a particular. (This reading is supported by the fact that in the first sentence in the above passage, Aristotle uses the soul, which he elsewhere explicitly identifies as a form (DA 412a21, *Meta.*1035b16), as an example of a this). Furthermore, by setting up a contrast between the two types of subject and by explicitly saying that the form predicated of one type of subject is a this, Aristotle makes it very natural to suppose that the form predicated of the other type of subject is universal. Hence, I shall suppose that form-c is a universal and form-m is a particular.⁷

7 The question as to the ontological status of form is no doubt one of the most hotly debated issues in Aristotelian scholarship. Among those who think that there are particular forms are Wilfrid Sellars, "Substance and Form in Aristotle," *Journal of Philosophy* 54 (1957) 688-699; E. Harter, "Aristotle on Primary ousia," *Archiv für Geschichte der Philosophie* 57 (1975) 1-20; Edwin Hartman *Substance, Body, and Soul: Aristotelian Investigations*. (Princeton: Princeton University Press 1977); T. H. Irwin *Aristotle's First Principles*. (Oxford: Clarendon Press 1988); Charlotte Witt *Substance and Essence in Aristotle: an Interpretation of Metaphysics VII-IX*. (Ithaca, NY: Cornell University Press 1989). Among those who do not are: M. J. Woods, "Problems in *Metaphysics Z*, Chapter 13." In J. Moravcsik (ed.), *Aristotle: A Collection of Critical Essays*. (New York: Anchor 1967) 215-238. I am not entering directly into this debate, though I obviously think that there are particular forms. One reason that I am not directly engaging in the debate is that the various factions seem oblivious to the possibility that there is a systematic ambiguity in Aristotle's use of the word 'form' of the sort I am suggesting. As a result, many of the arguments given are, in my opinion, inadequate. Consider, for instance, a common argument that form cannot be universal. Aristotle says (1) Substance is form; (2) Form is universal; (3) No universal is substance. Or consider what S. Marc Cohen says against the particularity of form: "In my opinion, the indefinability of particulars makes it impossible for substantial forms to be particulars. If there were a substantial form that is unique to some sensible particular, say Callias, then the definition corresponding to that form, or essence, would apply uniquely to Callias—it would define him, which is precisely what Aristotle says cannot be done." S. Marc Cohen "Aristotle's *Metaphysics*", *The Stanford Encyclopedia of Philosophy* (Winter 2003 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/win2003/entries/aristotle-metaphysics/>>. Both arguments, in my

SECTION IIIA

FORM-M

With the distinction between form-m and form-c in place, we can turn to their respective natures. I shall begin with form-m. What is a form-m? What is the nature of that entity that is predicated of matter as opposed to the composite of form and matter? This question, as it turns out, can be answered by focusing on the natures of the soul and the pairs of contraries that characterize the elements—for both the soul and the pairs of contraries are predicated of matter.

Among contemporary scholars, there is a common, indeed perhaps it is the standard, characterization of an Aristotelian soul. According to the characterization, an Aristotelian soul is a set of powers or, depending on subtle nuances of meaning, a set of faculties or capacities. Which capacities? Those characteristic of living things. Hence, all souls contain at least the capacity for nutrition and limited growth in two directions; animal souls contain in addition dispositions for perceptual activities; and human souls contain dispositions for rational thought.

Jonathan Barnes provides a clear statement of a capacity account of an Aristotelian soul.

Thus Aristotle's souls are not pieces of living things; they are not bits of spiritual stuff placed inside the living body; rather, they are sets of powers, capacities or faculties. Possessing a soul is like possessing a skill.⁸

Likewise, Richard Sorabji professes allegiance to the capacity account.

Aristotle sometimes thinks of the soul as a set of capacities, such as the capacity for nutrition, the capacity of sense perception and the capacity for thought. These capacities are not a mere conglomeration, but are related to each other in intimate ways, so as to form a

opinion, are no good, since they overlook the possibility that 'form' is ambiguous. In one sense of 'form', form is universal; in another, it is particular. Of course, one might want to establish a systematic correlation between the two senses. I do just that in section IIIB.

8 Jonathan Barnes, 'Aristotle', in *Greek Philosophers: Socrates, Plato, and Aristotle*, (Oxford: Oxford University Press 2001), p.275.

unity. The lowest capacity (nutrition) can exist without the higher ones, but not *vice versa* ... I shall follow Aristotle below, by thinking of the soul as a set of capacities.⁹

The capacity account is reasonably well supported by Aristotle's texts. Aristotle often talks of the soul as if it were a set of capacities. He begins the discussion of his views about the soul in the *De Anima* with a discussion of powers and even appears to identify the soul with certain kinds of powers. He says, for instance, that plants are living because they have an originaive power through which they increase or decrease in all spatial directions (DA 413a25-30). He then goes on to say: "This is the originaive power the possession of which leads us to speak of things as living at all" (DA 413b1-2). And a bit later he says: 'At present we must confine ourselves to saying that the soul is the source of these phenomena and is characterized by them, viz. by the powers of self-nutrition, sensation, thinking, and movement' (DA 413b10-3). Aristotle's analogy between soul and sight just prior to these passages also recommends an identification of the soul with capacities. At 412b17-413a13, Aristotle says that the relation of soul to body is analogous to the relation of sight to eye. Because sight is the capacity to take on the forms of objects without their matter, by analogy the soul is the capacity or unified set of capacities to engage in living activities. Finally, at *De Anima* 412a22-8, Aristotle after defining the soul as the first actuality of a natural organic body potentially possessing life, goes on to say at 417a21-b2 that a first actuality is a second potentiality. Aristotle then illustrates the distinction between first and second potentialities by appealing to kinds of knowledge, an example that would, again by analogy, recommend thinking of a soul in terms of capacities.

For the present purposes, two points about a capacity account must be made. First, the notion of a capacity will have to remain unanalyzed. This conforms to Aristotle's own practice, for he is not concerned to analyze the notion. In fact, it is in this instance reasonable simply to follow Aristotle's lead and consider a capacity an ἀρχή that is a principle or source—it is the source of the dynamical interactions with the world an object has. This, at any rate, is precisely what Aristotle says about the soul: 'At present we must confine ourselves to saying

9 Richard Sorabji, 'Body and Soul in Aristotle,' *Philosophy* 49 (1974) 64-5.

that soul is the source (*ἀρχή*) of these phenomena [sensation, nutrition, thinking and movement] and is characterized by them, viz. by the powers of self-nutrition, sensation, thinking, and movement' (*DA* 413b10-2).

Second, Aristotle clearly thinks that a soul is not only a form but also the form of some matter, namely the body. At *De Anima* 414a15-20, Aristotle says:

For, as we have already said, 'substance' is said in three ways—form, matter, and that which is from both. Of these matter is potentiality, form actuality. Since then that which is from both is ensouled, the body is not the actuality of the soul, but the soul is the actuality of some body ... It is not a body but something of (relative to) a body.

The soul, according to Aristotle, stands as form to the body, which is matter. Indeed, just after this passage, Aristotle criticizes earlier thinkers for not specifying the sort of body that a soul enforms. According to Aristotle, 'each thing's actuality by its nature can exist [only] with the potentiality which belongs to that thing or with its appropriate matter' (*DA* 414a26-7). And in keeping with these strictures, Aristotle defines the soul as the first actuality of a natural organic body potentially possessing life.

Two other important facets of Aristotle's treatment of the soul confirm its status as a form-m. In the passage from *Metaphysics* VII, where he distinguishes between two types of subject, Aristotle says that matter, in contrast to the composite, stands in relation to a form that is an actuality.

For we have discussed two of them: essence and a subject. And being a subject is two-fold: it is either (a) a this, as an animal is to its attributes, or (b) as matter is to actuality (*Meta.* 1038b4-7).

Aristotle, however, says in the *De Anima* that the soul is an actuality. Hence, the soul is correctly seen as a form-m. Furthermore, in the passage from *Metaphysics* IX in which he distinguishes between the two types of subject, he says that a form that enforms matter, i.e. a form-m, in contrast to form-c, is a particular. But each of the following passages recommends treating the soul as a particular: *DA* 412a7-8, *Met.* 1037 6-10. Furthermore, at *Metaphysics* 1039a1, Aristotle says that no universal is a substance; and at 1037a6 he says that the soul

is the first substance. The inference to the soul's particularity, then, is straightforward enough. The soul is thus a form-*m par excellence*. And as such, it is the source of the dynamical activities, in this case the living activities, of a material substance.

Likewise, the pairs of elemental contraries are both forms of the matter of a composite and the source of dynamical interactions. Aristotle introduces the elemental contraries into his system in *De Generatione et Corruptione* II 2 and 3. In chapter 2, Aristotle searches for the fundamental tangible properties. He considers different pairs of properties—hot/cold, dry-moist, heavy/light, hard/soft, viscous/brittle, rough/smooth, coarse/fine (GC 329b20-1)—and concludes that the two fundamental pairs hot/cold and wet/dry can explain the presence of all the others (GC 330a25). For instance, something is fine because it is suitably wet—fine matter, like moist objects, conforms to the shape of a containing body (GC 330b30). Then in chapter 3, Aristotle reasons that the fundamental contraries occur in four different pairings—cold/dry, hot/wet, hot/dry and cold/wet—that account for the forms of the four fundamental elements, earth, air fire and water respectively (GC 331a3-5).

Now, the connection between temperature, dessicative dispositions and the elemental contraries is obvious enough. Fire, for instance, as a result of having the hot as part of its form, is hot and so has the capacity to heat objects that are cooler than it. But in addition to being connected in obvious ways to temperature and dessicative dispositions, the elemental contraries are connected to the full range of tangible dispositions. Aristotle describes very briefly these connections in *De Generatione et Corruptione* II, 2 but presents them in painstaking detail in *Meteorology* IV. He traces all the following dispositions to the four fundamental contraries: unqualified becoming (378b27 ff.), natural change and destruction (379a10 ff.), concoction and its species boiling, parboiling and broiling (379a11 ff.), ripening, rawness (379a11 ff.), hardness, softness (381b23 ff.), liquefaction, condensation (382b29 ff.), solidification, melting, thickening, softening (383b17 ff.), the capacity to bend, combustibility, and inflammability (385b6 ff.). Furthermore, Aristotle thinks that the elements, due to their forms, have natural places in the world toward which they tend. Earth naturally tends downwards; fire, upwards; and air and water,

to intermediate positions (*Phys.* 205a10-2, 205a25-9, *DC* 276b1ff.). Hence, the elemental contraries are, according to Aristotle, an original source of the dynamical activities of tangible bodies.

In addition to being the source of dynamical activities, the elemental contraries, like the soul, enform matter. At least, such a view, though it has been challenged in the twentieth century, is to be sure the historically dominant one.¹⁰ For the moment, however, I won't defend the view but merely assert it, since I discuss this very issue in the next chapter.

The natures of the soul and the elemental contraries thus provide the basis for a characterization of form-m: a form-m enforms matter; it is a particular; and it is a capacity-like entity in that it is the source of the dynamical activities of the composite of it and the matter it enforms. This characterization will be very fecund; for I shall eventually argue that many of the meanings of 'form' that do not easily relate to the notion of a species do relate naturally to the notion of a form-m. For the moment, however, consider just one of these senses, namely the sense according to which a form is that without which something does not have a nature. In the *Physics*, Aristotle says that nature is a principle of motion (193b7). Now, one *might* argue that a species is a principle of motion. But, such an identification is surely strained. On the other hand, as I have characterized a form-m, it just is a principle of motion – it is, in other words, the source of the dynamical capacities of a material substance. Hence, on the assumption that a nature is a form-m, it is trivially the case that without a form-m something would not have a nature.

One last comment about form-m is in order before I turn to form-c. In chapter II, I argued that the resolution of the body problem re-

10 To deny that the elemental contraries enform matter is to deny the existence of prime matter. Among those who have denied that Aristotle thinks there is prime matter are H.R. King, "Aristotle Without Prime Matter," *Journal of the History of Ideas* 17 (1956): 370-89; W. Charlton, *Aristotle's Physics Books I-II* (Oxford, 1970); Barrington Jones, "Aristotle's Introduction of Matter," *Philosophical Review* 83 (1974): 474-500; M. Schofield, "Metaph. Z 3: Some Suggestions," *Phronesis* 17 (1972) 97-101; D. Stahl, "Stripped Away: Some Contemporary Obscurities Surrounding *Metaphysics* Z 3 (1029a10-26)," *Phronesis* 26 (1979): 177-80; and M.L. Gill, *Aristotle On Substance*, (Princeton, 1989).

quires form to be a body's source of the dynamical interactions with the world. Clearly, form-m is just such an entity. The resolution also required the source of the dynamical interactions with the world to be such that its abstraction from a body removed the body's substantiality; or conversely, the possession of such a source needs to be sufficient for something to be a substance. Form-m is also such an entity. To argue for this claim, however, requires first an examination of form-c.

SECTION IIIB

FORM-C

Unlike a form-m, a form-c is the form of a composite of form and matter. Furthermore, unlike form-m, form-c is easy to characterize. In its primary sense, a form-c is a species. In other words, the paradigmatic case of a form's being predicated of a material composite is that of a species being predicated of some material particular. I shall offer an argument for this claim in a moment. But for now, I shall simply assert it.

Now, it would be surprising if Aristotle was operating with two distinct conceptions of form without there being some intimate connection between the two. And as it turns out, the two conceptions are tied together in virtue of Aristotle's allegiance to what Christopher Shields has aptly termed the 'functional determination thesis'.¹¹ According to the functional determination thesis, an entity, *x*, is a member of some natural kind *F* if and only if *x* has the capacity to engage in the activities characteristic of members of kind *F*. Aristotle articulates such a view at *Politics* 1253a19-25 but states the matter most forcefully near the end of the *Meteorology*.

All these things are determined by their function: for each thing truly is itself when it can perform its function, for instance an eye when it can see. And when a thing cannot do so it is only homonymously what it is, for instance a dead eye or one made of stone. So too a wooden saw is not really a saw but is rather a likeness of a saw. The same is true of flesh. But its function is less clear than that of the tongue. The same is true of fire, but its function is even less clear than that of flesh. This is likewise true of the parts of plants and

11 Christopher Shields, *Order in Multiplicity: Homonymy in the Philosophy of Aristotle* (Oxford: Clarendon Press 1999), p. 33.

inorganic bodies like bronze and silver. Everything is what it is in virtue of some power of action or passion (*Met.* 390a10-9).

The extent of Aristotle's allegiance to the functional determination thesis is quite striking. Even a kind like fire, according to Aristotle, a kind which one might think would resist determination in terms of function, is subject to it.

Because of his acceptance of the functional determination thesis, one can attribute to Aristotle the following bi-conditional schema concerning kind membership.

I. For all x , x is a member of species F if and only if x is capable of performing those activities characteristic of F 's.

This schema already brings the connection between form- m and form- c into view. According to I, something is in a species just in case it has the capacities for engaging in activities characteristic of that species. But, because a form- m is the capacity-like entity that is the source of the dynamical interactions of a composite of form and matter, something can only be a member of a species if it has an appropriate form- m . A fire element, for instance, is in the species, fire, if and only if it has the form- m , in this instance the pair of contraries hot and dry, that is the source of those activities characteristic of fire. This fact about the relation between form- m and kind membership is captured by the following bi-conditional schema.

II. For all x , x is capable of performing those activities characteristic of F s iff x has matter enformed by a form- m , i.e. a source of dynamical activities, that is ordered toward F -ness.

Theses I and II, then, combine to entail the following bi-conditional schema.

III. For all x , x is a member of a species F if and only if x has matter enformed by a form- m , i.e. a source of dynamical activities, that is ordered toward F -ness.

Now, thesis III does not specify the domain of the variable x . But Aristotle clearly thinks that composite substances are those entities that are members of species, at least if those species are natural kinds. This is such a basic presupposition of Aristotle's physical-metaphysical treatises that it hardly needs corroboration. But whatever evidence

is needed for such a claim occurs at *De Anima* 434b12. There, Aristotle says that an animal is an ensouled body. Hence, it is not the form of the animal, i.e. the soul, that is an animal; nor is it the matter, i.e. the body. Rather, the composite of form and matter is the animal. Hence, the variable in III should be seen as ranging over composites of form and matter.

With the view that it is composite substances that are members of natural kinds in hand, the connections between form-m, species and form-c become clear. If members of species are composites, a species, because it is the composite's form, is form-c. Hence, we have an argument for the identity of form-c and species. Moreover, according to III any composite substance, *x*, will have a form-c, i.e. be a member of a species *F*, if and only if *x* has some matter enformed by a form-m that orders *x* towards *F*-ness. In this way, the two notions of form coalesce into the following relations: form-m is the form of the matter of a composite, *c*, and as such is necessary and sufficient for *c*'s being a member of its species, i.e. for *c*'s having a form-c. Furthermore, the form-m that enforms *c*'s matter is a particular—for instance Socrates's soul is a this-soul—while *c*'s form-c is a universal—for instance Socrates's species, i.e. human, is universal.

SECTION IV

A TAXONOMY

By making the distinction between form-m and form-c and characterizing them appropriately, one can inject some order into Aristotle's apparently disorderly use of the word 'form'. So far, the meanings of 'form' from the above list cluster in the following way.

Form-c 3. Species

4. λόγος

5. That which is signified by the λόγος

Form-m

10. That without which a thing does not have a nature

This leaves the following meanings to be explained.

1. Art.

2. That which, though not generated, is the end of a change.

- 6. The cause of a whole's being one.
- 7. That which makes something continuous.
- 8. The cause by which matter is a thing.
- 9. The first cause of (something's) being.
- 11. Shape.
- 12. Essence

I noted above that (6), the cause of a whole's being one, (7), that which makes something continuous, (8), the cause by which matter is a thing, and (9), the first cause of a thing's existence, do not obviously or easily fit into a cluster of terms associated with species. By now it should be clear, however, that this does not present an intractable problem, for they may (and I shall now argue they do) fit easily into a cluster of terms associated with form-m. This will then leave (1), art. (2), that which, though not generated, is the end of change, (11), shape, and (12) essence.

(8) and (9) come from Aristotle's discussion of substance in *Metaphysics* VII, 17. At 1041b7-8, Aristotle says: 'Thus we are seeking the cause (and this is the form) by means of which matter is something; and this is substance' (*Meta.* 1041b7-8). And near the end of the chapter, he says: 'And this is the substance of each thing; for this is the first cause of being' (*Meta.* 1041b26-7). Now, *Metaphysics* VII has been the source of so much scholarly controversy that any conclusions made about it must be accompanied with some reservation. Nonetheless, there are reasons for supposing that the form Aristotle mentions here is form-m. In the first instance, Aristotle denies at 1039a1 that anything that belongs universally can be a substance. Form-c, however, is universal. Furthermore, just prior to the quotation at 1041b7-8, Aristotle says that the question he is pursuing in the chapter is: why is the matter some one thing? And he then says that the answer is: 'because it has that which is the essence of a house; and because a man is this, or, a body has this' (1041b5-6). Hence, in one stroke Aristotle brings into view both matter and the fact that what explains matter's being something is some particular, i.e. a this. He then immediately identifies the this in question with form. Form-m, however, is precisely a particular form that, in enforming matter, makes matter something.

There is one final piece of evidence supporting the identification of the cause by which matter is a thing and the first cause of a thing's

existence with form-m. In the penultimate sentence of the *Metaphysics* VII, 17, Aristotle says:

Since some are not substances of things, but those that are substances are formed according to nature or by nature, it would seem that the substance of these is this nature, which is not an element but a principle (*Meta.* 1041b28-31).

Aristotle here says that those objects that are substance are formed according to nature or by nature. The substance of such substances, he concludes, is this nature. Now, keeping in mind the need for interpretive caution, one can nonetheless maintain that Aristotle identifies the object he is pursuing in the chapter with a substance's nature. But, if 'nature' here means a principle of motion, the identification of form-m with the senses of 'form' in question is directly supported. Of course, 'nature' might, like 'form', have many meanings; and so this passage does not provide incontrovertible proof that the form in question is form-m. Nonetheless, the combined weight of the evidence gives credence to the claim that the cause of matter's being a thing and the first cause of something's existence is form-m.

Of course, this line of reasoning does raise the question: what does it mean to say that a form-m is the cause by which matter is a thing and the first cause of a thing's existence? There is, however, a straightforward answer that follows from theses already laid down. Consider some matter, m, that is the matter of some composite, c. For instance, suppose m is the body of a living organism. According to Aristotle, in order for m to be the matter of c, it must have a form-m, in this case a soul, that orders c to c's species. This, at any rate, is strongly suggested by his discussion at *De Anima* 412b20-5, 412b27-413a2. There, he seems to accept that a dead body is only homonymously a body. In other words, Aristotle accepts the following principle.

IV. m is matter for composite, c, if and only if there exists a species (form-c), F, such that (1) c has F and (2) m has a form-m that orders c toward F-ness.

According to this principle, insofar as something is the matter of a composite, its being what it is, namely the matter of that composite, requires it to be enformed by a form-m.

Because something can count as the matter of a composite substance only if it is enformed by a form-m, insofar as some matter just is the matter of a composite, form-m is the cause of that matter's being something. For instance, a soul is the cause of some body's being the matter of a living organism – for without the soul, the body is no longer the matter of a living substance. Hence, form-m can be described as the cause (explanation) of some matter's being what it is, namely the matter of a composite. And in addition to its being the cause of matter's being a thing, form-m, as was made clear previously, is necessary and sufficient for some composite substance's being a substance. Hence, it is also legitimately described as the first cause of a substance's being.¹²

This result provides a way to reconcile Aristotle's apparently different attitudes toward kind membership in his biological works and his metaphysical works. According to the functional determination thesis, kind membership is determined by capacities. In his biological works, however, Aristotle distinguishes species in virtue of the parts that they have. He says explicitly that this is an appropriate mode of division (PA 644b7-10); and he goes on to make divisions according to ani-

12 This line of interpretation provides an interesting possibility concerning Aristotle's claim at *De Anima* 412b 20-5, 412b27-413a2 that a dead body is only homonymously a body. Aristotle's claim there has been the source of considerable scholarly speculation and criticism. In an influential article, J.L. Ackrill, 'Aristotle's Definitions of ψυχή', *Proceedings of the Aristotelian Society* 73 (1972-3), pp. 119-33; reprinted in J.Barnes, M. Schofield, and R. Sorabji, eds., *Articles on Aristotle*, vol. iv (London, 1978), pp. 65-75, argues that this doctrine of Aristotle's threatens the intelligibility of his hylomorphic framework. Bernard Williams, 'Hylomorphism', *Oxford Studies in Ancient Philosophy* 4 (1986), pp. 186-99, argues that the doctrine is intelligible though has counter-intuitive results. Christopher Shields, *Order in Multiplicity: Homonymy in the Philosophy of Aristotle* (Oxford: Clarendon Press 1999), ch. 5, presents a sustained examination of the doctrine within a larger treatment of homonymy in Aristotle. Within the present framework, Aristotle's claims might be interpreted as follows. If the second occurrence of 'body' in 'a dead body is only homonymously a body' is understood as meaning the matter of a living organism, then it is true that a dead body is not a body. Hence, the first occurrence of 'body', i.e. the occurrence that follows 'dead', could not have the same meaning as the second occurrence. Again, if 'body' literally means matter of a living organism, then 'body' in 'dead body' must not be 'body' in its literal sense. A dead body, in other words, is only homonymously a body.

mals' parts. For instance, one of his basic divisions is between those animals with blood and those without. Principle IV, however, resolves any tension. For, the parts of an animal, which collectively make up the animal's body, are, according to Aristotle, its matter (GA 715a7-10). According to principle IV, however, matter is what it is in virtue of its being enformed by a form-m and hence in virtue of its having certain capacities. Hence, a part is what it is only in virtue of its having certain capacities. And indeed, Aristotle is completely explicit about this: an eye without the capacity to see is only homonymously an eye (DA 412b20-5). Hence, a division in accordance with the parts of animals is ultimately a division in accordance with the capacities that an animal has.

It is worth noting at this point that the identification of form-m with the cause of matter's being a thing and the first cause of something's existence has an interesting result concerning essence. In *Metaphysics* VII, 17, Aristotle says that the form he has identified as substance is an essence. It would follow then that form-m is essence. This runs counter to the natural view, however, that an essence is a species. Such a view is supported by the facts that a λόγος signifies something's essence, and typically an Aristotelian λόγος consists of a genus and differentia that combine to determine a species. The correct conclusion to draw, I think, is that Aristotle's use of the word 'essence' is ambiguous. In one sense it means form-c; in another it means form-m. Given his willingness to use 'form' in so many ways, finding an ambiguity in his use of 'essence' can hardly be objectionable.

What, then, about the senses of 'form' according to which form is the cause of a whole's being one and the cause of something's being continuous? The complete story concerning these notions requires some account of Aristotle's theory of matter, which I shall give in the next chapter. But it should be intuitive enough at this point that they can be identified with form-m. By enforming a chunk of matter, a form-m creates a unified composite, i.e. a whole, which belongs to a species and in so doing accounts for the continuity of the enformed matter. For instance, a soul, in enforming a body, causes (explains the being of) a composite living organism, a composite that has as matter a continuous chunk of living material.

Three meanings remain—art, the end of generation and shape. The first two of these meanings can be accommodated by appealing to one of Aristotle's distinctions in *Metaphysics* V, 1. Aristotle thinks that there are three types of principles: principles of knowing, becoming and being: 'It is common to all principles, then, to be the first from which a thing either exists or is generated or is known' (*Meta.* 1013a17). Hence, because form is a principle, it can be expected to have three aspects. The senses of 'form' so far discussed have been form under the aspect of a principle of being. As a principle of knowing, however, form is art. And as a principle of becoming, form is the end of a change.

Form as a principle of becoming and its relation to form-m and form-c deserves some comment. First, it is not clear that as the end of a change a form must be either form-m or form-c. Consider, for instance, a generation. Not only is the having of a soul the end of a generation but so too is belonging to a species. Hence, I will suppose that both form-m and form-c can be an end of a change. Furthermore, Aristotle thinks that in every change there is some matter that acquires a form. Hence, there must be forms for each of the types of change, namely substantial, quantitative, qualitative and local. So far, however, form has been related only to substance—form-c is a species in the category of substance and form-m is a source of dynamical interactions that order a composite toward a species in the category of substance.

Despite their obvious relation to substance, however, the categorial features of both form-c and form-m lend themselves to a conceptual extension to accidental categories. A form-c is, categorially speaking, a shareable feature of a composite, while a form-m is a particular feature of some matter of a composite. These categorial features, however, can apply to features in the other categories. A universal quality, for instance roundness, is a shareable feature of round spheres, while a particular quality, for instance this roundness, can be thought of as a particular feature of the matter of the sphere.¹³ So, in a relaxed sense,

13 There is of course a substantial literature on non-substantial particulars in Aristotle's categories. Some of the more important contributions include: Gareth B. Matthews and S. Marc Cohen, "The One and the Many" *Review of Metaphysics* 21 (1968) 630-655; R. E. Allen "Individual Properties in Aristotle's *Categories*" *Phronesis* 14 (1969) 31-39; J. Duerlinger, "Predication and

there are both forms-c and forms-m in any category in which change occurs. Interestingly, a progression of just this sort from form in the category of substance to form in the other categories, a progression that is fuelled by the metaphysical requirements of change occurs in *Metaphysics* VII,9: 'It is not with respect to substance alone that our argument reveals that form is not generated; the argument is alike common with respect to all primary forms such as those of quantity, of quality and of the other categories' (*Meta.* 1034b9-10).

The argument so far has shown that eleven of the twelve senses of 'form' fall naturally into two distinct groups that center around two main notions of form. The only remaining sense is that of shape. It is not surprising, however, that the classification of shape has so far eluded us, since shape is not obviously subsumed by the two senses so far discussed. Shape is clearly not a species, nor is it obviously a source of the dynamical activities of a material substance. In fact, quite apart from issues concerning the nature of form, shape is difficult to contend with. Aristotle, I think, is right to call it a quality (*Catg.* 10a11); but it would seem to bear a much more intimate relation to quantity than other standard examples of quality like whiteness and sweetness. Indeed, later philosophers generally considered shape, unlike whiteness and sweetness, as a primary quality along with features like number and place, features that Aristotle rightly considers quantities. Shape is thus something of an anomaly. To find its appropriate place among the senses of form, therefore, requires not simply placing it under one

Inherence in Aristotle's *Categories*" *Phronesis* 15 (1970) 179-203; B. Jones, "Individuals in Aristotle's *Categories*," *Phronesis* 17 (1972) 107-123; J. Annas, "Individuals in Aristotle's *Categories*: Two Queries," *Phronesis* 19 (1974) 146-152; Edwin Hartman *Substance, Body, and Soul: Aristotelian Investigations*. (Princeton: Princeton University Press 1977); H Granger, "A Defense of the Traditional Position concerning Aristotle's non-substantial Particulars," *Canadian Journal of Philosophy* 10 (1980) 593-606; R. Heinaman, "Non-substantial Individuals in the *Categories*," *Phronesis* 26 (1981) 295-307; Daniel T. Devereux, "Inherence and Primary Substance in Aristotle's *Categories*," *Ancient Philosophy* 12 (1992) 113-131; Gareth Matthews, "The Enigma of *Categories* 1a20ff and Why it Matters," *Apeiron* 22 (1989) 91-104; Michael Wedin, "Nonsubstantial Individuals," *Phronesis* 38 (1993) 137-165. The considerations in this chapter provide another reason for positing non-substantial particulars in Aristotle's categorical scheme. Interestingly, the reasons are independent of the text of the *Categories*.

of the senses already articulated but rather ascending in generality to a genus that subsumes the two senses already articulated as well as shape.

I propose that the genus under which shape, form-m and form-c all fall is principle of order (τάξις). Aristotle, it must be admitted, does not stress the connection between order and the two types of form. But his definition of disposition (διάθεσις) in *Metaphysics* V does provide some evidence for such a taxonomy. A disposition, he says, is an order of that which has parts with respect to place, potency or species (*Meta.* 1022b1-4). Two of the sense of order are easily discerned from the text: an order with respect to place is a position; and an order (or a principle of order) with respect to a potency is plausibly interpreted as a form-m. The third type of order, namely order with respect to species, however, presents some difficulty.

It might seem obvious that an order with respect to a species would be a species. And it is easy enough to see how a species is a principle of order – it is a principle of taxonomical order. However, some important commentators do not understand Aristotle in this way. Most notably, Aquinas understands an order with respect to species as a differentia in the category of quantity.¹⁴ Now, one type of differentia in the category of quantity is shape – for geometrical figures differ from one another in virtue of their shapes. So, one might interpret Aristotle as holding that one type of disposition is shape.

Regardless of whether or not Aristotle has shape in mind in this passage, however, it would seem that a shape is a kind of order—it is the order of the parts of a material substance with respect to themselves.¹⁵ On this understanding, shape presents a nice contrast with position, which is a spatial ordering of the parts of a material substance with respect to something extrinsic to them. Let us suppose, then, that conceptually, at least, there are the following types of order: taxonomical, dynamical and spatial. The following differentiation of the genus order is thus in order.

14 Thomas Aquinas, *Commentaries on Aristotle's Metaphysics*, trans. John P. Rowan (Dumb Ox Books: Notre Dame) 1995, p. 373.

15 I shall give a fuller treatment of this passage in chapter 5.

order

taxonomical

dynamical

spatial

a. intrinsic—shape

b. extrinsic—position

And with such a differentiation, the following taxonomy of the meanings of 'form' falls into place.

Principle of order—Form

With respect to knowing

(1) Art

With respect to becoming

(2) The end of change

With respect to being

Taxonomical—Form-c

(3) Species

(4) λόγος

(5) That which is signified by the λόγος

(12) Essence

Dynamical — Form-m

(6) The cause of a whole's being one.

(7) That which makes something continuous.

(8) The cause by which matter is a thing.

(9) The first cause of a thing's existence.

(10) That without which a thing does not have a nature.

(12) Essence

Spatial

(11) Shape

CONCLUSION

It will be useful both for the chapters to come and as an overview of what I have already presented to review the metaphysical theses that undergird the taxonomy as it has emerged in this chapter. It is undeniable that Aristotle held a teleological view of the world. Just how to

understand his teleology is controversial; but that the world exhibits some sort of teleological ordering is central to his thought. Perhaps the most significant result of this chapter is that for Aristotle form is the primary metaphysical entity responsible for such an ordering. In its fundamental sense, form is a principle of order. With respect to being, form-c and form-m are the most important types of such a principle, though there is conceptual room for shape as well. Form-m and form-c are both crucial to Aristotle's hylomorphic ontology. Form-m enforms matter and orders the composite of that form and matter to the species, i.e. the form-c, to which the composite belongs. And it does this because the possession of certain capacities, according to Aristotle, is both necessary and sufficient for species membership. Furthermore, such a view does not overlook the role that the parts of a material composite, i.e. its matter, plays in determining kind membership. For, the parts themselves are functionally determined – that is, they are the parts they are only in so far as they have certain capacities – and it is form-m that bestows upon such parts their capacities. This is why form-m is correctly characterized as the cause by which matter is a thing. By enforming some matter, it creates a unified continuous whole that has both, as a whole, certain distinctive capacities and parts each of which have capacities that make them the sort of thing they are. And the resulting composite thereby has the structures needed to place it in the species, i.e. the form-c, to which it belongs.

CHAPTER 4

PRIME MATTER

Aristotle's hylomorphism can be thought of as a kind of recursive ontological theory. According to the theory, a material substance is a composite of form and matter. The matter of the composite, then, is itself a composite of form and matter. Such a structure, however, does not continue infinitely but rather has a base case, namely a matter that itself is not a composite of form and matter. Traditionally, such a matter has been called prime matter. A proper understanding of Aristotle's hylomorphism, therefore, requires an understanding of form, which I provided in the last chapter, and an understanding of prime matter, which I discuss in this chapter.

Now, the question of prime matter in Aristotle is a vexed one, both interpretively and philosophically. The main interpretive difficulties concern whether Aristotle accepted the existence of prime matter as something distinct from the basic elements and mixtures thereof. In the last fifty years, this question has received a great deal of attention.¹ In particular, the textual evidence pertinent to it has been thoroughly discussed and assessed, so much so, it seems to me, that little independent progress on the issue is to be had by scrutinizing Aristotle's texts. The philosophical difficulties, on the other hand, concern the coherence of the concept of prime matter. Traditionally, prime matter is supposed to be some kind of stuff that in itself is absolutely formless. But what, really, could such a stuff be?

In this chapter, I address both the interpretive and philosophical issues concerning prime matter, though my primary focus is philosophical in nature. My aim is to show that a philosophically interesting

1 Cf. Ch.3 note 3 for some of the main contributors to the debate.

account of prime matter can be articulated that strongly coheres with, even if it is not necessitated by, Aristotle's texts. I begin my discussion with an examination of one of the best recent attempts to make sense of the concept of prime matter – that of Robert Sokolowski. I shall call Sokolowski's view *the extension interpretation*.² According to the extension interpretation, prime matter is what Aristotle sometimes calls διάστημα what he sometimes calls μέγεθος and what we would call 'extension'. My reasons for discussing the extension interpretation are two-fold. First, according to the interpretation I defend, although prime matter is not extension, it bears an intimate relation to extension. Hence, by first focusing on extension, I shall lay the groundwork for the view that I shall eventually defend. Second, the extension interpretation raises certain philosophically interesting issues. In particular, it raises the interconnected issues of the nature of extension and the way extension can be integrated into Aristotle's theory of material substances. I shall argue that Sokolowski does not adequately address these issues and shall then go on to address them myself. In so doing, I aim to provide a philosophically robust and perspicuous account of extension, one that not only is interesting in its own right but also provides the basis for a perspicuous account of the nature of prime matter.

SECTION I—SOKOLOWSKI'S CHARACTERIZATION OF EXTENSION

Sokolowski bases his interpretation of prime matter on two passages. In *Metaphysics* VII 3, Aristotle performs a thought experiment in which he mentally strips away all qualitative and quantitative determinations of an object. What remains, he claims, is matter that is capable of receiving attributes accidentally but possesses none of the attributes in itself. Aristotle says:

2 Robert Sokolowski, "Matter, Elements and Substance in Aristotle," *Journal of the History of Philosophy* 8(1970): 263-288; Richard Sorabji, "The Presidential Address: Analyses of Matter, Ancient and Modern," *Proceedings of the Aristotelian Society* 86(1986): 1-22.

But when length and breadth and depth have been removed, we do not see anything left over, unless there is something which is bounded by these ... Consequently, this last thing is in itself neither a this nor a quantity nor any of the others (*Meta.* 1029a16-18).

About this passage, Sokolowski writes:

The matter left over is something bounded by determined dimensions. In itself it does not have any specific dimensions, but it is capable of receiving them, i.e. capable of being marked off into determinate sizes. This implies that matter already has extension in itself. The powers of hot and cold, fluid and solid modify the state of matter, but they do not extend matter originally.³

Sokolowski interprets the referent of Aristotle's remarks in the *Metaphysics* passage as a kind of matter that has no determinate dimensions but is capable of being made determinate through form.

The picture of prime matter as a stuff that in itself is indeterminate but that is made determinate by various limiting principles, is reinforced by another passage Sokolowski cites within Aristotle's discussion of place in *Physics* IV 2. Aristotle says:

Hence, to those who consider things in this way, the place of each [thing] is the form; but if place seems to be the interval (διάστημα) of an extended thing, it is the matter. For this is other than the extended thing, it is that which is bounded and determined by the form, for instance by a plane and a limit; such a thing is matter and the undetermined; for when the limit and the attributes of the sphere are taken away, nothing remains except the matter (*Phys.* 209b5-11).

In this passage, Aristotle uses the word διάστημα as the name for the matter that is bounded and determined by form. Διάστημα differs from the extended thing and is what remains when the limits and attributes of a sphere are removed. Διάστημα, then, is an initially indeterminate stuff, and form, in a manner of speaking, carves out a region of it; and the resulting form-matter composite has a determinate size, shape and presumably, though Aristotle does not mention them in the above passage, causal powers.

From these two passages Sokolowski forms a conception of prime matter as extension. Although he does not say much more about the

3 Sokolowski, *op. cit.*

exact nature of extension than what appears in the above quotation, he does provide the following characterization. 'For Aristotle, the underlying matter is simply formless, unqualified, space-filling stuff.'⁴ This description of extension as formless, unqualified, space-filling stuff is quite suggestive. And in some ways, it is very much on the right track. Nonetheless, it leaves much about the nature of extension unexplained. What exactly is to be made of the idea of formless, unqualified, space-filling stuff? Such a stuff is unlike other more ordinary stuffs. Bronze, for instance, is a stuff with determinate formal characteristics. So how and why is it legitimate to call extension a 'kind of stuff'?

In addition to being incomplete, Sokolowski's characterization faces a difficulty. By describing extension as space-filling stuff, Sokolowski implicitly forces upon Aristotle a distinction between matter (extension) and space. Extension, it would seem, is the stuff that *fills* space; and so, if Sokolowski's description of extension is taken at face value, there must be some space distinct from the extension that fills it. But, Aristotle, in *Physics* IV 6-10, argues at length against the view that in addition to matter there is space, or as Aristotle calls it, the void (τὸ κενόν), that matter occupies. Thus, if prime matter is extension, it cannot be space-filling stuff.

This difficulty with Sokolowski's characterization is no mere quibble but points to a rather serious question about the coherence of Aristotle's views about space. Perhaps the strongest evidence that Aristotle would appeal to matter in order to explain the spatiality of material objects occurs in *Physics* IV. In his concluding remarks about the void in *Physics* IV, 9, he says:

From what has been said, then, it is clear that a void does not exist separately, neither simply nor in what is rare, nor potentially, unless one wishes to call the void a cause of locomotion. For then the matter of what is heavy or light, qua such, would be the void; for the dense and the rare with respect to these contraries is productive of locomotion ... (*Phys.* 217b20-25)

In this passage, Aristotle says that the void does not exist; but if one were to call something 'the void', one could only mean the matter of what is heavy and light. Aristotle, in a manner of speaking, has turned the void into the matter of sensible objects.

4 *ibid.*

That Aristotle would appeal to matter in order to explain the spatiality of objects finds corroboration in an earlier passage in *Physics* VI, 9.

The matter of a great and small body is the same. This is clear from the following. When air comes from water, the matter comes to be something not by somehow appending something else to it. On the contrary, what was potentially comes to be in actuality; and the same happens when water comes from air. Likewise, when the large comes to be from the small and the small from the large. Similarly, when a great volume of air becomes smaller or a small volume of air becomes greater, the matter that is potentially both becomes both. For just as it is the same matter that changes from cold to hot and from hot to cold because it is potentially both, so too when the hotter comes from the hot, because there is nothing in the matter which comes to be hot which was not hot when it was less hot (*Phys.* 217a20-217b4).

Aristotle begins this passage by saying that the matter of a great and small body is the same and then immediately illustrates this by saying that when a small volume of air becomes greater, the matter itself, which is potentially great, becomes great. Aristotle thus seems to be suggesting that matter itself is what has the potential to increase or decrease in volume. Matter, so to speak, is spatially malleable. Of course, this passage does not by itself require one to interpret Aristotle as believing that extension is an underlying matter that explains the spatiality of objects. In my opinion, however, Sokolowski (along with others) has shown that Aristotle had the concept of extension in this sense. Furthermore, if Aristotle did not posit extension as the ground of the spatiality of objects, he would be forced to accept the somewhat unsatisfactory position that matter as a brute metaphysical fact has the potential for having different spatial properties without there being any ground to explain such a potentiality. Hence, attributing this concept to Aristotle seems not only textually grounded but charitable as well.

But note that if Aristotle explains the spatiality of objects in terms of extension and does not appeal to space itself, the incompleteness of Sokolowski's interpretation becomes all the more worrisome. It is not obvious, after all, how something can be both a kind of matter as well as the ground of the spatiality of material objects. In order to complete

this account of extension, therefore, we need an explanation of how the void can be turned into matter. It is to this issue that I now turn.

SECTION II

EXTENSION

In his thinking about spatiality, Aristotle obviously did not have recourse to contemporary mathematical sophistication, though as I shall argue in a moment his conception of extension can be developed in a mathematically rigorous fashion. Informally, however, we can contrast this conception with the more familiar conception of absolute space. Consider, therefore, some arbitrary regions of absolute space, A and B. Because these regions have fixed relations between them, if A is two feet from B at some time *t*, then it is two feet from B at all other times. This fact about absolute space leads naturally to an account of the changing spatial relations between material objects. Material objects inherit their spatial relations by *occupying* these fixed regions. Hence, any two objects occupying A and B at any time *t* will be two feet from each other at *t*, though at some other time they can come to occupy different regions thereby inheriting the spatial relations that hold between those two regions.

Like absolute space, extension is a space-like structure in that it contains regions.⁵ But, it differs from space in two important respects.

5 Before providing a characterization of extension, I should note an objection to the idea that Aristotle had a theory of any space-like structure at all. There is no question that Aristotle had a theory of place that is designed to accommodate the metaphysical commitments of our ordinary talk about where things are. Such a theory is designed to explain, for instance, the truth of the statement that Socrates is in the Agora. It is not clear, however, that Aristotle's thinking about spatiality involved anything more than his theory of place. And so, one might argue, an appeal to extension so as to explain the spatiality of material objects is an over-interpretation of Aristotle. In response to this objection I shall make two points. First, there is the textual evidence adduced by Sokolowski that Aristotle did have the conception of extension and that it was a matter-like something at some level of hylomorphic analysis. And there is also the textual evidence from *Physics* VI, 9 that I have adduced. Second, the interpretation of extension I am offering obviously fits into the larger interpretation I am defending in this book according to which Aristotle's hylomorphic ontology as providing the ground for many of the structures

First, its regions need not remain fixed with respect to one another over time. So, for example, two regions could be two feet from each other at one time and three feet from each other at another time. Second, material objects do not occupy regions of extension but are partially composed of them. Indeed, on this conception material objects are a composite of form and some region of extension. Clearly, such a view requires some sort of relation, one that is probably primitive, that holds between forms and matter (in this case regions of extension). Call such a relation *the enforming relation*. As with objects on the absolute space conception, objects on this conception inherit their spatial relations from the spatial relations of regions. On this conception, however, they do so not by successively occupying different regions but by being partly composed of regions that successively change their relations

So characterized, extension becomes much more matter-like. To see this, consider a less remote kind of matter—the bronze of a statue. Neither the shape of the statue nor the statue itself can be said to occupy the bronze. Instead, the bronze, to use a word that is difficult to define adequately, *constitutes* the statue. One mark of this fact is that the statue, as well as its shape, is located wherever the bronze is, and the bronze is located wherever the statue is. Hence, if extension is the matter of a hylomorphic compound, then it, like the bronze, must constitute the composite it is the matter of. And as a result, it must go where the composite goes. Or, more accurately, the relations that hold between regions of extension must not be fixed but must instead be capable of changing over time so as to explain the differing relations between the material objects in question.

As I have said, what I have characterized is not much more than a picture. In what follows, however, I want to show that the picture can be fleshed out considerably with some contemporary mathematical apparatus. In doing so I will be appealing to a mathematical development obviously not available to Aristotle; and indeed the characterization contains some features that run counter to Aristotle's general ways of thinking. The characterization I provide, for instance, appeals

that are inherent in his categorial scheme. Quite clearly, place is a structure in Aristotle's categorial scheme. And, as should become clear from what follows, such a structure finds a very natural ground in extension.

to the notion of a point and so is naturally assimilated into an ontology of points. Aristotle, however, though he accepts that there are points (*Meta.*1016b20-31), denies their substantiality (*Meta.* 1077b12). Despite the difficulties with points, however, and despite the risk of anachronism, there are good reasons for engaging in this project of clarification.

First of all, it is difficult to see what extension might be. Several philosophers have appealed to the notion, but without some robust characterization of the sort I shall give, such an appeal can appear to lack much content. Second, the account of extension I shall give provides a perspicuous way of understanding not only Aristotle's conception of the spatiality of material objects but also how he might have understood various phenomena associated with spatial motion. Finally, and most importantly, my account of Aristotelian extension will prepare the way for some speculations I make in the final section about the nature of prime matter as distinct from but importantly related to extension.

The structure of Aristotelian extension can be captured first by characterizing a richer structure (arguably latent in common sense) and then by abstracting certain features from that structure. Let us begin, therefore, by appealing to a four-dimensional structure M of points.⁶ The four dimensions are the three spatial dimensions and the temporal dimension. To give the structure a temporal dimension it is natural and in accord with Aristotle's own view of time to suppose that for any two points, p and q , within M there is a well-defined interval of time. As a result, for any point p there will be a set of points simultaneous with p . With these stipulations, the structure M can be thought of as stratified into a succession of instantaneous three-dimensional spaces called *hyper-planes of simultaneity* each of which bears determinate temporal relations to all the other such spaces in the manifold.

Once the structure is partitioned into three-dimensional hyper-planes of simultaneity further features can be added. One such feature is a distance function $d(p,q)$ defined on any two points within the same hyper-plane. This distance function provides the hyper-plane with a metric. And with such a metric, the space will exhibit what contempo-

6 My characterization of absolute space draws heavily from Michael Friedman, *Foundations of Space-Time Theories* (Princeton, 1983).

rary mathematicians refer to as affine and conformal properties as well as the topological properties required by the very idea of a manifold. That is, the notions of straightness (affine), angularity (conformal) and nearness (topological) can be defined within the space.

The structure described so far contains separate Euclidean spaces that bear temporal relations to one another. These spaces can be combined into an enduring absolute space by including one more feature that ‘connects’ all the hyper-planes of simultaneity together. This feature is nowadays called a ‘rigging’, and I will follow this convention.⁷ A rigging is a relation that holds between two different points just in case those regions occur in the same spatial location. Hence, one can think of the rigging as creating a connection across time among points of space that runs in a way we can now conceive of as orthogonally through all the hyper-planes of simultaneity. Importantly, the rigging connects points in a way that preserves their metrical relations to other regions. For instance if p_1 and q_1 are in the same hyper-plane of simultaneity and are a distance d from each other, and p_1 is connected to p_2 by the rigging while q_1 is connected to q_2 , and p_2 and q_2 are in the same plane of simultaneity, then p_2 and q_2 are a distance d from each other.

Let us formulate the following principle—call it ‘the fixity principle’—that characterizes this aspect of space. If two points are connected by the rigging just in case the relation R holds between them, two points are in the same plane of simultaneity just in case the relation S holds between them, and the distance between any two points, x and y , is given by $d(x,y)$, then:

$$(x_1, x_2, y_1, y_2) \text{ (if } ((x_1 S y_1) \ \& \ (x_2 S y_2) \ \& \ (x_1 R x_2) \ \& \ (y_1 R y_2)), \text{ then} \\ d(x_1, y_1) = d \text{ iff } d(x_2, y_2) = d)$$

The fixity principle is just a formal way of saying that any two points at a single time connected by the rigging to two other points at an-

7 It should be remembered that the term ‘rigging’ emerged within a certain historical context, and my use of the term is not intended to reflect any view about the relationship between Aristotle’s views on space and other historically important treatments.

other time will be the same distance apart as the two points to which they are connected.⁸

The structure so far characterized is one way of viewing what might be called 'absolute space'. And as I said, it is plausible to suppose that such a view of space is latent in common-sense conceptions. Aristotelian μέγεθος, however, is not absolute space. As the informal discussion of extension brought out, when we move to Aristotelian μέγεθος we can keep the idea of a structure stratified into hyper-planes of simultaneity; but we must abandon the fixity principle. Suppose, then, that there is a structure *M* that contains simultaneity hyper-planes. And suppose that a rigging connects the points in the various simultaneity planes. But suppose that the fixity principle is false. In other words, suppose that it is possible that

$$(x_1, y_1, x_2, y_2) (x_1 S y_1 \ \& \ x_2 S y_2 \ \& \ x_1 R x_2 \ \& \ y_1 R y_2 \ \& \ d(x_1, y_1) = d \ \& \ d(x_2, y_2) \neq d).$$

At this point, the mathematical detour we have taken can now begin to pay off. For, we have reached a structure that can play the role of extension. With this characterization in hand, we can see how a matter-like stuff can nonetheless be the ground of the spatiality of material substances. To see this, let us consider two types of motions that such a manifold might underlie.

First, consider spatial motion. Let us posit a primitive relation of informing that holds between a form and a particular region of points. And let us suppose that there is in addition to the form and region of points a third entity, namely the composite of form and matter. Under such a supposition, there could be a composite *A* of form *F*₁ and

8 Now, as characterized so far, space seems to be a four-dimensionalist sort of entity, which, one might argue, is problematic from an interpretive point of view. I have already noted that the appeal to points is at odds with Aristotle's ontology. But, once one appeals to points, it would certainly be more in line with Aristotle's views to have them endure over time. For, there are several passages (e.g. *Catg.* 5a26-7 and *Phys.* 218a2-3 and 5-6) that can be taken to suggest that Aristotle is a presentist. One can, however, remove the four-dimensionalism of the structure by allowing points to exist in different hyper-planes of simultaneity. To do this, one needs to construe the rigging as the identity relation. In this way, one can suppose that points endure over time. Under such conditions, adherence to the fixity principle entails that the metrical relations of any two points are permanently fixed.

region r_1 and a composite B of form F_2 and region r_2 . Further, let us suppose that there are two points, p_1 and p_2 , that occur within regions, r_1 and r_2 , respectively by which one measures the distance between A and B. Finally, let us suppose that at time t_1 A is two feet from B. The fact that would make this to be the case is that A is a composite of form F_1 and matter, r_1 , B is a composite of form F_2 and matter r_2 , and $d(p_1, p_2) = \text{two feet}$. But now suppose that between time t_1 and time t_2 , A changes its location so that it is three feet from B. Assuming that A's form enforms region r_1 so that at time t_2 A has as matter r_1 , and likewise for B and r_2 , then the fact that would make it the case that A is three feet from B is that A is a composite of a form and region r_1 , B is a composite of a form and region r_2 , and $d(p_1, p_2) = \text{three feet}$. In this way, spatial motion is not conceived of as physical objects successively occupying regions whose relations between each other are fixed. Rather spatial motion is conceived of as material composites having matter whose metrical relations between each other can change over time.

A second form of motion that extension so characterized can underlie is increase and decrease. Suppose that there is a cubical composite, A, of form F_1 and region r_1 at time t_1 . And suppose that there are three lines— x , y , and z —of A by which one measures the volume of A. The volume of A would thus be equal to the product of the lengths of x , y and z . The lengths of x , y , and z , though, would be determined by the distance function applied to the endpoints of those lines—call them x_a, x_b, y_a, y_b , and z_a, z_b . In other words, the volume of A would be $d(x_a, x_b) * d(y_a, y_b) * d(z_a, z_b)$. Now, suppose that between time t_1 and t_2 , the distance between x_a and x_b decreases. As a result, the volume of A would decrease. A, in other words, would shrink; but again the shrinking would be the result of a change in A's underlying extension. It would not be the result of some physical object, namely A, occupying a region of space at time t_2 that is different and smaller than the region of space it occupies at time t_1 .

By relinquishing the fixity principle, one arrives at a space-like structure that can plausibly be seen as containing regions that are the matter for various form-matter composites. Because the points of the regions do not obey the fixity principle, the regions can act as a kind of changeable structure that underlies the forms of sensible composites.

They are capable of taking on different volumes and changing their distances between each other. In this way, the regions of this space-like entity can be the matter for form-matter composites as well as confer spatiality on material composites. As a result, one need not posit a void that physical objects occupy. Rather, the void has been turned into matter.

SECTION III

WHAT IS PRIME MATTER?

I have argued that Aristotle had the concept of extension, that one can characterize extension mathematically and that the resulting theory fits easily into a hylomorphic ontology. I have not yet addressed, however, the question as to the nature of prime matter. In particular, I have not addressed whether prime matter is, as Sokolowski claims, extension. Now, it is difficult to provide much textual support for such an identification. As is well known, many scholars think that Aristotle's texts do not support even attributing to Aristotle the view that there is any more remote matter than the elements. I disagree with such scholars but am nonetheless willing to admit that Aristotle's texts cannot provide much support for any theory about the nature of prime matter.

There is, however, a philosophical reason to resist the identification of prime matter and extension. Philosophically, the idea of prime matter is the idea of something that in itself is formless but that has the potential to take on any form. Extension as I have characterized it, though, does have in itself formal characteristics. It is, for instance, necessarily composed of regions that bear metrical relations to one another. In response to such an objection, one might try to deny that the metrical relations in question are forms in the right sense of 'form' thereby retaining the idea that prime matter does not have any forms in itself. But, Aristotle's favorite example of a form is shape – and surely if shape is a kind of form, then metrical relations between regions would qualify as a type of form. So, even if Aristotle accepted the view that extension is matter *at some level* of hylomorphic analysis, the identification of extension and prime matter looks philosophically

suspect. But if prime matter is not extension, we face an obvious question: what is it?

In response to this we need to return to the mathematical characterization of extension that I have provided. In characterizing extension, I appealed to the notion of a set of points structured in some way. There are two components to such an idea – the set of points and the relations defined on them. The resulting structure, I said, is extension. Now, were one to abstract away the relations from extension, one would arrive at the set of points. Or, so one might think. But in fact, once the relations are removed, what one arrives at is a structureless set of objects with no intrinsic properties. And such objects could not be points. For, necessarily any point bears some spatial relation to something. Hence, without any relations defined on them, the resulting objects can hardly be called points. So, let us just call them objects.

With this distinction in mind, I suggest that we understand Aristotelian prime matter as the ontological correlate to the completely unstructured set of objects that is ‘the matter’ for the relations defined on them. It is the fundamental bare something or other that allows for the very possibility of extension at all. It would be, so to speak, the ground for any contentful mathematical structure that could characterize extension and hence the spatiality of material substances.

Of course, this characterization of prime matter is philosophically satisfying only if it can make sense of the idea that prime matter is in itself formless but stands in potentiality to all forms. At 73a28 in the *Posterior Analytics*, Aristotle give his definition of some predicate F’s belonging to a subject G in itself. He says that F belongs to G in itself if and only if (1) F is in the definition of G, as, for example, three-sided is in the definition of triangle; or (2) G is the proper subject of F, as, for example, a line is the proper subject of straightness. In the first sense of ‘in itself’, only a genus, G, that is also itself a species can be in itself F. For, a genus that is not also a species is a highest kind and so does not have a definition. Now, it does not seem plausible to consider prime matter a genus, since it lacks any nature that could unify all those objects that would belong to it. Nonetheless, even if it is not a genus, it should be clear that, like a highest kind, it must lack a definition, since

it lacks all structure. After all, without any structure, what could possibly be its defining formal feature?

It is not so obvious, however, that prime matter could not be in itself F in the second sense. One might argue, for instance, that it is the proper subject of those relations that are constitutive of extension. After all, prime matter does serve as the matter for such formal features. Despite this possibility, however, there are reasons to deny that prime matter is in itself F even in this second sense. These reasons stem from the way in which prime matter could be a subject of properties.

Ancient commentators often distinguished between a primary and a secondary bearer of properties. Consider, for instance, a bronze statue. Arguably, it is the statue, which for the sake of this example can be considered a composite of the bronze and the shape, that is the subject in which the shape inheres. Nonetheless, there is a sense in which it also makes sense to say that the bronze has that shape as well. The Medievals marked this duality by calling the statue the primary subject of the shape and the bronze the secondary subject of the shape. And in general, one might consider the matter of a form-matter composite the secondary subject for those properties for which the composite is the primary subject. Matter, however, at least some matter, is itself a composite of form and matter. Bronze, for instance, according to Aristotle is a composite of a form that is a mixture of the elemental forms and some more basic matter. Hence, the bronze would be a primary subject for such forms, while its matter would be the secondary subject. Given the way the Medievals make this distinction, it should be clear that anything that is a primary subject of a property is a composite of form and matter. Prime matter, however, is not a composite of form and matter and hence cannot be a primary bearer of properties. It must always remain at best a secondary bearer of properties. So, for instance, extension is the primary bearer of those structural features constitutive of it, while prime matter, even though it is the matter for such feature, is only the secondary bearer of those properties. It can only ever borrow its character from those entities that are the primary bearers of various properties.

Returning, then, to our original question, we can see why prime matter is not in itself F in the second sense of that notion. Any genus that is in itself F in the second sense must be a primary subject of F.

For, if it were only the secondary subject of F, surely it would be the primary subject and not it that would have the right to the label of being the proper subject of F. Hence, the fact that prime matter could only ever be a secondary subject of properties counts against its being in itself F in the second sense.

We can see, then, that it really is the fact that prime matter is natureless that rules out its being in itself F in either sense. Because it is natureless, it cannot have a defining formal feature and so cannot be in itself F in the first sense; and because it is natureless, it cannot be a primary subject and so cannot be in itself F in the second sense. Of course, despite the fact that prime matter is not in itself F, it can nonetheless stand in potentiality to all form. For, an entirely structureless set of objects *can* nonetheless be augmented with further structure so as to create genera that are capable of being studied.⁹ Indeed, as I have argued in this paper, prime matter can be augmented with structural relations so as to create extension. Hence, prime matter in this sense does indeed stand in potentiality to all other forms.

At this point, it is possible to respond to an objection commonly raised against prime matter. One might press the question: what is the ontological status of prime matter? Is it, for instance, a particular? If not, is it a universal? Or is it devoid of ontological characteristics? Any answer to these questions, it would seem, is problematic. If it is a particular or universal, it must have some definite ontological nature. But this is at odds with its naturelessness. If, on the other hand, it is

⁹ This understanding of prime matter provides a response to Daniel Graham who argues that the concept of prime matter is incoherent. "The Paradox of Prime Matter," *Journal of the History of Philosophy* 25 (1987): 475–90. Graham insists that a potentiality must be grounded in some actual characteristic. Hence, prime matter, which is supposed to be devoid of actual characteristics and yet stands in potentiality to all form is paradoxical. Although Graham is not explicit about the matter, such a line of reasoning gains its plausibility from a focus on the physical aspect of matter. If, on the other hand, one approaches prime matter from a quasi-mathematical perspective, there is nothing incoherent at all in the notion of a structureless set of objects that can be augmented with structure. Indeed, one is quite literally forced to such a concept when one thinks of removing the structure from a set of points.

devoid of ontological characteristics, it would seem to be a metaphysical phantom, something that we cannot really know.

In response to the objection, one must first distinguish between two ways of referring to matter. One can refer to the matter of some composite, for instance the bronze of such and such a statue; or one can refer to matter as such, for instance bronze. Now, I contend that the following two claims about bronze are true:

1. The bronze of such and such a statue is particular.
2. Bronze is neither particular nor universal.

If one were to think that bronze had some sort of independent existence apart from the objects it constituted, one might be required to reject 2. But there is nothing problematic in refusing to grant an ontological status to something that is being referred to as an abstraction from those conditions that make its existence possible. So, we have analogously,

1. The prime matter of a statue is particular.
2. Prime matter is neither particular nor universal.

Hence, there is a sense in which prime matter is particular and a sense in which it is not. And just as in the case with bronze, it is in no way problematic to refuse to grant ontological status to prime matter in so far as it is being referred to apart from those conditions that make its existence possible.

A problem, however, remains. For, we are admitting that prime matter in sense 1 has some sort of ontological status; and doesn't this violate its very nature? No. Because its particularity is dependent on its being enformed. This follows from the fact that prime matter (as such) is neither universal nor particular, while the prime matter that constitutes a statue is particular. Hence, particularity is not intrinsic to prime matter, and so there is no violation of its naturelessness.

Finally, unlike bronze, prime matter in both senses is devoid of primary actual (as opposed to potential) characteristics. For instance, both bronze as such and the bronze of such and such a statue are primarily hard. But, there is no primary actual characteristic of either prime matter as such or the prime matter of such and such a statue. So again, the naturelessness of prime matter is preserved.

SECTION IV

PRIME MATTER, MATHEMATICS AND MATERIAL SUBSTANCES

It is worth noting the way in which this account of prime matter can be integrated into Aristotle's theory of mathematics and his account of material substances. According to the interpretation I am offering, prime matter occupies a special position in both the mathematical hierarchy of objects and the material structure of substances. In fact, one interesting aspect of this interpretation is the way in which these two different parts of Aristotle's system dovetail.

As one moves up the genus/species structure that a mathematician studies, the structures become more general and hence less structured. (Here I am using genus and structure interchangeably and am assuming an Aristotelian mathematical perspective.) Each structure has characteristics in itself but also is potentially a part of other structures in which it actually has features that it does not have in itself. Furthermore, each structure has features from which one can abstract so as to arrive at a structure of higher generality. If the chain of genera and species is not to go on infinitely, however, one must arrive at some most general structure. Now, if that genus is itself a composite of form and matter, which I suggest it must be if it is to be a genus at all, then it must be possible to abstract from its form so as to arrive at some utterly structureless something or other. Such a something would not be a genus, would in itself have no characteristics, but would nonetheless stand in potentiality to any of the more specific structures. Such a something, I contend, is prime matter. It is that set of objects that results from de-structuring extension.

Likewise, Aristotle's hylomorphism requires the positing of a structureless type of matter. In several places, Aristotle asserts that composites of form and matter have matter that is itself a composite of form and matter. If such a structure is not to go on infinitely, however, one must arrive at a matter that is not itself a composite of form and matter. Now, I think that Sokolowski is right to think of extension as matter at some very basic level of hylomorphic analysis. But, unlike Sokolowski, I think that one can de-structure extension so as to ar-

rive at prime matter that serves as the ultimate matter of a material composite.

When one turns to Aristotle's theory about the relation between mathematical objects and material substances, one can reinforce the view that prime matter and extension are crucial in both Aristotle's theory of mathematics and his hylomorphism. Aristotle thinks that mathematical entities do not independently exist. It is not that mathematical entities do not exist at all; but they only exist as dependent entities whose mathematical treatment requires the abstraction from some of the conditions that are necessary for their existence. (*Meta.* 1061a28-36, *Meta.* 1078a1-5, *Meta.* 1078a25-6, *Phys.* 193b31-4). A surface, for instance, is dependent on a physical substance whose physicality requires its ability to move. A mathematician, however, treats the features of a surface in so far as the surface is a quantity, not in so far as it inheres in a mobile substance.¹⁰ In this way, although mathematicians do not treat mathematical entities as if they exist in the physical world, such entities do exist in material substances.

With such a characterization of mathematics, one would expect there to be something in material composites that corresponds to the various objects that mathematicians study, though one would expect the existence of such entities to be dependent on mobile substances. In the case of extension, one could take such a stuff to be the intelligible matter Aristotle mentions at *Metaphysics* 1036a3. Extension is intellectual matter because, in its pure form, i.e. in the form in which mathematicians study it, it is abstracted away from any conditions of mobility and sensibility that characterize its actual existence. Mathematicians study the features of extension qua quantity, not qua matter of a mobile, sensible substance. Indeed, in chapter 6 I shall argue that quantity as such just is extension. So, the study of quantity turns out to be for Aristotle primarily the study of extension. In this way, extension is not only a highest kind that mathematicians study but also the most basic matter that admits of some essential structure. Extension, of course, does not actually exist in the form in which mathematicians study it. Rather, it exists in material composites as the matter for sub-

10 It should be clear the way in which this interpretation intersects with the interpretation of Aristotle's philosophy of mathematics that I articulated in chapter 2.

stantial forms. As the matter of a material composite, extension has in a secondary sense characteristics that the material object has. It would be, for instance, the secondary subject of mobility. It is precisely this dual nature of intellectual matter, one might argue, that provides the rationale for Aristotle's remark at *Metaphysics* 1036a3:

Some matter is sensible and some is intelligible; examples of sensible matter are bronze and wood and any movable matter, *but intelligible matter exists in sensible things but not qua sensible*, as in mathematical objects for example (*Meta.* 1036a3).

As should be clear by now, however, I think that one should not stop at extension in either the mathematical case or the material case. Standing above extension mathematically and below extension materially is prime matter. Like extension, prime matter, according to the interpretation I am offering, exists in material composites. Its existence, however, and any formal characteristics it might have are entirely dependent on the forms that enform it. And so, it is only when one completely abstracts away all the formal content from a material composite, that is only when one abstracts away all the causal powers and the spatial structures that characterize a material composite, that one arrives at, in its pure form, prime matter.

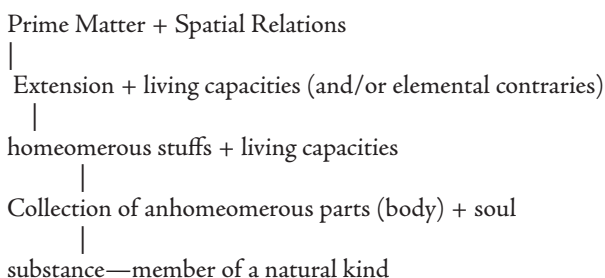
CONCLUSION

With the accounts of form and prime matter that I have given, it is now possible to see what the hylomorphic structure of a material composite looks like. At the hylomorphic foundation of a material substance is prime matter. Enforming prime matter is what can be considered a form-m, namely the set of relations constitutive of extension. Extension is the composite of prime matter and such relations. Enforming extension, then, are the elemental contraries and mixtures thereof.¹¹ For instance, the pair hot and dry enforms prime matter; and the resulting composite is a fire element. Now, the matter of a living material substance is, of course, not earth, air, fire or water. Instead, there is at the first level homeomerous stuffs like blood, muscle and

11 This account of the hylomorphic structure of a material composite depends on a leveling account of mixture, which Kit Fine convincingly establishes in "The Problem of Mixture", *Pacific Philosophical Quarterly* 76 (1995) 266-369.

tissue. Such stuffs are composites of extension and certain capacities distinctive of living beings. So, for instance, blood is a composite of extension and the capacity to transmit food in its penultimate form to the extremities of the body. Such homeomerous stuffs are the matter of the anhomeomerous parts of the body. And, once again, it is certain living capacities that enform such stuffs. So, for instance, an eye is a composite of certain homeomeorus stuff and the capacity to take on the form of objects without their matter. A body, then, is a collection of anhomeomeorus parts; and the form of a body is the soul, which again is a unified set of capacities.

The following diagram illustrates such relations.



A few comments about this diagram are in order. At each level, some matter is enformed by a form-m. The results from chapter 3, however, suggest that the resulting composite of matter and form-m should have a form-c, which is a species. And indeed, with one wrinkle, this is the case. I shall argue in chapter 6 that the composite of prime matter and spatial relations, namely extension, is in fact the genus quantity. But because quantity is a highest kind, it does not belong to some other genus. A composite of extension and living capacities, on the other hand, namely some homemoerous stuff, is in some species. For instance, flesh is in the species flesh. Such a species, however, is not independent of the natural kind to which a living substance belongs. In fact, the definition of such a species would include the concept part of such and such an animal. And because a part of a substance is not itself an actual substance, flesh is not an actual substance. Similar comments apply to anhomeomerous parts. Finally, the composite of a body and soul has as a form-c the natural kind to which the composite belongs.

One final comment is in order. Although I have distinguished in the diagram the soul and the living capacities that enform both extension and homeomerous parts, one should not think of these as independent existents. What exactly the relation is between the various capacities and the soul is a difficult issue, one that Aristotle discusses at *DA* 411b13-31. It would seem that the entire soul in some sense permeates each of the individual capacities. Whatever the correct interpretation of Aristotle's position is, one can nonetheless distinguish such capacities conceptually, even though the soul is itself in some sense a unity of all such capacities.¹²

12 Cf. Christopher Shields *Order in multiplicity: Homonymy in the Philosophy of Aristotle* (Oxford: Clarendon Press 1999), ch. 6, for the best recent discussion of unity in Aristotle.

CHAPTER 5

QUALITY

With substantive accounts of form and matter in place, it is now possible to turn to the categories so as to see the extent to which its various structures can be traced to Aristotle's hylomorphic ontology. Aristotle recommends that inquiries should start with what is better known to us and proceed to what is better known by nature. For the remainder of the book, I shall follow his advice. I begin with what is better known to us, namely the accidental categories of quality and quantity and then move to the category of substance.

In this chapter, I argue that the category of quality admits of a derivation from the nature of form. In my view, the possibility of such a derivation has been obscured by two factors: (1) the lack of a clear account of the nature of form; and (2) Aristotle's presentation of the category of quality in the *Categories*. As should be clear, I have already addressed the first issue; and, as shall become apparent by the end of this chapter, the taxonomy of form I provided in chapter 3 is the basis for a systematic derivation of the genera in the category of quality. But to provide such a derivation first requires coming to grips with the genus/species structure in the category of quality.

In chapter eight of the *Categories*, Aristotle divides the genus, quality, into four species: (1) habits and dispositions; (2) natural capabilities and incapacities; (3) affective qualities and affections; and (4) shape. Because Aristotle does not explicitly subsume any of these species under further genera, it is natural to interpret them as the highest species under the genus quality. If so, the following diagram represents the genus/species structure in the category.

Quality

I. Habits and Dispositions

II. Natural Capabilities and Incapabilities

III. Affective Qualities and Affections

IV. Shape

This interpretation of the category of quality is so naturally suggested by Aristotle's discussion that most commentators do not question it. Porphyry, for instance, in his commentaries on the *Categories*, simply asserts that there are four species in the category of quality and then goes on to discuss Aristotle's treatment of them.¹ Likewise, Aquinas, though he tries to derive the four species in a reasonably systematic manner, does not seem to question that there are just these four main species.² And more recently, J.L. Ackrill's commentaries on the *Categories* shows that he thinks there are these and only these four highest species in the category of quality.³ Because such an interpretation is so naturally suggested by Aristotle's text, and because it is at least implicitly presupposed by most discussions about the category of quality, I will call it *the canonical interpretation*.

The canonical interpretation, though a natural reading, leaves the category of quality in a rather uneasy light. Why? Because it is not at all obvious what the justification or even the motivation is for dividing quality into just these species. Indeed, when the species are simply listed, it is hard to deny that the list appears rather arbitrary. Why, for instance, should natural capabilities and incapacabilities be considered a highest species under the genus quality? Or what reason is there for thinking that there are no other species under quality?

The apparent lack of any systematic derivation of the list of species in the category of quality has not gone unnoticed by scholars. J.L. Ackrill is representative:

When Aristotle says that quality is 'spoken of in a number of ways' he does not mean that the word 'quality' is ambiguous but only that

1 Porphyry, *On Aristotle's Categories*, trans. Steven K. Strange, (Ithaca: Cornell University Press, 1992), p.139.

2 Aquinas, *Treatise on the Virtues*, trans. John A. Oesterle, (Notre Dame: University of Notre Dame Press, 1984.), pp. 4-5.

3 Aristotle, *Categories and De Interpretatione*, trans. J.L. Ackrill, (Oxford: Clarendon Press, 1963)

there are different kinds of quality. He proceeds to list and discuss four kinds. *He does not 'deduce' them or connect them on any principle.* ...[emphasis mine]⁴

And it is no doubt the lack of such a deduction that is behind Ackrill's criticisms of Aristotle a little later in his commentaries:

He [Aristotle] gives no special argument to show that [habits and dispositions] are qualities. Nor does he give any criterion for deciding that a given quality is or is not a [habit-or-disposition]; why, for example, should affective qualities be treated as a class quite distinct from [habits and dispositions]?⁵

Akrill finds Aristotle's division of the genus, quality, at best unjustified. Montgomery Furth, however, goes further. And Ackrill, it would seem, is being polite. Montgomery Furth has gone so far as to call the species in the category of quality a monstrous motley horde: 'I shall largely dispense with questions like ... the rationale (if there be one) for comprehending into a single category the monstrous motley horde yclept Quality ...'⁶ And it must be admitted, I think, that these attitudes are to some extent warranted. Ackrill is right to point out that Aristotle does not provide an explicit deduction of the four species. Indeed, Aristotle's own remarks at 10a25-6 suggest that, lacking any systematic deduction of the species, he was not confident that his list was exhaustive. And given the lack of a deduction, questions about the legitimacy of the divisions Aristotle does provide naturally arise.

Although Ackrill's criticisms of Aristotle are not unreasonable, in this chapter, I argue that there is an alternative interpretation to the canonical interpretation, what I will call *the regimented interpretation*, that can not only go some way toward removing the dissatisfaction that he and others have had with it but can indeed be incorporated into the thesis that the categorial scheme is derivable from hylomorphism.

4 *Ibid* p.104.

5 *Ibid*. p.104. Ackrill translates the words ἔστις and διόθεσις as 'states' and 'conditions' respectively. I have interpolated 'habits' and 'dispositions' to provide continuity with my translations.

6 Montgomery Furth, *Substance, Form and Psyche: An Aristotelian Metaphysics*, (Cambridge: Cambridge University Press, 1988) 14.

My main argument for the regimented interpretation proceeds in two stages. First, I examine the details of Aristotle's discussion of the first three canonical species and conclude not only that they are subsumed under the single genus of dispositions but also that the genus of dispositions admits of a more or less systematic and symmetrical differentiation. As a result, the category of quality should be understood as being primarily divided into two species: shape and dispositions. And because the genus of dispositions is systematically differentiated and Aristotle does not differentiate shape at all, any arbitrariness in the category of quality must be located in the division of the genus, quality, into the two species, shapes and dispositions. In the second stage of the argument, I propose a hypothesis about the way Aristotle understands the nature of quality itself, a hypothesis that leads to a very plausible division of quality into shape and dispositions. What is the hypothesis? Not surprisingly, it is that quality as such is a principle of order. The connection to form, then, is obvious. If I am right, quality as such simply is a type of form.

In addition to this main argument, an implicit argument runs through the chapter. Given Aristotle's settled taxonomical method, one should expect the specification of differentiae in marking boundaries between the species in the category of quality. It is surely noteworthy, however, that Aristotle supplies no such differentiae for the canonical four highest species. Indeed, such a fact ultimately lurks behind philosophical dissatisfaction with the canonical interpretation. For without such differentiae, it is difficult indeed to see what Aristotle could say to a detractor who doubts that there are just the four canonical species in the category of quality. The regimented interpretation, however, does articulate such differentiae and in so doing not only accords with Aristotle's general taxonomical method but also provides the philosophical resources to respond to those who are doubtful of the divisions Aristotle makes.

SECTION I

THE FIRST THREE CANONICAL SPECIES

Although Aristotle says that the first species in the category of quality is habits and dispositions, it is clear from his remarks that he thinks

habits and dispositions are in fact two distinct species that fall under a common genus. Aristotle begins his discussion by providing a way to differentiate between habits and dispositions. He says that dispositions are easily displaced while habits last longer and are more difficult to displace (*Catg.* 8b28). And he provides examples of items in both species: scientific knowledge and the virtues are habits (*Catg.* 8b29), while a hot condition, a chill, sickness and health are dispositions (*Catg.* 8b36-7). Aristotle's explicit differentiation of habits from dispositions, then, as well as his use of examples to illustrate the differentiation show that he thinks the first canonical species is a genus under which fall the two species habits and dispositions.

What, then, is the genus under which habits and dispositions both fall? Aristotle's concluding remarks about the first canonical species strongly suggest that the answer is: dispositions. At 9a10, after repeating his differentiation of habits from dispositions, Aristotle says:

But habits are also dispositions, though dispositions need not be habits; for although those who have habits are in some way disposed according to them, those who are disposed need not have a habit (*Catg.* 9a10-13).

In this passage, Aristotle seems to be contradicting what he has just said. If habits differ from dispositions in the way he says they do at 8b28, Aristotle cannot consistently claim at 9a10-13 that habits are dispositions but dispositions need not be habits. But the threat of contradiction disappears if a special kind of ambiguity is noted. Elsewhere in his works, Aristotle uses the same word to refer to a genus and a species falling under that genus. For instance, in *Physics* III, 1 he uses the word κίνησις to refer to the genus of change, and in *Physics* V, 3 he uses κίνησις to refer to the species of change that includes accidental but not substantial change. This sort of ambiguity also occurs in English. The genus animal divides into humans and, well, animals. And in this passage, a similar sort of ambiguity can be seen. In one sense, 'disposition' refers to a genus, and in another sense it refers to a species falling under the genus. I will mark this ambiguity of 'disposition' by italicizing the name of the species.⁷

7 Both Ackrill, *ibid.* p.104, and Apostle, trans., *Aristotle's Categories and Propositions* (Cornell: Peripatetic Press, 1980), p.82, accept the ambiguity of the word 'disposition', διάθεσις, as used by Aristotle in this context.

Once such an ambiguity is accepted, Aristotle's remarks in this passage make perfect sense. If habits and *dispositions* are species under the genus, dispositions, then all habits would be dispositions though not all dispositions would be habits. Moreover, Aristotle can be seen to be providing a justification for including habits under the genus dispositions. Aristotle says that those with habits are disposed in some way according to them. So assuming that things are disposed in virtue of dispositions, habits must fall under the genus dispositions. On the most plausible (and only charitable) interpretation, then, Aristotle thinks that the first canonical species is a species of dispositions under which fall those dispositions that are easily displaced, i.e. *dispositions*, and those that are long lasting and difficult to displace, i.e. habits.

Once the first canonical species is understood as dispositions, it is a small step to place the second canonical species under a common genus with the first. Aristotle contrasts the second canonical species from the first by saying that things with such qualities are not merely disposed in some way or other but rather have a natural capability or incapability (*Catg.* 9a16-9).⁸ He says, for instance, that some people are natural boxers or are by nature sickly (*Catg.* 9a19). This suggests that the second canonical species consists of dispositions that are natural, while the first canonical species consists of dispositions that are acquired. And Aristotle's examples of items falling under the first two canonical species confirms such an interpretation. Science and virtue are his examples of habit; and in the *Nicomachean Ethics*, Aristotle says that science and virtue are acquired (*En.* 1103a15). Furthermore, the examples of *dispositions* that Aristotle provides—a hot condition, a chill, a sickness and health—are also acquired. The items under the second canonical species, on the other hand, are all items that some-

8 I am taking the *πως* in the sentence, 'οὐ γὰρ τῷ διακεῖσθαι γέ πως ἕκαστον τῶν τοιούτων ποιὸν λέγεται, ἀλλὰ τῷ δύναναι ἔχειν φυσικὴν ἢ ἀδυναμίαν τοῦ ποιῆσαι τι ῥαδίως ἢ μηδὲν ἀσχεῖν,' as signalling a contrast. So taken, the sentence reads: 'Each of these is not said merely in virtue of being disposed but rather in virtue of having a natural capacity to act or not to be affected.' The crucial contrast, then, is between being disposed and being disposed in virtue of having a natural capacity or incapacity.

thing has naturally.⁹ Being a natural boxer, being a runner, being sickly or being healthy are all non-acquired dispositions.

It would seem, then, that despite the omission by Aristotle of any genus that subsumes the first two canonical species, they can in fact be subsumed under the same genus—disposition. And once this is done, it is possible to provide a differentiation of the species under that genus. (As will emerge later, the genus of dispositions will itself have a differentia). It divides first into acquired and natural dispositions; and then acquired dispositions divide into acquired dispositions that are easily displaced, i.e. *dispositions*, and those that are long lasting and difficult to displace, i.e. habits.

Like the first two species, the third canonical species, namely affective qualities and affections, is plausibly subsumed under the species dispositions. It should not, however, be subsumed directly under the same genus as the first two canonical species. It should not, in other words, be placed in a genus/species hierarchy in which it, along with the first two canonical species, is one of three highest species under a genus. Such a structure would be represented as follows.

- Dispositions
 - I. Acquired Dispositions
 - II. Natural Dispositions
 - III. Affective qualities and Affections

Rather, it should be considered as one of two highest species under a genus of dispositions. The other species should then be divided into the first two canonical species. Such a structure would be represented as follows.

- Dispositions
 - I. Dispositions (of a sort to be specified)
 - A. Acquired dispositions (Habits and *Dispositions*)

9 At *Catg.* 9a25, Aristotle also says that hardness and softness are natural capabilities and incapacities. I take Aristotle there to be directing his comments at hardness and softness something has that are not acquired. Hence, I interpret 'naturally' as the contrary of 'acquired'. So interpreted, it is a slightly weaker notion than something's having a quality by nature. A person might, for instance, have a non-acquired laziness, though he wouldn't have such a quality by nature.

B. Natural Dispositions (Natural capabilities and Incapabilities)

II. Affective Qualities and Affections

The subsumption of affective qualities and affections under the genus, dispositions, is recommended by the fact that Aristotle's examples of affective qualities and affections are objects of perception. In the *Categories*, he says that among the items falling under the third canonical species are sweetness, bitterness, sourness, heat, cold, whiteness, and blackness (*Catg.* 9a29-31). And in the *De Anima*, Aristotle says that sweetness and bitterness are proper objects of taste (*DA.* 422b10-2); colors, proper objects of sight (*DA.* 418a26); and heat and cold, proper objects of touch (*DA.* 422b26). Hence, assuming that the *Categories* and the *De Anima* can be given a unified reading, affective qualities and affections are proper objects of sense.

Such an interpretation is also supported by Aristotle's discussion of qualitative change in *Physics* VII, 3. He says there that qualitative change occurs only in the third species of quality and that such a species consists of those qualities that are sensible (*Phys.* 245b4-246a4). So affective qualities and affections are objects of sense. But Aristotle's discussion of the sensible objects in the *De Anima* makes it clear that they are dispositional in nature. It is the nature of color, for instance, to be able to set in motion a transparent medium as long as there is light (*DA* 418b1). Color need not be setting in motion the transparent; but it is essentially capable of doing so. And so it is essentially a disposition of some sort. Hence, because affective qualities and affections are proper objects of sense, and because proper objects of sense are dispositions, affective qualities and affections are dispositions. It can thus be seen that consistency between the *Categories* and the *De Anima* entails the incorrectness of the canonical interpretation. *De Anima* 418b1-2 treats the *idia* of sight as essentially dispositions, but the canonical interpretation treats the third canonical species as distinct from dispositions. Hence, some sort of regimentation of the category of quality is needed.

By itself, the fact that affective qualities and affections are dispositions does not require the acceptance of the latter of the two possible differentiations of the genus, disposition, represented above. But there is a reason to prefer the latter differentiation, a reason that stems from

the nature of the objects of perception. The proper objects of perception, according to Aristotle, are dispositions to produce a kind of motion in perceivers. He not only characterizes them in this way in the *De Anima*, but in his discussion of the third canonical species in the *Categories* he provides just such a characterization. He says:

Similarly, heat and cold are not called affective qualities because those that have them have been affected in some way, but rather they are called affective qualities because each of the ones mentioned are productive of an affection with respect to sensation (*Catg.* 9b5).

Affective qualities and affections thus produce sensations, which are a kind of motion, in perceivers. But such a sensation is an occurrence in a subject that is other than the subject that has the proper object of perception. The sweetness of honey, for instance, causes a sensation in something other than the honey itself. But dispositions to produce motions in subjects other than the subject with the disposition can be differentiated from those that produce motions in the subject with the disposition. And the first two canonical species consist of dispositions of such a sort. Science, for instance, is a disposition to produce a motion, namely intellection, in the subject with the disposition. And being a natural boxer is a disposition to produce boxing motions in the subject with the disposition.

The first three canonical species can thus all be subsumed under the genus dispositions. And this genus can be divided into those dispositions that cause motions in the subject with the disposition and those that cause motions in a subject other than the subject with the disposition. The latter of these species is the third canonical species, i.e. affective qualities and affections, while the former is divided into those that are natural, i.e. natural capabilities and incapacities, and those that are acquired, i.e. habits and *dispositions*. And, as I have already said, habits are differentiated from *dispositions*, in virtue of being longer lasting and more difficult to displace than *dispositions*.

At this point, there has been an unfortunate explosion of genera that are entitled to be called 'dispositions'. The main genus is a genus of dispositions; it is divided into two species each of which is aptly called 'dispositions'; and one of these species is divided into two species one of which is a species of dispositions which itself has a species of dispositions under it. With the reservation that the structure may

become overly rococo, I will try to mark these differences with the following labels: *Dispositions*, **Dispositions**, Dispositions and *Dispositions*. Rather than describing each of these species, I will present the following diagram that should make clear which name refers to which species.

Quality

I. *Dispositions*

A. **Dispositions**—*Dispositions* that cause motions in the subject with the disposition

1. Dispositions—**Dispositions** that are acquired

a. Habits—Dispositions that are long lasting and difficult to displace

b. *Dispositions*—Dispositions that are easily displaced

2. Natural Capabilities and Incapabilities—**Dispositions** that are not acquired

B. Affective qualities and affections—*Dispositions* that cause motions in a subject other than the subject with the disposition

II. Shape

This diagram already represents an improvement over the canonical interpretation. Where the canonical interpretation takes the four species as basic and underived, the regimented interpretation has already located a considerable amount of interesting structure in the category. The differentiation of the genus, *dispositions*, though, is not complete: more structure can be gleaned from Aristotle's discussion of affective qualities and affections. Furthermore, the structure might be interpreted in such a way that affective qualities and affections admits of a differentiation that is roughly symmetrical to the differentiation of **dispositions**. And once such an interpretation is accepted, the entire genus, *dispositions*, admits of a symmetrical differentiation.

Aristotle's name for the third species indicates that he thinks it is divided into two species. He calls the species, 'affective qualities and affections'; and so it is natural to suppose that there is a genus divided into one species called 'affective qualities' and another called 'affections'. And if the regimentation of the category of quality so far proposed is correct, the genus under which affective qualities and affections fall is the genus *dispositions* to produce motions in subjects other than the

subject with the *disposition*. Now, it should be clear from the diagram above that such a genus is at the same level as the genus *dispositions* to produce motions in a subject that is the same as the subject with the *disposition*. It should also be clear that this latter genus is differentiated by the differentiae 'acquired' and 'natural' and that the natural *dispositions* are differentiated by 'long lasting and difficult to displace' and 'easily displaced'. So, if there is to be a symmetrical differentiation of the genus, *dispositions*, the genus under which affective qualities and affections fall should be differentiated with features analogous to 'acquired', 'natural', 'long lasting', 'difficult to displace', and 'easily displaced'. And, indeed, in the following passage, Aristotle does seem to provide just such a differentiation.

For if paleness and darkness come to be in one's constitution according to nature, they are called '[affective] qualities', for we are said to be qualified with respect to them. If, for instance, because of a long sickness or scorching something happened to become dark or pale and did not easily revert to its original condition and perhaps remained that way throughout its life, these would be called '[affective] qualities' ... But all those that are easily lost and quickly revert to their original condition are called 'affections' ... and not '[affective] qualities' (Catg. 9b22-29).¹⁰

In this passage, Aristotle seems to say that affective qualities are differentiated from affections in virtue of the fact that affective qualities are in one's constitution by nature or are long lasting and difficult to displace while affections are easily displaced. He seems, in other words, to be using the same features to provide a differentiation of the genus in question as are used to differentiate the genus, *dispositions* that cause motions in a subject with the disposition. It must be admitted that the two differentiations are not exactly symmetrical. Under the genus, *dispositions* to cause motions in a subject that is the same as the subject with the disposition, there is one species corresponding to those *dispositions* that are natural and another that corresponds to those *dispositions* that are acquired. On the other hand, under the genus, *dispositions* to cause motions in a subject other than the subject with the disposition, there is one species corresponding to those *dispo-*

10 As can be seen, I have interpolated 'affective' into the text. This interpolation requires justification, which I will provide shortly.

sitions that either are natural or are acquired and difficult to displace and another species that corresponds to those *dispositions* that are acquired and easily displaced. Nonetheless, the similarity between the two differentiations is hard to deny.

SECTION II

THE THIRD CANONICAL SPECIES: SOME DIFFICULTIES

The symmetry that results from the proposed differentiation does make the category of quality interestingly systematic. And insofar as charity recommends attributing to Aristotle interestingly systematic differentiations rather than haphazard ones, charity recommends the proposed interpretation. Nonetheless, a careful examination of the text reveals that there are some difficulties with this interpretation of the third canonical species. And as a result, the interpretation I am proposing is not straightforwardly supported by the text.

The difficulties emerge from the fact that the interpretation I have proposed can only be gleaned from the above passage if one interpolates the word 'affective' before the final occurrence of the word 'qualities'. The original text actually reads as follows:

those which arise from [causes] which disappear easily and which soon revert to the original conditions, on the other hand are called 'affections' and not qualities ...

Now, there are what I take to be compelling grounds for allowing the interpolation. Aristotle begins his discussion of affective qualities and affections at 9a28, several lines prior to the above passage. And there he says that affective qualities and affections are the third species of the genus quality. But affections could only be part of a species under the genus, quality, if affections are qualities. And so internal consistency demands allowing the interpolation. Nonetheless, some difficulties remain.

Although allowing the interpretation avoids inconsistency, Aristotle's remarks after this passage are problematic. At 9b30-3, Aristotle seems to argue that affections are not qualities by appealing to one of the characteristic marks of qualities. According to Aristotle, things are

called such and such in virtue of qualities; but, he argues that things are not called such and such in virtue of having affections. He says:

For we are not said to be such and such in virtue of them [affections]. For neither is the man who blushes because of shame called 'a blusher', nor is the man who turns pale because of fear called 'a pale man', but each of them is rather said to have been affected in some way. Such things, then, are called 'affections' and not 'qualities' (*Catg.* 9b30-3).

After this passage, Aristotle goes on to make a similar argument about certain states of the soul. A man in pain, for instance, may be more irritable for a while but would not as a result be called irascible (*Catg.* 10a7-9). Aristotle's justification for his exclusion of affections from the genus, quality, suggests, however, that the lack of 'affective' before 'qualities' in the previous passage is not merely an oversight on Aristotle's behalf. And this would seem to count against the interpolation.

Despite these difficulties, the total evidence counts in favor of the interpolation. As I have already indicated, not allowing the interpolation forces attributing to Aristotle a contradiction. Furthermore, if one reads Aristotle as trying to exclude affections from the genus, quality, his arguments must be considered to be seriously flawed. So the evidence against the interpolation that arises from Aristotle's argumentation is fairly weak—certainly too weak to defeat the need for consistency. Finally, the regimented interpretation provides an easy diagnosis of the difficulties of Aristotle's argument. And so, insofar as allowing the interpolation supports the regimented interpretation, allowing the interpolation provides a way to illuminate considerably the issues Aristotle is treating in this portion of the text.

Aristotle tries to justify the claim that affections are not qualities by saying that things are not called such and such in virtue of states that easily revert to the original condition. And Aristotle illustrates this claim by saying that a person who blushes because of shame is not called a blusher in virtue of his blushing. Nor is a person who turns pale because of fear a pale man. But these examples do not provide a good reason to suppose that the state of the person's face is not a quality. A person who blushes because of shame may not be called a blusher; but such a person would nonetheless be called red-faced, even if he is only red-faced for a little while. Hence, because the state of a

momentary blusher's face passes the test for being a quality, it should be considered a quality.

From the perspective of the regimented interpretation, an even fuller diagnosis of the argument can be made. Because the momentary redness of a blusher's face is a disposition to produce sensations in perceivers, it is a quality that falls under the same species as the redness of an apple. Not only are both rednesses qualities but both are dispositions that produce motions in subjects other than the subject with the disposition. But, because it quickly reverts to its original condition, the momentary redness of a blusher's face, unlike the redness of an apple, is an affection, not an affective quality. Being a blusher, on the other hand, is a disposition to produce motions, namely reddenings of the face, in the subject with the disposition. If such a disposition is natural, it is in the second canonical species; and if acquired, it is in the first canonical species. So the fact that a person would not be called a blusher in virtue of the redness of his face would only go to show that such a redness is not a quality in one of the first two canonical species. And indeed, it is not.

SECTION III

THE THREE CANONICAL SPECIES RECONFIGURED

The examination of the first three canonical species has thus revealed order where there first appeared chaos. The first two canonical species have the sort of differentiation proposed in section I. And with only some difficulty textually, they can best be understood as dispositions to produce motions in subjects other than the subject with the disposition and as divided into such qualities that are either: (1) acquired and easily displaced; or (2) natural or acquired and difficult to displace. The first species consists of affections; and the second, affective qualities. The following diagram captures the differentiation of the first three canonical species.

Quality

I. *Dispositions*

A. **Dispositions**—*Dispositions* that cause motions in the subject with the disposition

1. Dispositions—**Dispositions** that are acquired

a. Habits—Dispositions that are long lasting and difficult to displace

b. *Dispositions*—Dispositions that are easily displaced

2. Natural Capabilities and Incapabilities—**Dispositions** that are not acquired

B. **Dispositions**—*Dispositions* that cause motions in a subject other than the subject with the *Disposition*

1. Affective Qualities—**Dispositions** that are either long lasting or not-acquired

2. Affections—**Dispositions** that are easily displaced

II. Shape

It should be clear that the structure represented by this diagram is far more systematic and symmetrical than the structure involved in the canonical interpretation. It can also answer one of the criticisms of Aristotle raised by Ackrill. Recall that Ackrill says:

Why, for example, should affective qualities be treated as a class quite distinct from habits and dispositions?¹¹

Although this question has some force against the canonical interpretation, the regimented interpretation can answer it. According to the regimented interpretation, affective qualities are dispositions to produce motions in subjects other than the subject with the disposition while habits and dispositions are dispositions to produce motions in the subject with the disposition. Hence, according to the regimented interpretation, the differentiation of the genus, *dispositions*, contains all the justification one needs for treating affective qualities as a class quite distinct from habits and dispositions.

The regimented interpretation can also go some way toward answering another of Ackrill's worries. Ackrill claims that Aristotle does not deduce the list of species in the category of quality from any sort of principle. The differentiation of the genus, *dispositions*, though, can be seen as a deduction of the species under it. The species are derived

11 J. L. Ackrill, *Op Cit*, p.104.

from natural divisions that flow from the nature of the genus. And since three of the canonical species fall under *dispositions*, at least three of the species in the category of quality have in some sense been deduced. So Ackrill's worry has been partly answered.

It must be admitted, however, that the deduction so far provided is not a complete answer to Ackrill's worry. The genus *dispositions* itself as well as the species, shape, have yet to be deduced from any principle. As a result, there still seems to be an arbitrary division of quality into the species shape and *dispositions*. To provide a complete response to Ackrill, therefore, we must turn to a deduction of *dispositions* and shape from the genus quality itself.

SECTION IV

DISPOSITIONS AND SHAPE

The regimentation of the category of quality I have so far proposed is, I think, well supported by Aristotle's discussion in the *Categories*. The examples of items falling under the first three canonical species are all understood by Aristotle as dispositions. And once the subsumption of the first three canonical species under dispositions is accepted, a rather symmetrical differentiation of the genus that follows the contours of Aristotle's own differentiations can be provided. Unfortunately, it is not possible to glean from Aristotle's discussion in the *Categories* the constitutive differentiae of dispositions and shape. And in some sense this differentiation is the most troubling one. What, after all, could the justification be for dividing quality into shape and dispositions? And not only is the answer to this question not to be found in the *Categories*, it is also not obviously found anywhere else in Aristotle's texts.

Because of the difficulties in finding textual evidence for a division of quality into shape and *dispositions*, at this point my reading of Aristotle becomes much more speculative. I do not think that it is required by Aristotle's texts. Nonetheless, I do think that there is a way to understand quality that can make sense of a division of quality into shape and *dispositions*. And so the speculation can at the very least be seen as a fruitful one: if accepted, it would provide the resources for a complete and systematic deduction of the species in the category of quality.

The differentiation of quality can be completed by interpreting Aristotle as thinking that a quality is an order, or perhaps a principle of order, of that which has parts. Although Aristotle does not explicitly define quality in this way, his definition of dispositions (διάθεσις) in the *Metaphysics* can provide some support for such an interpretation. In *Metaphysics* V, Aristotle says:

Disposition means the order of what has parts, either as to place or as to potency or as to species (*Meta.* 1022b1-2).

This definition consists of a genus and three differentiae that divide the genus. The genus is—order of that which has parts. And the three differentiae are (1) as to place, (2) as to potency, and (3) as to species. The genus, order of that which has parts, is thus being divided in virtue of those things toward which an order can order something. An order can order something toward a place, toward a potency and toward a species.

Aristotle does not name the three species under the genus order of that which has parts. And there is some uncertainty as to what the third kind of order is. But the interpretation congenial to the thesis of this paper stems from the interpretation found in Aquinas' commentaries on Aristotle's *Metaphysics*. Aquinas, picking up on Aristotle's own statement of the connection between the word ἕξις and the word 'disposition', διάθεσις (*Meta.* 1022b2-3), takes the third kind of order to consist of the differentiae in the category of quantity.¹² But I think it is possible to broaden the extension of this kind of order and consider it to be the differentiae of both material substances and various mathematical objects.¹³ Such an understanding is made plausible if one allows a certain vacillation between the notion of an order and the notion of a principle of order. Because differentiae can be seen as principles that place material substances in their respective kinds, a

12 Thomas Aquinas, *Commentary on Aristotle's Metaphysics*, trans. John P. Rowan, (Notre Dame: Dumb Ox Books, 1961), p. 373.

13 The interpretation I am proposing is, I think, consistent with the interpretation found in W.D. Ross, trans., *Aristotle's Metaphysics* vol. 1, (Oxford: Clarendon, 1924), p.335. Ross speculates that by 'order with respect to a species' Aristotle means the coordination and subordination of the species in a genus. Because a differentia is that which guarantees such a coordination, the principle of such an order would be a differentia.

differentiae can be seen as a principle that orders material substances toward their respective species.

This way of understanding order towards a species finds support in Aristotle's discussion of quality in the *Metaphysics*. At 1020b1-3, Aristotle says:

One meaning of quality, then, is the differentia of substances, while another concerns immovable mathematical objects as in the case of numbers which are said to be of a certain quality (*Meta.* 1020b2-3).

In this passage, Aristotle divides quality into the differentiae of substances and features of mathematical objects, a division that mirrors the division I have made within orders toward species. And interestingly, just after this passage, Aristotle illustrates what he means by the quality of mathematical objects in such a way that the origin of shape begins to emerge.

At 1020b3-7, Aristotle says:

For example, the numbers which are composite and not one-dimensional, of which the plane and solid are imitation (these are numbers which have two and three factors, respectively), and in general, that which belongs to the substance of a quantity (*Meta.* 1020b4-7).

Aristotle here illustrates the qualities of quantities with the examples of plane and solid numbers. A plane number is a number with two factors; a solid number, a number with three. This example is illuminating, for in it Aristotle applies to numbers a description that has a geometrical origin. He describes a number with two factors as a plane number. This clearly reflects the fact that to the extent that mathematicians in Aristotle's time had developed anything resembling a general theory of numbers, such a theory was geometricized. That is, one can find in mathematical works of the time theorems about various numerical relations; but such theorems are always part of a general theory of geometry and were proven by geometrical methods. Hence, it is not surprising to find Aristotle ascribing properties to numbers with geometrical terminology.

Now, if numbers have differentiae with a geometrical origin, and geometrical objects have geometrical differentiae, then, assuming that numbers and geometrical objects are the fundamental kinds of quantities, geometrical differentiae will be the fundamental quantitative differentiae. And, Aristotle's list of quantities in the *Categories*, with the

exception of speech, supports the view that numbers and geometrical objects are the fundamental kinds of quantities. Among the quantities, according to Aristotle, are: line, surface, body, number, time, place and speech (*Catg.* 4b23-4). Of course, line, surface and body are kinds of geometrical objects. Place is not. But, as defined in the *Physics*, place is an immobile boundary of that which contains (*Phys.* 212a20-21). And a boundary has enough affinity to a surface that it is plausible to suppose that its differentiae will be akin to geometrical differentiae. And finally, as defined in the *Physics*, time is a number of motion. That is, it is defined in terms of number; and so number must be considered to be definitionally prior to time. Hence, the list of quantities in the *Categories* supports the interpretation that numbers and geometrical objects are the fundamental quantities. And since, as I have noted, the differentiae of numbers would according to Aristotle have a geometrical origin, it is plausible to suppose that Aristotle thought the fundamental differentiae of quantities are geometrical in nature.

So what, then, would be the differentiae of geometrical objects? Shapes. What is the difference, for instance, between a curved line and a straight line? Their shapes. Likewise with a square surface and a triangular surface. So Aristotle's own division of qualities into differentiae of substances and differentiae of mathematical objects, a division that I have subsumed under order with respect to a species, provides the origin of the species shape.

For the moment, let this discussion of orders toward species suffice. According to Aristotle, there are two other kinds of orders, orders toward a place and orders toward a potency, which, as it turns out, are easier to understand than orders toward a species. An order toward a place is a position. For instance, if Socrates' parts are ordered toward the room in which he is located in such a way that his back and legs are on the ground, then he is lying in the room. On the other hand, because in one of its senses a potency is a principle of motion (*Meta.* 1019a15), an order as to a potency is a sort of disposition for some kind of motion. It is, in other words, the sort of thing that falls in the first regimented species in the category of quality. If this is correct, there is yet another ambiguity in the notion of a disposition. We would have to suppose that 'disposition' in the definition above differs from the 'disposition' that is the name of the species in the category

of quality. But this is not overly troubling. And if the ambiguity is accepted, the origin of the first regimented species in the category of quality has been found. It is one of the species under the genus, order of that which has parts.¹⁴

We are close to seeing how an identification of quality with ordering principles allows for the differentiation of the genus quality. But, there is one final distinction that needs to be made. Two of the species under order of that which has parts, differ from the third in a crucial respect. The order toward a place is not grounded by an intrinsic feature of a substance alone but rather essentially includes another item, namely the place toward which the substance is ordered. The other orders, on the other hand, do seem to be grounded by intrinsic features of substances. Although orders toward potentialities and species are in some sense relational notions—the specification of the kind of order involved mentions something else—the orders are grounded by intrinsic features of the substance itself. A substance is ordered toward a species in virtue of its having certain intrinsic features, namely those features specified by the differentia; and it is ordered toward a potentiality in virtue of its having certain intrinsic features, namely dispositions. And it is plausible enough to suppose that shape is an intrinsic feature of a substance. So it seems that one final differentiation of the genus, order of that which has parts, is possible. And with this differentiation made, the following hierarchy can be given.

I. Order of that which has parts

A. Intrinsic Order

- i. with respect to potentiality—disposition for a kind of motion
- ii. with respect to species
 - a. differentiae of substances
 - b. differentiae of mathematical objects—shapes and arithmetic properties derived from geometry¹⁵

14 This understanding of the first two species follows exactly Aquinas' understanding, *op cit.* p373.

15 Someone might object that this understanding of shape conflicts with what Aristotle says at 10a16-20: 'Rare, dense, rough' and 'smooth' might seem to signify quality, but such things differ from the classification so far given. For it would seem that each reveals a certain position of the parts with respect to one another. From this passage, one might think that the position of parts with respect to one another falls outside of the category of quality

B. Extrinsic Order—position

It is now possible to see how an identification of quality with ordering principles allows for a complete differentiation of the genus quality. Suppose that qualities are intrinsic orders (or principles of order). Such orders will divide into three kinds: dispositions for motions, differentiae of material substances, and shape.¹⁶ Now, at *Metaphysics* 1020b15, Aristotle says that differentiae of substances are qualities; and so it is a virtue of this division that they are contained in it. But, because differentiae are essential features of material substances, they do not fall in the category of quality and so would not appear in a list of species in the category of quality. The other two species, on the other hand, would be in the category of quality. And it should be clear by now that they are the first two regimented species in the category of quality.

By identifying qualities with orders (or principles of order), it is thus possible to provide a complete deduction of the species in the category of quality. The first two species are deduced from the genus, order of that which has parts. And the species under the genus, dispositions, are deduced in the way illustrated in the previous section. And not only can a complete differentiation be given but the differentiation has two additional merits. First, the differentiation of each genus in question flows from the nature of that genus itself. The division between dispositions and shape flows from the nature of orders: they can be with respect to a potency or with respect to a species. And the primary division of dispositions flows from a categorical fact about dispositions: they can cause motions either in objects with the disposition causing the motion or in objects other than the object with the disposition causing the motion. Second, and equally as important, the differentiae involved in the divisions satisfy the requirement that they fall outside the genus being divided. Being directed toward a potency or directed

and so that shape cannot be the order of the parts of something. It is important to note, however, that Aristotle here uses the word *θέσιν* and not *ἐξίς*, 'order', which is the word Aristotle uses in his definition of *διάθεσις*.

16 I am ignoring for the moment the quasi-arithmetical features derived from geometry.

toward a species are not qualities. Nor is the location of a motion being caused by a disposition a quality.¹⁷

Now, although I have been speaking of identifying quality as such with principle of order, it should be obvious enough by now that I think quality should in fact be identified with form as such. For, as I have already argued, in its fundamental sense, form is a principle of order. So, the conceptual clarification of the nature of form and the regimenting of the category of quality have coalesced so as to support the thesis that at least part of Aristotle's categorial scheme bears such an intimate tie tohylomorphism that the former can be derived from the latter.

I shall end this chapter with the following thought. I have noted Kant's criticisms of Aristotle's highest kinds. Of course, one can direct

17 It is noteworthy that my derivation of the species under the genus, quality, is not the first such attempt in the history of Aristotelian scholarship. Two other attempts, both of which can be found in Aquinas, *Treatise on the Virtues*, trans. John A. Oesterle, (Notre Dame: University of Notre Dame Press, 1984.), pp. 4-5, are worth noting. Simplicius provides the following derivation. "Some qualities are natural—those that are in their subject by nature and always; others come from without—those that are caused extrinsically and can be lost. Now the latter are habits and dispositions, and they differ insofar as they can be lost easily or with difficulty. Regarding the natural qualities, some belong to a thing insofar as it is in potentiality to something, and thus we have the second species of quality. Others belong to a thing insofar as it is in act, and these are either deep-rooted or only on the surface. If deep-rooted, we have the third species of quality. If on the surface, we have the fourth species of quality, such as figure, and form, which is the shape of the living being." Aquinas, after criticizing Simplicius' derivation, provides the following derivation. "Now quality, properly speaking, implies some mode of a substance ... Now the mode or determination of the subject by way of accidental being can be taken in relation to the very nature of the subject, or according to the action and passion which follow upon its natural principles, which are matter and form, or according to quantity. If we take the mode or determination of the subject in regard of quantity, we have the fourth species of quality ... But in the second and third species of quality we are concerned with the mode or determination of the subject in regard to action and passion. Hence in both species we take into account whether something is done easily or with difficulty, whether it is transitory or lasting ... The mode or determination of the subject in view of the nature of the thing, however, belongs to the first species of quality, which is habit and disposition."

such a criticism at any of the categories. And in the present case, one might ask, why we should consider quality a highest kind? We have, however, made progress in the attempt to answer this question. For, we can now provide something of an answer: quality is a highest kind because it is identical to a basic type of hylomorphic entity, namely form. Of course, this does not completely answer the question but rather pushes it back one step – for, one can now ask why form should be considered one of the basic types of metaphysical entity. In chapter 7, I address this question. For now, however, we can at least give a provisional justification for this aspect of Aristotle's scheme. Granting the cogency of his hylomorphic ontology, the category of quality is not only justifiably regarded as a highest kind but also has the internal structure that, with a little regimentation, is latent in Aristotle's discussion of it.

CHAPTER 6

QUANTITY

In the last chapter, I argued that the category of quality admits of a systematic derivation from the nature of form. In this chapter I show that the category of quantity admits of a systematic derivation from matter, though as shall become apparent, form is implicated in the derivation in a way that matter is not implicated in the derivation of quality.

Interpreting Aristotle on the nature of quantity is complicated by the fact that he provides two different treatments of that category: one in *Categories* V and one in *Metaphysics* V 7. Interestingly (and perhaps not surprisingly) the treatments differ in important respects. In the *Categories*, Aristotle provides two different differentiations of quantity. According to the first, quantity divides into continuous and discrete quantity; the former then divides into line, surface, body and time, and the latter into number and speech. According to the second, quantity divides into quantities whose parts have a relative position with respect to one another and quantities whose parts do not (*Catg.* 4b20-2). Although the differences between these two differentiations are interesting, for the purposes of this paper I shall focus on the first. For, in the first instance, the differentiations appear to be compatible; and second, by presenting the division into continuous and discrete quantities before the other division, Aristotle, it would seem, gives priority to the former. In this chapter, therefore, not only will I assume that the two differentiations do not need philosophical correction to make them compatible but I will also follow Aristotle's lead and take the division into continuous and discrete quantities to be the more fundamental.

A much more trenchant difficulty emerges, however, when one looks at the differentiation of quantity Aristotle provides in the *Metaphysics*. There, Aristotle divides quantity primarily into numerable quantities, which are pluralities, and measurable quantities, which are magnitudes (*Meta.* 1020a9). Hence, unlike the *Categories* differentiation in which Aristotle first divides quantity with the differentiae 'continuous' and 'discrete', in the *Metaphysics* Aristotle first divides quantity with the differentiae 'measurable' and 'numerable'. Furthermore, the divisive differentiae of measurable and numerable quantities in the *Metaphysics* include the notion of a limit. For instance, a body, according to Aristotle, is a *limited* magnitude in three dimensions; and a number is a *limited* plurality (*Meta.* 1020a14). In the *Categories*, however, no corresponding concept occurs. The *Metaphysics* differentiation thus appears to be richer and subtler than the one in the *Categories*.

For what is to come, it will be useful to present both the differentiations of quantity in their full form. The differentiation in the *Categories* is as follows.

- quantity
 - continuous
 - line
 - surface
 - body
 - time
 - place
 - discrete
 - number
 - speech

And in the *Metaphysics*, it is as follows.

- quantity
 - measurable — magnitude (μέγεθος)
 - limited (πεπερασμένον)
 - in one dimension—line
 - in two dimensions—surface
 - in three dimensions—body
 - unlimited (ἀπέραντον)—?
 - numerable — plurality
 - limited (πεπερασμένον)—number
 - unlimited (ἀπέραντον)—?

The differences between the differentiations of quantity in the *Categories* and the *Metaphysics* can of course be explained by a developmental hypothesis according to which Aristotle, because he wrote the *Categories* early in his career and the *Metaphysics* later, had available to him, as a result of his later physical and metaphysical inquiries, a different and more extensive set of concepts when he wrote the *Metaphysics*. Such a historical speculation strikes me as reasonable; and I am not averse to accepting it. In this chapter, however, I address the following philosophical question as to the relation between the two differentiations: are there interesting conceptual connections between the two differentiations that would explain in a systematic way the differences between them? And I offer the following answer: the discrepancies between Aristotle's treatment of quantity in the *Categories* and his treatment of it in the *Metaphysics* can be explained by his identifying quantity as such in the *Metaphysics* with extension as such. According to Aristotle's later view, I shall argue, all quantities in a primary sense arise from extension. Substantial forms, then, bring with them determinate dimensions so that when a substantial form belongs to prime matter both continuous quantity and discrete quantity arise, i.e., on the one hand there are solids, surfaces and lines, and on the other hand there is number because of the existence of separate bodies scattered in space. In this way, one can see the species of quantity that Aristotle articulates in the *Categories* as more or less unfolding systematically from the natures of form and matter.¹

1 It may at this point be worth mentioning the issue as to the extent to which form and matter and the closely related concepts of actuality and potentiality are present in the *Organon*. Although matter is not mentioned in the *Organon*, there is evidence at *Posterior Analytics* 94a20-95a10 that Aristotle had developed his four-cause scheme of explanation by the time he wrote the *Posterior Analytics*. Such a scheme obviously includes both form and matter. Scholars have questioned the extent to which Aristotle's use of four causes in the *Posterior Analytics* is evidence that he had a fully developed four-cause scheme of explanation when he wrote the *Organon*. Some interpret the discussion of the four causes in the *Posterior Analytics* as a later interpolation; some, as a rudimentary and unsatisfactory account of the four-cause scheme that Aristotle uses in his physical-metaphysical treatises. Cf. David Ross *Aristotle* (London: Methuen & Co. LTD 1947), pp.51-2; Jonathan Barnes, tr. and ed., *Aristotle: Posterior Analytics* (Oxford: Oxford University Press 1975), p.215, Graham, *op. cit.*, p. 157. The distinction between actuality and

SECTION I

SOME PRELIMINARIES

In order to discuss adequately the relationship between the *Metaphysics* and *Categories* differentiations, some preliminary comments about Aristotle's treatment of quantity in the *Categories* are needed. One important aspect of the *Categories* differentiation concerns the fact that time and place need not be considered basic quantities but can instead be understood in terms of other quantities, namely number and surface respectively. In the *Physics*, Aristotle defines time as the number of motion with respect to the before and after² (*Phys.* 219b2). Hence, time is at least conceptually posterior to number—it is the number of some definite thing, namely motion. Hence, an account of Aristotle's conception of number in general should account for the nature of time.

Despite the fact that time's definitional posteriority to number allows one to focus attention on number itself, one complication does at this point emerge. In the *Categories*, time and number occur in distinct non-subordinate genera. Time, according to Aristotle, is continuous, but number is discrete—so the definition from the *Physics*, which would make time a kind of number and hence a discrete quantity, does not seem to fit with the *Categories* differentiation.

A remedy for this difficulty exists, however, that uses distinctions Aristotle makes in his *Metaphysics* discussion of quantity. According to Aristotle, time is continuous because motion is; and motion is continuous because the underlying continuum in which it occurs is.

potentiality is clearly in the *Organon* though it seems restricted to contexts in which Aristotle discusses necessity and contingency; Cf., for example, *De Interpretatione* (19a30-19b4, 22b30-23a25) and *Prior Analytics* (25a37).

2 Although κίνησις is often used by Aristotle to cover the notion of change in general, I have chosen to translate it as 'motion' rather than 'change' for the following reason. According to Aristotle, the change that is the primary measure of time is the local motion of the primary heavenly sphere (*Phys.* 223b20, *Phys.* 260b29). The time of other changes, then, is derivative upon this type of change, which, according to Aristotle, is the only type of change that can be continuous and eternal (*Phys.* 241b20, 265a9). Translating κίνησις in this context as 'motion', then, highlights this aspect of Aristotle's view.

others are said to be quantities like motion and time, for these too are said to be quantities in a way and are continuous in view of the fact that the subjects of which these are attributes are divisible. By 'subject' here I mean not the moving object but the interval through which the object has moved (*Meta.* 1020a28-31).

Hence, time has a dual aspect with respect to its continuity. Although it is a kind of number and so is intrinsically discrete, because its underlying subject is continuous, it also shares in continuity. Hence, even though time and number appear in non-subordinate genera in the *Categories*, time can still be thought of as a kind of number. Put another way, one can think of time not so much as a number but as the numbering of *something*, namely motion. This in turn reduces the puzzlement as to how something by nature discrete (the number-series) can characterize something continuous – after all continuous quantities can be measured using discrete measures (and the enumerations thereof) plus fractions.

Aristotle's definition of place, like his definition of time, makes place derivative upon another more fundamental quantity, in this instance surface. Unlike the definition of time, however, the definition of place does not make immediately apparent the connection. But with only a little interpretive work, such a connection does emerge.

In the *Physics*, Aristotle says that place is the primary motionless boundary of that which contains (*Phys.* 212a20). In this definition, Aristotle does not identify place with a kind of surface but rather with a kind of boundary; but such boundaries are plausibly understood as surfaces. The place of a portion of wine, for instance, can be identified with the inner surface of the bottle that contains the wine. The surfaces involved in a place might of course only be roughly continuous. The place of my computer is the room I am sitting in. And the boundaries in this case would be the surfaces of the walls, floor and ceiling of the room. Nonetheless, the inner boundaries would consist in surfaces.

This sort of identification does run into the difficulty that surfaces are not obviously motionless. The wine bottle's inner surface, for instance, is not motionless — it moves with the wine bottle. Aristotle, however, provides the distinctions needed to remove this difficulty. He distinguishes between (1) things that move essentially and (2) things that move accidentally. And among things that move accidentally he

distinguishes between (a) those that *can* move in themselves, things like the parts of a body and a nail in a ship and (b) those that *cannot* move in themselves but do so always as attributes, things like whiteness and knowledge (*Phys.* 211a19-23). Now, a surface is in the category of quantity and so, as an attribute, falls into class 2b. In other words, qua what it is, that is qua attribute, a surface is motionless – insofar as it moves, it does so only accidentally, that is only in relation to the substance it is present in. Hence, in the sense that place is motionless, so too is a surface; and so place can be understood as a kind of surface.

Because place and time are derivative quantities, focus can be directed at the other more fundamental species in the category. There is, however, one final oddity in the *Categories* list of quantities. For, removing place and time does leave species, namely body, surface, line and number, that seem to fall naturally enough into the category; but it also leaves a species that does not so obviously belong, namely λόγος (speech). It is not clear why Aristotle considers λόγος a quantity in the *Categories*, and interestingly he omits it from his discussion in the *Metaphysics*. Aristotle explicitly says in the *Categories* that λόγος is spoken speech (*Catg.* 4b32). So understood, λόγος is something like a series of sounds, which, as a result of conventions, is semantically significant (*De Int.* 16a1-20). As such, however, λόγος consists in proper objects of sense, which belong in the third species in the category of quality: affective qualities and affections. And so it is difficult to see how it can be a basic species in the category of quantity.

In light of the difficulties concerning the placement of λόγος in the categories, I will leave it as something of a puzzle and not try to include it in the derivation of quantity. Hence, I will focus on the species: body, surface, line and number, and in particular on the way in which the derivation of these species can be informed by the differentiation of quantity that Aristotle gives in the *Metaphysics*.

SECTION II

THE CONNECTION

With these initial comments about the *Categories* differentiation in place, it is now possible to turn to both the connection between the *Metaphysics* and *Categories* differentiations and the way in which the

species in quantity are derivable. One way to approach these issues is by noticing an intriguing feature of the *Metaphysics* differentiation. In the *Metaphysics*, both magnitude and plurality are differentiated by the differentia, 'limited'. A number, for instance is a limited plurality; and body, line and surface are limited magnitudes. Given the general tendency in Aristotle to differentiate via a positive and a privative term, one might expect that both magnitude and plurality would thus also be differentiated by 'unlimited' as well. Aristotle, however, fails to provide such a differentiation. Magnitudes can be limited; but they cannot be unlimited. So too with pluralities. But why?

As it turns out, the answer to this question is not hard to determine. An unlimited quantity would be ἄπειρον, that is without limit. An unlimited quantity, though, would be an instance of the actual infinite whose possibility Aristotle denies. Quantities are for Aristotle implicitly capable of being numbered, which infinities are not (*Phys* 206a12-20). Hence, both types of quantity admit of differentiation by 'limited' but do not admit of differentiation by the corresponding privative term.

This doctrine, that quantity must be limited, is intriguing, for it mirrors another metaphysical doctrine of Aristotle's, namely that matter cannot exist without form. Aristotle does not, to my knowledge, ever explicitly connect quantity as such with matter. But suppose for the moment that they are not accidentally related. Suppose that their connection is guaranteed by the fact that quantity flows from matter, or more precisely, that quantity as such simply is matter of a very special sort, namely indeterminate extension. The following sort of picture would then emerge. Uninformed indeterminate extension would be limitless quantity and hence would be an instance of the actual infinite Aristotle denies could exist. Because an actual infinite cannot exist, extension, i.e. quantity, must be limited in some way by form. The metaphysically necessary carving up of matter by form, then, results in discrete and continuous composites of form and matter, which can be measured and counted respectively. It results, in other words, in numerable and countable quantities.

SECTION III

A DERIVATION

With a general picture of the category of quantity in place as well as substantive accounts of form and matter, it is possible to turn to turn to a more precise articulation of the connection between the *Metaphysics* and *Categories* differentiations of quantity. One initial set of conceptual connections that serves to link the differentiations are those between measurability and continuity on the one hand and numerability and discreteness on the other. Aristotle explicitly notes these connections in his discussion of quantity in the *Metaphysics*: 'A quantity is called a 'plurality' if it is divisible potentially into parts that are not continuous and a 'magnitude' if it is divisible potentially into parts which are continuous' (*Meta.* 1020a10-2). Aristotle does not explain why these connections hold; but given certain every day conceptions of what it is to measure and count, the connections are plausible enough.

When we measure, we usually measure some continuous whole and what we use to measure is also usually continuous. For instance, were we to measure a table, which is something continuous, we would place some continuous unit of measurement, for instance a meter stick, next to the table so that one end of the table is square against one end of the meter stick, and we would mark off where the other end of the table lined up against the meter stick. Of course, one might measure discrete entities, for instance the combined lengths of two cars, but to do so one would measure the cars independently and add their lengths. Such an account of measuring is, of course, focused on spatial measurements. And indeed, one might object that non-spatial measurements need not be of continuous entities. The weight of a pile of sand, for instance, can be measured by a scale even though the pile of sand is not a genuine continuous unity. For this reason, it is best to interpret Aristotle as dividing quantity with spatiality primarily in mind.

Aristotle's views about numbers likewise reflect some fairly quotidian facts about human practices, though, his account of numbers, as will become apparent shortly, is in some tension with other aspects of his metaphysics.³ His linking of numbers with discreteness reflects the

3 Cf. Julia Annas, *Aristotle's Metaphysics: Books M and N* (Oxford: Clarendon Press 1976), for a helpful discussion of Aristotle's treatment of numbers.

fact that, unlike measuring, counting is generally directed at discrete entities. When we count, we collect several discrete entities under a single count noun. Count nouns generally bring their own criteria of identity and diversity; and because one criterion of diversity is generally discreteness, counting generally involves the subsumption of a plurality of discrete entities under a single count noun. So, for instance, we might collect two spatially separated but individually bound collections of paper under the count noun 'book' and say: there are two books on the table.

Although Aristotle's remarks about numbers are sparse, they do support the interpretation according to which he thinks numbers number entities under a single count noun. He says at *Metaphysics* 1092b19-21: 'And a number, whatever it may be, is always of something, for example, of parts of fire, or of parts of earth, or of units.' Aristotle here says that numbers are always of something, that is of some F or other. His examples of such F's are not ordinary count nouns like 'animal' or 'book' but rather 'part of fire', 'part of earth', and 'unit'. But this is due to the fact that he is discussing at this point in the *Metaphysics* ratios of elements like three parts of fire to two parts of earth.

In his discussion of the senses of 'one' in *Metaphysics* V, 6 Aristotle sheds further light on his conception of number. At 1016b17-23, he says:

To be one is to be a principle of some number. For the first measure is a principle; the first object by which we know is the first measure in each genus; hence the principle of the knowable in concerning each thing is the one. But the one is not the same in all genera. For in one case it is the quarter-tone, in another it is the vowel or the consonant; in weight it is another, and in motion still another (*Meta.* 1016b17-23).

Aristotle here articulates a view according to which counting involves some unit which serves as a measure, what he calls a 'principle of number'. (Hence, counting is a form of measuring, though it must be measuring in a different sense from the measuring of measurable quantities.) The measuring always involves something that will serve as an example of one such and such whether it be one quarter-tone, one vowel, one consonant, etc. With such a principle, then, one can go on to count several such and suches. Although he does not use this sort

of language, one can interpret Aristotle as articulating the view that numerable pluralities arise from the existence of criteria for identity. Because there is a criterion for being one consonant, it is possible to mark off a plurality of such ones thereby assigning them a number.⁴

Aristotle's account of number thus places two requirements on any numerical plurality. First, there must be some unit in the plurality. This requires there to be some criterion by which something can be said to numerically one. Second, each of the members of the plurality must fall under some single universal F. With both these conditions satisfied, it is possible for each single member to be numerically one—this is made possible by the existence of a criterion for numerical oneness—for each member to fall under the single universal F—this is made possible by the fact that F is a universal—and hence for there to be some number *n* of F's in the plurality.

Aristotle's theory of number is clear enough; but at this point a difficulty arises in virtue of (1) Aristotle's explicit criterion of numerical identity in the *Metaphysics* and (2) his recognition that numbers number entities that are not obviously capable of satisfying such a criterion. At *Metaphysics* 1016b33, Aristotle says: '[Things] are numerically one if their matter is one.'⁵ In saying this, Aristotle seems to be appealing

4 Aristotle's discussion in *Metaphysics* X, 1-2 corroborates such an interpretation. For instance, he says: 'Therefore, all things are measured by unity': (*Meta.* 1053a18) and 'Then, too, a measure is always homogenous with what is measured ...' (*Meta.* 1053a25).

5 There are other passages in which Aristotle links numerical diversity with the having of distinct matter: 1018a8-12, 1025b27-31, 1074a33-35, and most importantly 1034a5-8: "When the whole has been generated, such a form in this flesh and in these bones, this is Callias or Socrates; and they are different on account of their matter (for it is different) ... " A rather extensive debate has occurred concerning the question as to whether matter in Aristotle is a principle of individuation. A.C. Loyd, "Aristotle's Principle of Individuation," *Mind* 79 (1970): 519-29; and G.E.M. Anscombe, "The Principle of Individuation," *SPAS* 27 (1963): 83-96 accept such an interpretation. H.F. Cherniss, *Aristotle's Criticism of Plato and the Academy* (Baltimore, 1944); and W.S. Sellars, "Substance and Form in Aristotle," *Journal of Philosophy* 54 (1957): 688-99, on the other hand, argue that what makes Socrates and Plato numerically distinct are two numerically distinct instances of the same form. E. Regis, "Aristotle's Principle of Individuation," *Phronesis* 21 (1976): 157-66, argues that neither interpretation is correct. I do not need to take a

to the intuition that a single member of a natural kind will in general have matter that forms a unified continuous whole. All of Socrates's parts, for instance, form a continuous region of matter—his hands are continuous with his arms, which are continuous with his shoulders, etc. The parts of Plato and Socrates, on the other hand, are not likewise continuous with each other.

Aristotle's linking of numerical oneness with the having of unified matter, however, though it satisfies a common sense intuition about numerical identity, would seem to restrict the sort of entities that can be numbered to those entities that have matter. But, Aristotle clearly thinks that there are entities that can be numbered that do not in any obvious way have. Motions, for instance, as Aristotle's definition of time makes clear, can be numbered.⁶ So too can tones (*Meta.* 1016b24), categories, and unmoved movers (*Meta.* 1074a15). So it would seem that a fundamental tension exists in Aristotle's account of number.

The tension can be eased, however, if not ultimately removed, in a way consonant with Aristotle's general philosophical tendencies. One might suppose that there is a fundamental sense of numerical identity that attaches to material substances, which can then be extended in

stand on this issue, for whether or not Aristotle thinks matter is a *principle* of individuation, the passages from the *Metaphysics* show that he at the very least thinks two distinct material composites have numerically distinct matter. It may ultimately turn out that the fact that two of Socrates's parts are parts of the same individual must be traced to the fact that a single form informs those parts. In other words, the principles of the unity and diversity of the parts of a material composite may be a form. If so, Aristotle's remark that something is numerically one if its matter is one cannot be understood as his articulating a principle of numerical unity. Nonetheless, the oneness of an individual's matter in the sense of its having a natural continuity can serve as a criterion of oneness. And in fact, Aristotle notes an ambiguity in 'one' along just these lines prior to the above passage. At *Metaphysics* 1016b12, he says, 'Again, in one sense we say that anything is one if it is a quantity and continuous, but in another sense we do not say so unless the object is a whole of some kind, that is, unless it has one form.' But, as I have said, I can remain neutral on the issue.

6 One might think that motions could have matter in some sense. In *Physics* III 1, Aristotle defines motion as the actualization of the potential qua potential and then assimilates matter to potentiality in *Metaphysics* IX 8.

various ways to entities that are not material substances. The extension would be most appropriately Aristotelian if it were effected by homonymy relations. Aristotle, for instance, provides criteria for the oneness of motion, one of which is the oneness of the subject of the motion (*Phys.* 227b30). If the oneness of the subject of the motion can then be understood in terms of oneness of matter (or enformed matter), then at least with respect to motion, numerical oneness can be homonymously related to Aristotle's explicit criterion of numerical oneness. The complete effecting of such relations for all the sorts of entities that Aristotle thinks can be counted would, of course, be a rather monumental task; and it is not one that I will undertake. Nonetheless, so as to alleviate the tension in Aristotle's theory of number I will suppose that numerical oneness and hence numerical plurality apply in their fundamental sense to substances and in a derivative sense to any entity for which an appropriate criterion of numerical identity exists.

The view of measurable and numerable quantities that emerges, then, is this. A measurable quantity is a continuous chunk of matter, and a numerable quantity is a plurality of such chunks of matter that all fall under the same count noun. Notice that the similarity between measurable and numerable quantities consists in their both being chunks of matter with their dissimilarity arising from their being either one such chunk or many such discrete chunks falling under a single universal count noun. Such a similarity begins to make visible the way in which quantity flows from matter. For, in general, two species fall under a single genus in virtue of some similarity between them. In this case, then, the genus is quantity, and the similarity between the species directly involves matter—a measurable quantity is a continuous chunk of matter and a numerable quantity is a plurality of such chunks of matter. So the genus quantity, i.e. that which unifies the two species in question, is matter involving. If one were to specify the feature corresponding to the genus, and one were to allow wanton nominalization, one could say that the genus quantity corresponds to matterity.

Following this line of thought, let us suppose that the matter that accounts for the similarity between measurable and numerable quantities is extension. In itself, extension would be limitless. It would be

something of an amorphous limitless metaphysical blob. Without the presence of some sort of limiting principles, at least limiting principles that mark off the regions of distinct boundaries, it would not contain distinct regions and hence would not contain any unified continuous regions.⁷ So it would not yet contain continuous entities that could be measured. But suppose that such extension is structured via the introduction of form. Which sort of form? It would have to be structured by the sort of form that informs matter, which, according to the account of form sketched in the chapter 3, is form-m. Such an introduction of form-m as an informing principle would create distinct regions of matter that constitute various form-matter composites. It would, in other words, create bodies whose matter is extension and whose forms-m are principles of motion. And because forms-m inform continuous underlying matter, the informing of matter by a plurality of forms-m creates a plurality of discrete composites each of which has continuous underlying matter.⁸

With discrete bodies resulting from the composition of form-m and extension, the world is ready to be numbered. A plurality of F's consists in discrete composites of form-m and matter falling under the form-c F. The form in question must be form-c, for F must be universal, and form-c is, of the two fundamental types of form, universal.

There is an interesting sense in which this understanding of quantity introduces an asymmetry into it; and indeed it may threaten the possibility of the two species falling under a single genus. Pluralities it would seem contain measurable quantities. Aristotle, however, accepts a principle according to which items cannot be defined in terms of a single genus if the one item potentially contains its predecessor (DA 414b31). And because a plurality arguably potentially contains the measurable quantities that are part of the plurality, the unification of the two species under a single genus is threatened.

7 One might suppose that formless extension has distinct regions in potency. Until it is informed by form, however, it would not have such distinctions in actuality.

8 It may seem that the interpretation I am proposing requires forms within a species to be multiplied prior to their enforming matter. I do not think, however, that such a thesis is required by the interpretation I am proposing. The multiplicity of forms-m could be understood as posterior to a universal form-m informing matter.

This difficulty, however, is not intractable. In the first instance, measurable quantities contain parts, which are numerable. So if there are part-whole relations that threaten the unity of the species, they are at least symmetrical: pluralities contain magnitudes, and magnitudes contain pluralities. Second, it is possible to unify the category of quantity by explicitly identifying quantity as such with extension. The unification does require the following slightly awkward formulation of two differentiae: (1) informed by form-m; and (2) informed by forms-m the resulting composites of which are informed by some form-c F. But these two differentiae, when added to extension, do create the species measurable and numerable quantity respectively. Hence, we have the following structure.

Unlimited extension (μέγεθος) — *Quantity*
 informed by form-m — *measurable quantity*, i.e. limited magnitude
 (μέγεθος)
 in one dimension—line
 in two dimensions—surface
 in three dimensions—body
 informed by forms-m the resulting composites of which are informed
 by some form-c—*numerable quantity*, i.e. limited plurality,
 i.e., number

One pleasing aspect of this hierarchy is its principled elimination of the privative differentia 'unlimited'. Measurable quantity is now identified with limited magnitude rather than with magnitude simpliciter; and numerable quantity is now identified with limited plurality. These identifications are made possible because unlimited is now part of the genus which, because it is matter as such, must, by metaphysical necessity, be limited by form. This structure also provides a rather stunning justification for two Aristotelian positions, at least as they manifest themselves in the category of quantity. According to Aristotle, substantiality decreases as one ascends a genus-species hierarchy (*Catg.* 2b22). And in this hierarchy, by ascending to the highest genus, one arrives at a very indeterminate sort of matter, which would be very insubstantial. Furthermore, by identifying the genus quantity with unlimited extension, and by denying the possibility of an actual infinite,

Aristotle guarantees that quantity cannot exist as such without being determined by a differentia.

The identification of quantity with unlimited extension thus allows for a derivation of the species in quantity. The main divisions in the category of quantity have already been derived. Continuous quantity and measurable quantity are convertible—and they arise from the limiting of extension by form-m. Discrete quantity and numerable quantity are likewise convertible—and they arise from the limiting of form matter composites by forms-c. And because number, owing to the elimination of λόγος, is the only species under numerable quantity, we can suppose that numbers (of F's) just are limited pluralities of a certain sort. The divisions among the types of continuous quantity, then, flow from the dimensionality of extension itself. Body is limited measurable quantity in three dimensions; surface, limited measurable quantity in two dimensions; and line, limited measurable quantity in one dimension.⁹

The virtues of the present account should be evident. There are, however, two remaining difficulties that must be addressed before it can stand firm as an interpretation of Aristotle. The first difficulty concerns the fact that the constitutive differentia of plurality contains plurals, namely 'forms-m' and 'composites'. Were this structure intended as an analysis of number, which it is not, it would be charged with a blatant circularity. But even though it is not an analysis of number, the following question does arise: how can the differentia of plurality make appeal to what appears to be not just a quantitative notion but a notion involving plurality itself, namely forms-m and composites? And once this question has been raised, does it not equally apply to the other differentia, for that differentia contains a singular, namely 'form-m'. But is not a singular likewise a quantitative notion?

In order to answer this question, one must remember that according to the interpretation in this paper number in the species of quantity is the number of composite material substances. The appeal to numeral-ity in the differentiae is an appeal to a unity and plurality of forms-m, which are principles of material substances. (The plurality of composites of form-m and matter reduces to the plurality of form-m—for

9 Aristotle seems to think that the tri-dimensionality of extension can be known *a priori* (*De Caelo* I, 1).

many composites are many forms-*m* informing extension.) Now, that Aristotle allows types of entities other than material composites to be numbered has already been shown. As long as there are criteria of identity for such entities, they can be numbered. Hence, it is legitimate to appeal to a number of forms-*m*.

That the plurality of forms-*m* is presupposed by the derivation does, however, require some categorial facts concerning form and matter to be underived. These facts, though, are facts about hylomorphic entities; and so such a requirement coheres with an interpretation according to which hylomorphism is a prior and more fundamental theory than categorialism. According to the interpretation in question, the categorial scheme is intended to represent the basic structures of material composites. That some aspect of the scheme, in this instance the notion of a plurality, must be applied to hylomorphic entities does not vitiate the contention that, as a representation of the categorial structures inherent in material composites, the scheme can be derived from hylomorphism.

One final issue must be addressed. It may seem that according to the interpretation I am offering substances are in the category of quantity. For, a composite of form and prime matter would be a substance – and I am claiming that the species in the category of quantity unfold from such composites. As I have derived quantity, however, I have appealed to form-*m* informing extension so as to create bodies. Here, however, the results from earlier chapters resolve the difficulty. The derivation I have provided does depend on principles of substance—but once the principles have been allowed to structure a world containing mobile material substances, one significant feature of such substances must be abstracted in order to arrive at species in the category of quantity, namely motion. As I argued in chapter 2, the abstraction of motion requires the abstraction of form. As I argued in chapter 3, the type of form required for motion is form-*m*; and such a form is responsible for the substantiality of a material composite. Hence, its abstraction results in the category of quantity, which is not subordinate to the category of substance and which can ultimately be identified the most indeterminate type of matter that has enough structure to be a genus.

CHAPTER 7

SUBSTANCE

I have so far argued that Aristotle's categorial scheme, or at least the part of it that I have examined, is systematically connected to his hylomorphic ontology and, as a result, admits of at least a partial derivation. But the results so far are incomplete in two ways. First, and perhaps most importantly, I have not explained how form and matter are related to the most fundamental category: substance. Second, some very general issues remain unresolved. The main thesis of this book is that Aristotle's categorial scheme admits of a systematic derivation from his hylomorphic ontology. Such a thesis is motivated in part by philosophical concerns – by providing some such derivation the Kantian criticism of the categorial scheme can be challenged. Because the scheme owes many of its important structures to Aristotle's hylomorphism, one can reject the Kantian claim that the scheme is a hodge-podge affair without any deeper explanation than Aristotle's brilliant though haphazard philosophical brainstorming. But, such a defense is only partial. For, it pushes the philosophical burden onto Aristotle's hylomorphism. Without an *a priori* justification for the existence of form and matter, someone sympathetic to Kant's objections might still have grounds to criticize Aristotle. Without some *a priori* argument for the existence of form and matter, someone might argue, Aristotle's categorial scheme, though it is derivable from hylomorphism, is nonetheless unjustified since it depends on an ontological scheme that itself lacks the requisite justification.

In this chapter, I address both the category of substance and the larger issue of the *a priori* justification for the existence of form and matter. I do so, however, indirectly. Instead of focusing directly on

these two topics, I instead focus on a topic that is in some ways one of the fundamental issues in the interpretation of Aristotle, namely his attitude toward the plenitude of being. In addition to being an interesting issue in its own right, I shall eventually argue that interpreting Aristotle in a certain way regarding this issue results in a systematic and arguably *a priori* treatment of his category of substance as well as his introduction of form and matter in to his philosophical system.

SECTION I

LOVEJOY, HINTIKKA AND THE PLENITUDE OF BEING

More than any other scholars Arthur Lovejoy and Jaako Hintikka have discussed whether Aristotle accepted a doctrine of the plenitude of being. In his classic work, 'The Great Chain of Being', Lovejoy articulates the doctrine as follows:

no genuine potentiality of being can remain unfulfilled, that the extent and abundance of the creation must be as great as the possibility of existence and commensurate with the productive capacity of a 'perfect' and inexhaustible Source, and that the world is better, the more things it contains.¹

As this passage indicates, Lovejoy links a philosopher's acceptance of plenitude with his belief in the existence of a fundamental source of the world, which, because of its overflowing nature, guarantees that every potentiality of being is fulfilled. As a result, Lovejoy does not attribute plenitude to Aristotle. Because Aristotle's unmoved mover is eternally contemplating itself, it is entirely self-contained – unlike Plato's One, it does not overflow itself into other realms of being.

Hintikka, on the other hand, attributes plenitude to Aristotle.² Not surprisingly, he does not trace Aristotle's acceptance of plenitude to an overflowing source of being. Rather, he argues that Aristotle was committed to plenitude because he accepted a modal thesis according to which to be possible is to be true at some time or other. In defense

1 Arthur Lovejoy, *The Great Chain of Being: A Study in the History of an Idea*, (Cambridge, Mass: Harvard university press 1936), p. 52.

2 Jaako Hintikka, *Time & necessity: Studies in Aristotle's Theory of Modality* (Oxford: Clarendon Press, 1973), p.95.

of his interpretation, Hintikka cites the following passages that taken together strongly support attributing such a modal principle to Aristotle: *De Caelo* 281a28-282a25; *De Gen. et Corr.* 338a1-3, 335a2-b7; *Met.* 1050b7-8, 1047a12-14 1026b27-37, 1064b32 ff.; *De Int* 18b11-15; *Top.* 112b1, 115b17-18; *Phys* 203b30, 221b25-222a9; *De Part. An.* 644b21-3. And with the modal principle in place, it is easy enough to see why Aristotle would be committed to plenitude. For, suppose that it is possible that *p*. Then *p* must be true at some time. Hence, every possibility must at some time or another turn out to be true.

The textual evidence that Hintikka adduces does seem to count heavily in favor of his interpretation. So shouldn't we simply conclude that he is right and Lovejoy wrong? Well, maybe. But, there is a residual issue that makes Hintikka's position on this matter less than completely satisfactory – his position does not obviously address in a satisfactory way Lovejoy's reasons for thinking that Aristotle did not accept plenitude. Lovejoy refuses to attribute plenitude to Aristotle because he does not see how Aristotle's unmoved mover could be the source of the material world. It could, of course, be an ordering principle – it could be the object of desire of material substances and so, in some sense, direct their motions; but, because it is not overflowing, it could not be the ontological source of mobile being. Instead, according to Lovejoy, Aristotle simply took the existence of mobile being as a brute fact, and, as a result, must have thought that there is at least one possibility, namely the existence of mobile being, that need not have obtained.

Hintikka does have a response to this line of argumentation. But, because he ties Aristotle's acceptance of plenitude to his views about modality and time, the response sidesteps the fundamental concern that motivates Lovejoy and so is not obviously compelling. The difficulty can be brought to light by considering a line of argumentation that at first seems to favor Hintikka's interpretation. Suppose for the sake of *reductio* that it is possible that mobile being does not exist. Then, on the assumption that to be possible is to be true at some time or other, there must be a time at which mobile being does not exist. But, because Aristotle defines time as the measure of motion (*Physics* 219b2), he cannot accept such a possibility. And so, far from represent-

ing a possibility that need not have but does as a matter of contingent fact obtain, the existence of mobile being is necessitated by Aristotle's definition of time and the modal principle that Hintikka attributes to him.

This argument, it seems, provides yet more evidence against Lovejoy's interpretation and so would, I think, be agreeable to Hintikka. Whereas Lovejoy interprets Aristotle as taking the existence of mobile being as a brute contingent fact, this argument shows that Aristotle was in fact committed to its necessity. And so Lovejoy's reason for not attributing plenitude to Aristotle is undercut. But the issue is not yet quite settled. For even if we accept that mobile being is necessary, we can still ask the question that concerned Lovejoy, namely what *explains* the existence of mobile being.

In response to this question, Hintikka might very well say: nothing. The necessity of such a fact, he might argue, provides all the explanation that is needed. Just as the fact that triangles have three sides is both necessary and not explained by any further fact, so too the fact that mobile being exists is necessary and is not explained by any further fact. In the former case, Hintikka might argue, the necessity is rooted in a definition; and in the latter case, it is a trivial consequence of Aristotle's view about the relation between possibility and time. Such a response, however, is not the only one possible; indeed, by considering the other possibility, the road will be paved for an interpretation that retains Aristotle's commitment to plenitude but meets Lovejoy's concerns in a much more direct way.

Taking the existence of mobile being as a brute necessity overlooks the intriguing possibility that, despite its necessity, it nonetheless admits of an explanation. Such a view might strike some philosophers as odd, since some philosophers think that necessities are the sort of things that don't require explanation. For instance, an appropriate answer to the question – what explanation can we give for the fact that $2+2=4$? – would according to some philosophers be: well, it is necessary, what other explanation is needed? Aristotle however, had a very different, and arguably more subtle, view about this matter. For he did not think all necessities are on a par – some, he thought, are brute. For instance, all those involved in correct definitions do not have any explanation. Others, however, do. For instance, the fact that triangles

have two right angles does have an explanation, namely that they have three sides. And in general, Aristotle thought that the essence of a genus explains why it has the proper characteristics that it has as a matter of necessity (PA I, 4-6). Once it is admitted that some necessities have an explanation while others do not, however, we can turn to the question of mobile being's existence and ask: which sort of necessity is it, brute or explainable? If the interpretation that I said would be agreeable to Hintikka is correct, we are forced to conclude that the necessity is brute, or at least a trivial consequence of Aristotle's views about modality. But perhaps, it is not. Perhaps Aristotle thought that there is some sort of deep explanation for the existence of mobile being.

In thinking about this issue, it is interesting to note that Aristotle touches on but never settles in any explicit way the question as to whether there is some explanation for the existence of mobile being. In *Physics* I, 2 and 3, Aristotle addresses those philosophers who deny that motion exists. At 185a1-5, he says that someone investigating nature need not determine whether what exists is, as Melissus and Parmenides hold, one and motionless.

Now to investigate whether what exists is one and motionless is not a contribution to the science of nature. For just as the geometer has nothing more to say to one who denies the principles of his science – this being the question for a different science or for one common to all – so a man investigating principles cannot argue with one who denies their existence. For if what exists is just one, and one in the way mentioned, there is a principle no longer, since a principle must be the principle of some thing or things (*Phys.* 185a1-5).

Aristotle's contention here is in some ways easy to discern – he is simply denying that a physicist must argue against those who deny the existence of motion. In another respect, however, the precise nature of the view Aristotle is advocating resists easy determination. The difficulty arises from what might seem an innocuous aside but what is in the end a comment that has considerable interpretive significance. Aristotle illustrates his claim about physics by drawing an analogy to geometry—he says that a physicist confronting someone who denies the existence of motion is like a geometer confronting someone who denies the principles of geometry. Such a geometer, Aristotle says, need

not argue against his skeptical opponent. So far so good. But Aristotle goes on to add that the concern over the principles of geometry cannot be dismissed altogether. Rather it belongs to some different science or to a science that is in some ways common to all sciences. By analogy, then, a physicist need not address someone who denies the principles of physics; nonetheless, questions about such principles could not be dismissed. Rather, some other science or some science common to all sciences must address them.

As it turns out, Aristotle reiterates a similar point in very similar language at *Physics* at 252a32. He says:

To maintain that all things are at rest, and to disregard sense-perception and attempt to show the theory reasonable, would be an instance of intellectual weakness ... Further, just as in arguments about mathematics objections that involve first principles do not affect the mathematician – and the other sciences are similar – so, too, objections involving the point that we have just raised do not affect the physicist; for it is a hypothesis that nature is a principle of motion (*Phys.* 253a32-253b6).

Aristotle here again denies that a physicist must contend with objections to his principles, and he again draws an analogy to mathematics. And though he takes care to point out that a scientist inquiring into some particular genus need not investigate the principles of that science, the passage implies that the scientist in question need not demonstrate the principles of his science *qua that scientist*. A mathematician, for instance, need not demonstrate the principles of mathematics. But by a further implication, some other science does investigate such principles. Analogously, then, a physicist *qua* physicist need not determine whether mobile being exists; but, by implication, it would seem that, *qua* some other type of scientist, a physicist does.³

3 Although the *Metaphysics* passages only imply that scientists must be concerned about the nature of their principles *qua* some higher more general science, Aristotle explicitly states such implications at *Posterior Analytics* 77b3-9: And for those one should supply an argument from the principles and conclusions of geometry; but for the principles, the geometer *qua* geometer should not supply an argument; and similarly for the other sciences too. We should not, therefore, ask each scientist every question, nor should he answer everything he is asked about anything, but only those determined by the scope of this science (*PA* 77b3-9).

It is thus tempting to think that Aristotle thought that some type of explanation of mobile being was in order. Moreover, it is not difficult to see how such a question intersects with the debate between Lovejoy and Hintikka. If Aristotle did think that some science more general than physics can in some way demonstrate the existence of motion, then such a demonstration would count as an explanation of mobile being. Furthermore, because first philosophy is, according to Aristotle, the only science more general than physics, and because first philosophy is concerned with being, such a demonstration would have to contain predicates associated in some intimate way with being; and this would result in an ontological explanation of the existence of mobile being. Although it may not be exactly the sort of explanation Lovejoy was looking for – it may not appeal to the overflowing nature of the unmoved mover – it may nonetheless provide a sufficient response to Lovejoy insofar as it is concerned with being itself rather than Aristotle's formal modal apparatus.

Unfortunately, however, Aristotle never does address this issue either at the object level or at the meta-level. He never in a meta-theoretical stance argues that some other science explains the principles of physics, nor does he give an argument in some other work that could count as an explanation of the existence of motion. Despite Aristotle's reticence about this matter, however, in this paper I shall allow myself the latitude for a certain speculation that I think provides compelling interpretation of Aristotle on these issues. I shall speculate that Aristotle did in fact accept the plenitude of being, though I shall diverge from Hintikka's formulation of it. According to the principle as I articulate it, what I shall henceforth call *PP*, every degree of the perfection of being must be instantiated.

In the remainder of this paper, I shall argue that several interesting interpretive consequences result from attributing *PP* to Aristotle. First, it provides the basis of the sort of explanation to which Aristotle alludes in the *Physics* passages above. With *PP* in hand, it is possible to construct a syllogism that not only strongly resembles those that are supposed to be part of an Aristotelian science but also concerns the connection between motion and being. That alone, it seems to me, makes viewing Aristotle's metaphysical system through the lens of *PP* attractive. More interestingly, however, are the implications *PP* has for

the unity of Aristotelian sciences. I shall argue that PP provides an ontological principle of unity for the various epistemic projects that together constitute Aristotle's system of sciences. PP thus serves as something of a paradigm for Aristotle – it is a principle around which some very basic structures in his metaphysical system turn. Of course, it is one thing for PP to be a paradigm for Aristotle and another for it to play a role in the larger philosophical context in which Aristotle was operating. I shall argue, however, that PP did play such a role. If I am correct, not only can PP be seen as a principle that gives to Aristotle's philosophical system a remarkable internal coherence but it also connects Aristotle to a tradition of metaphysical speculation started by philosophers before him. If I am correct, by giving a distinctively Aristotelian flavor to some very general metaphysical theses present most noticeably in Plato's middle dialogues, Aristotle supports his scientific theories with a metaphysical apparatus concerning the nature of being.

It may seem that the considerations I shall present are the basis for an argument that Aristotle accepted PP. And in some sense they are—I do think that viewing Aristotle's system as if he accepted PP does have a number of interesting and attractive interpretive results. But I in fact think that the correct interpretation is more complicated than this. Although for much of the paper I shall proceed as if Aristotle accepted PP in the same way that he accepted any number of other philosophical theses that occur explicitly in his works, several reasons suggest that it is more plausible to view PP as something of an unarticulated regulative principle that guided Aristotle rather than an explicitly formulated principle that he accepted. This is not, however, to denigrate the role that PP had in Aristotle's thought. Indeed, such principles are often of extreme interest to the historian of philosophy. For they provide a clue to the philosophical gestalt in which philosophers from different eras were operating. They are, so to speak, a kind of unarticulated form of thought which have as matter the various philosophical theses that occur explicitly in a philosopher's texts. And such, I shall argue, is precisely the case with PP. I shall argue that in addition to unifying a number of themes both within Aristotle's own system and within ancient Greek metaphysics, it also illuminates

considerably the character of the intellectual milieu in which Aristotle was operating.

SECTION II

INTERPRETIVE CONSEQUENCES OF PP

SECTION IIA

A DEMONSTRATION OF THE EXISTENCE OF MOTION

According to PP, every degree of the perfection of being must be instantiated. I shall discuss later the exact content of this principle. But for the purposes of constructing an explanation of mobile being, it suffices to be clear about the logical form of the principle. It can be stated as follows.

I. Necessarily, for all F, if being F is a degree of the perfection of being, then F-being is instantiated.

With such a principle in place, an argument for the existence of mobile being can be constructed by adding the following premise and conclusion.

II. Necessarily, being mobile is a degree of the perfection of being

III. Hence, mobile being is instantiated.

This argument already illustrates the interest of attributing PP to Aristotle. Not only does it resemble the sort that belongs in an Aristotelian science – its logical form is slightly more complex than the standard Aristotelian Barbara syllogism but bears obvious similarities, and its premises are both assertions of necessity – but its middle term is *degree of the perfection of being*. Hence, because middle terms are the standard explanans in an Aristotelian science, this argument provides an explanation of the existence of mobile being that is both Aristotelian in nature and explicitly ontological. And this, I contend, is an improvement over both Lovejoy and Hintikka. Whereas Lovejoy could see no ontological explanation for the existence of mobile being, and whereas the view I tentatively attributed to Hintikka takes the existence of mobile being as a trivial consequence of Aristotle's modal framework, the view I am now suggesting forges a deep connection

between Aristotle's views about being and the existence of motion. If I am right, Aristotle has the resources to provide the sort of argument to which he alludes in the *Physics* – *qua* first philosopher it is indeed possible to explain the existence of mobile being.

SECTION IIB

THE UNITY OF ARISTOTELIAN SCIENCES

Of course, physics is only one of the main branches of Aristotelian science. And it would be odd were Aristotle to think that mobile being could be demonstrated but that the existence of any of the other branches of Aristotelian science would have to be taken as a brute fact. As it turns out, however, it is possible to use the principle of plenitude as I have articulated it, along with certain subsidiary views, in order to provide the demonstrations in question.

Aristotle thinks that the three theoretical sciences are mathematics, physics and theology (*Meta.* 1026a16, *Meta.* 1064b1). And numerous comments he makes about the genus-species hierarchies in the world show that he thinks the following structures are of central importance (*Meta.* 1069a30, *DA* 412a17, 413a21, *DA* 414a35, *NE* 1098a4).

Substance

- Immobile — Unmoved Mover(s)
- Mobile — Body
 - Eternal — Heavens
 - Destructible — Sublunary bodies
 - Unensouled — Elements/mixtures
 - Ensouled — Living things
 - Incapable of Perception — Plants
 - Capable of Perception — Animals
 - Irrational — Brutes
 - Rational — Humans

Quantity

Mathematics, according to Aristotle, studies quantity (*Meta.* 1061a28-36, *Phys.* 193b31-4); physics, mobile substance (*Phys.* 185a13, *Meta.* 1026a16), i.e. body; and theology, the unmoved movers (*Meta.* 1026a20). Moreover, physics contains all those sciences that

study the genera subsumed under the genus, mobile substance. So, for instance, biology is a part of physics.

As I have already said, I think that PP can be used so as to provide an explanation for the existence of the main branches of Aristotelian science. But a great deal more needs to be done in order to see how it does so. I have already argued that Aristotle can use the principle of plenitude to demonstrate the existence of mobile being. But to demonstrate the existence of the genera that Aristotelian sciences study is a much larger task. In the first instance, a demonstration of the existence of mobile being is not yet a demonstration of the existence of mobile substance, which strictly speaking is the subject matter of physics. Secondly, the demonstration of the existence of mobile being that I provided relied on a premise according to which being mobile is a degree of the perfection of being; and not only is it not obvious what this means, it is not obvious why it might be true. Finally, it is one thing to demonstrate the existence of mobile substance and quite another to demonstrate the existence of all the other genera that the sciences study.

The first order of business in this task is to articulate more clearly the content of PP. And in this regard, it is first important to note that PP does not commit Aristotle to the dubious thesis that being comes in degrees. Rather, according to PP, being has a feature, namely perfection, which comes in degrees. To claim that the perfection of being comes in degrees is analogous to the claim that walking comes in degrees of quickness. Walking itself does not come in degrees; but the speed at which someone walks does. Analogously, whether something is does not come in degrees; but the way in which it is does. With that said, we can now ask two questions. First, what, according to Aristotle, is the nature of being? Second, how are the degrees of being differentiated from one another?

Aristotle, of course, addresses the first question in the *Metaphysics* and insists there that being is said in many ways (*Meta.* 1026a35). One such way is categorial being (*Meta.* 1026a36), which itself is said in ten ways (*Catg.* 1b25-2a4). And among the ten types of categorial being substance is the primary sense (*Meta.* 1028a30). Now, PP might apply to all the different senses of being; but if it applies to any of

them, it surely applies to substance. Hence, 'being' in PP can be replaced by 'substance' so as to yield PPS.

PPS: Every degree of the perfection of substance must be instantiated.

What, then, about the second question? What counts as a degree of the perfection of substance? One passage that provides some insight into this question occurs in the *Parts of Animals*. At *PAn* 644b21-645a1, Aristotle argues that the heavenly spheres are more divine than destructible substances (*PAn* 644b21-645a1). The source of such divinity stems from the fact that the heavenly spheres, though capable of accidental change, are not capable of essential change. They cannot, in other words, come into or go out of existence. Destructible substances can fail to be what they are both accidentally and essentially—they can acquire and lose accidental features, and they can come into and go out of existence. The heavenly spheres, on the other hand, though they can change accidentally as a result of their local motion, cannot go out of existence.

Aristotle's view about the source of the divinity of the heavenly spheres can be augmented by his view about the unmoved mover. His argumentation in *Metaphysics* XII, 9 shows that he thinks that the unmoved mover is a perfect substance. According to Aristotle, the unmoved mover must have himself as an object of his thought. Why? Because the unmoved mover, being the best of all possible beings, must think about the best of all possible objects; and the unmoved mover is the best of all possible objects (*Meta.* 1074b30-5). The unmoved mover, however, is pure actuality – it does not admit of any potentiality at all (*Meta.* 1072b1-15). So, just as in the case with the heavenly spheres, there is a connection in Aristotle's thought between the degree to which something admits of the potential for non-being and the perfection of that thing.

These textual clues can be augmented by considering in the abstract what it would mean for something's being to be perfected. One plausible answer to such a question that springs to mind is: a being's being is perfected to the extent that it excludes non-being. So, for instance, a being whose being is perfect would altogether exclude non-being. A being that is less perfect than a perfect being would admit accidental

but not essential non-being. And beings less perfect still would admit both accidental and essential non-being.

To say that something excludes non-being is, of course, to speak metaphorically. But the metaphor can be made precise in the following natural way: for x to exclude non-being is for x to be incapable of not-being what x is. In other words, a being whose being is perfect would be altogether incapable of not being what it is. Such a view is expressed by the following thesis:

T: The being of substance, x , is perfect if and only if it is not possible for x not to be what it is.

It is important to read T with the appropriate scope distinctions in mind, since T is ambiguous between

Ta: $(x)(\text{the being of } x \text{ is perfect if and only if necessarily for any attribute } F, \text{ if } Fx, \text{ then } Fx); \text{ and}$

Tb: $(x)(\text{the being of } x \text{ is perfect if and only if for any attribute } F, \text{ if } Fx, \text{ then necessarily } Fx)$

Clearly, Tb and not Ta is the intended reading – Ta would have the result that the being of every substance is perfect. Rather, according to the intended reading of T, a substance's being is perfect if and only if the attributes that it in fact has are such that it is impossible for it not to have them.

Call any being whose being is perfect a level 0 being. Level 0 beings exclude altogether non-being. A level 1 being, then, would exclude essential but not accidental being and a level 2 being would admit both accidental and essential non-being. These distinctions are captured by the following theses.

T1: A level 1 being is such that (i) it is possible for it not to be what it is accidentally; but (2) it is not possible for it not to be what it is essentially.

T2: A level 2 being is such that it is possible for it not to be what it is accidentally and what it is essentially.

A level 0 being would thus be perfectly actual. A level 1 being would be capable of accidental and not essential change. Finally, a level 3 being would be capable of both accidental change and essential change.

If I am right that Aristotle accepted PPS, then he should have accepted the existence of beings at all three levels. And of course he does. The unmoved movers are level 0 beings; the heavenly spheres, level 1 beings; and the destructible substances, level 2 beings. PPS, then, in conjunction with plausible theses about how to differentiate among the degrees of perfection of being allows for a principled division of the genus, substance, a division that accords well with the divisions Aristotle made.

Now, T1-T3 account for the existence of at least three types of substances; but further discriminations among level 2 beings can be made in accordance with a principle that appears implicitly in claims Aristotle makes concerning particular species.

According to Aristotle, the being of a mobile substance is perfected to the extent that it imitates, as much as its nature permits, the divine perfect being. Mobile substances, in other words, are ordered with respect to the perfection of being in accordance with their degree of imitation of the unmoved mover.

The most explicit allusion to such an ordering in Aristotle's works occurs in *De Anima* II, 4. In his discussion of nutrition and reproduction, Aristotle says:

The acts in which it manifests itself are reproduction and the use of food, because for any living thing that has reached its normal development and which is unmutated, and whose mode of generation is not spontaneous, the most natural act is the production of another like itself, an animal producing an animal, a plant a plant, in order that, as far as its nature allows, it may partake in the eternal and divine. That is the goal towards which all things strive, that for the sake of which they do whatsoever their nature renders possible ... Since then no living thing is able to partake in what is eternal and divine by uninterrupted continuance (for nothing perishable can forever remain one and the same), it tries to achieve that end in the only way possible to it, and success is possible in varying degrees; so it remains not indeed as the self-same individual but continues its existence in something like itself – not numerically but specifically one (DA 415a26-415b8).

Aristotle here says that animals reproduce because they inherently strive to partake as much as their nature allows in the eternal and divine. Indeed, he says outright that the goal of *all things* is to partake in the eternal and the divine. But because destructible substances cannot live forever, they do the next best thing, which is to propagate the species to which they belong.

In this passage Aristotle restricts his attention to the way in which reproductive activities are an imitation of divine activity. But his attitude here is plausibly taken as an instance of a general view according to which the world is ordered teleologically in virtue of degrees of imitation of the divine. And if one adds to such a general thesis the views that being is perfected to the extent that the divine is imitated and that every degree of the perfection of being must be instanced, it becomes possible to see how Aristotle would have thought that the genus, substance, admits of a principled division into species each of which displays rather distinctive activities.⁴ I have already argued that substance first divides into immobile perfect substance and mobile imperfect substance. I have also mentioned that mobile substance divides into eternal and destructible substances and that the latter's being is more perfect than the former's. Because the being of the heavenly spheres is as perfect as is possible for mobile substances, they must undergo the perfect motion, which, according to Aristotle, is continuous, eternal circular motion (*Physics* VIII 7,8). Destructible substance, then, divides into living and non-living substances. Non-living substances are the elements and mixtures thereof; and they are only capable of imitating the divine mind insofar as they move to the places to which

4 Aristotle's teleology can be understood in two different ways corresponding to two different concepts of the final cause. The expressions ὁ ἐνεκά τιτι and ὁ ἐνεκά τινοϋς, which express, respectively, the dative of interest and the genitive of the object of desire, correspond roughly to the distinction between the beneficiary of an action and the aim or object of that action. Cf. W. Kullman "Concepts of the Final Cause," in *Aristotle on Nature and Living Things*, A. Gotthelf, ed. (Pittsburgh-Bristol: Mathesis Publications-Bristol Classical Press 1985), pp. 169-175. The teleological ordering to which I am referring in this paper is an ordering with respect to the latter notion of final causation. Hence, my view is compatible with the view, which is defended by David Sedley, *Is Aristotle's Teleology Anthropocentric?* *Phronesis* 36 (1991), pp. 179-196, that in the former sense Aristotle's teleology is anthropocentric.

their natures order them. Living substances, on the other hand, are capable of nutrition and reproduction, which capacities allow them to be self-sustaining for a period of time and, as Aristotle says in the above passage, to imitate the divine insofar as they propagate. The activity of the divine mind, however, is a kind of knowing. And so, in order for the world to exhibit all the degrees of perfection, there must be imperfect substances that can know. Knowledge, however, comes in two varieties – knowledge of particulars and knowledge of universals. The former requires sense perception; and the latter, rationality.⁵ Hence, PPS requires the existence of imperfect substances capable of perception and rationality. And so, the principle of plenitude, along with a thesis about the ways in which being can be perfected, entails the existence of the subject matter for all the main Aristotelian sciences that fall under the genus body.⁶

The only remaining science whose subject matter requires explanation is mathematics. It is here that the results from earlier chapters become relevant. As I argued earlier, the subject matter of mathematics results when motion is abstracted from body. Hence, insofar as Aristotle can explain the existence of bodies by appeal to the principle of plenitude, he can explain the existence of the subject matter of mathematics.

5 Aristotle's complete account of the relation between sense, reason, particulars and universals is of course complicated. In some sense, one can perceive universals (*PA* 100a15, *Phys* 18410-20). And in some sense, reason must apprehend the universal in a particular image (*DA* 431b2). Nonetheless, some sort of connection between sense and particulars and reason and universals is certainly an aspect of Aristotle's thought.

6 Notice that this interpretation goes some considerable way toward explaining Aristotle's acceptance of the eternity of the species. Cf. J M Cooper, "Aristotle on natural teleology", in *Language and Logos*, ed. M. Nussbaum and M. Schofield, (Cambridge: Cambridge University Press 1982) pp. 197-222, for an alternative discussion of Aristotle's views about the eternity of species and teleology.

SECTION IIC

PP: ARISTOTLE AND PLATO

The interpretation of Aristotle that I have provided has implications for some rather large and admittedly vague issues concerning Aristotle's fundamental attitude about the rational coherence of the world. Were I to use terms that are, like the issues in question, vague and rife with ambiguity but that nonetheless do seem to connote general tendencies of thought, I might say that it yields an answer to the question as to whether Aristotle was more of an empiricist or a rationalist. As a general rule of thumb, empiricists have been content to let the world contain unexplained brute pluralities, while rationalists have had an impulse toward unifying and explanatory principles. Now, in the case of Aristotle's sciences, the debate between an empiricist and a rationalist interpretation revolves around the question: does Aristotle take the subject matter of his sciences as a brute unexplained fact, or does he find them capable of some deeper ontological explanation?

Different answers to these questions lead to very different pictures of the way Aristotle viewed the world. According to one picture, the subject matter of rational inquiry is not only pluralistic but is also incapable of further explanation. To be sure, within any particular science there are necessary, primitive and *a priori* knowable principles, for instance the principle within geometry that all triangles are closed three-sided plane figures. But, there are no explanations as to why there are triangles in the first place. The world, according to such a picture, contains brute and unexplained pluralities, which are the subject matter of the most basic theoretical sciences. Alternatively, Aristotle might have thought that the subject matter of rational inquiry is indeed pluralistic and that within various sciences one must formulate indemonstrable principles but that the existence of the subject matter is nonetheless capable of some explanation. These two world-views represent within the theoretical domain two different attitudes concerning the one and the many. To what extent, according to Aristotle, does the many, in this instance the many sciences, admit of a systematic and unified explanation, in this instance a demonstration (or at least a conceptually intertwined set of demonstrations) of the existence of the genera that

the many sciences study? To what extent, in other words, does the one hold sway over the many?

It should be clear by now that I am advocating the latter interpretation. Viewed in the light of PP, Aristotle's system not only displays a remarkable degree of internal coherence but is also an attempt to describe the world as a remarkably coherent unity. To this extent, he was much more of a rationalist than an empiricist. There is, of course, considerable debate about the extent to which Aristotle was influenced by Plato. But, if I am correct, Aristotle did at least inherit Plato's rationalist impulse as regards the existence of the subject matter of rational inquiry. Moreover, I am inclined to think that the connection between Plato and Aristotle on these matters amounts to more than just shared cognitive tendencies. Indeed, I think that the connection between the two is deeply conceptual, though I also think that the only way to appreciate the conceptual connections is to view both their metaphysical systems through the lens of PP. With PP in mind, one can see that Aristotle, while retaining a Platonic commitment to PP, nonetheless modifies in a distinctive way several Platonic views.

In the doctrines I have attributed to Aristotle it is certainly possible to hear at least the echoes of Plato. Form, being and perfection constitute a Platonic triad; matter, becoming and imperfection constitute a second. And the two triads stand to each other as master to slave, as original to copy, as original source of formative power to material being formed. In fact, the idea that pure being excludes non-being is a dominant theme of Plato's middle dialogues. According to Plato, the world of form is the domain of pure being; and the world of flux, which is teleologically ordered in virtue of its imitation of the forms, is a mixture of being and non-being. So, for instance, he says in the *Republic*:

It would remain, then, as it seems, for us to discover that which partakes of both, of to be and not to be, and that could not be rightly designated either in its exclusive purity, so that, if it shall be discovered, we may justly pronounce it to be the opinable, thus assigning extremes to extremes and the intermediate to the intermediate. (478e)

As is known, Plato abandons, (or at least modifies) this view in the *Sophist*, where he allows the forms to intermingle with non-being.

(241d) Nonetheless, at various points in the dialogues, Plato is committed to the following claims all of which sound very much like the claims that surface when Aristotle's system is viewed in light of PP: (1) pure being excludes non-being; (2) the domain of impure being is intimately linked with the material world; (3) the domain of pure being is changeless; and (4) impure being imitates pure being.

Despite the similarities between Plato and Aristotle on these points, however, Aristotle does not bifurcate the world in quite the same fashion as Plato. Having accepted the links Plato draws, Aristotle incorporates them into an anti-Platonic hierarchy of substance. Substances, according to Aristotle, are the fundamental beings. These fundamental beings come in two varieties in accordance with the perfectibility of their being: perfect and imperfect. In fact, on the assumption that the principle of the plenitude of being is true, substance *must* come in these two varieties. Perfect substances are necessarily changeless, hence do not share in potentiality (it is not the case that they *can* be and not be), and hence do not have the principle of potentiality and imperfection, matter. Imperfect substances can change, hence share in potentiality (they *can* be and not be), and hence do have the principle of potentiality and imperfection, matter. The imperfect substances, however, as a result of their being substances, must have in addition to a principle of potentiality and imperfection a principle of substantiality and perfection, namely form. This principle is a source of those activities that not only place substances into their respective kinds but also are imitations to greater or lesser degrees of the unmoved mover's eternal perfect activity.

Aristotle, then, accepts the middle Plato's view that pure being does not mix with non-being as well as the view that the world of non-being, i.e. the material world, is teleologically ordered by relations of imitation of the world of pure being. He also accepts the later Plato's claim that the world contains highest kinds. But, he rejects Plato's list of highest kinds, which includes being. And in so doing he denies that being is a genus arguing instead that it is a *pros hen* homonym. Finally, and perhaps most importantly, he allows imperfect beings to meet the criteria for substance-hood. These theses, then, combine with the principle of plenitude so as to provide a differentiation of the genus substance into the genera that the theoretical sciences study.

SECTION V

THE PRINCIPLE OF PLENITUDE AND HYLOMORPHISM

The focus on plenitude and its relation both to Aristotle's system of sciences and his hylomorphism is, to be sure, idiosyncratic. The last section should make it clear, however, that considerable light is cast on Aristotle's system of sciences when one views it through the lens of plenitude. Likewise, an interesting perspective concerning Aristotle's hylomorphism emerges as a result of plenitude. Although commentators generally think that Aristotle introduces form and matter as a result of considerations about motion, there is another route to their introduction. I have argued that mobile substances are inherently striving to be as much like the unmoved mover as their natures permit, thereby perfecting their being as much as possible. But, one might ask: what, according to Aristotle, keeps mobile substances from completely imitating the unmoved mover?

The obvious answer to this question is: matter. That matter keeps substances from perfect divine imitation crops up in various places in Aristotle's works. Perhaps the most interesting instances of such a doctrine occur in Aristotle's metaphorical descriptions of the fatigue caused by the presence of matter and potentiality. In *Metaphysics* XII, 9 Aristotle argues against the presence of potentiality in the unmoved mover precisely on the grounds that such potentiality would wear him out: 'First, then, if he were not thinking but a potency, it is reasonable that the continuity of his thinking would be fatiguing him' (*Meta.* 1074b28-9). And in his discussion of actuality in *Metaphysics* IX, 8, Aristotle says: 'Nor are they worn out by this activity, for their motion does not come from a potentiality of two contradictories, as in destructible things, so as to make the continuity of such motion tiresome; for the cause of this is substance in the sense of matter or potency, and not in the sense of actuality' (*Meta.* 1050b24-8). Aristotle also argues that deformities in nature are the result of form's not being able to master matter (*GA* 768b15-768b35). And he argues that the divine contemplation that humans are capable of is subject to the limitation imposed by the presence of the body (*NE* 1178b35).

With the idea that matter is a principle of imperfection in hand, the following doctrines naturally unfold. Every substance is a being and as such must either have, in the case of mobile substances, or be, in the case of the unmoved movers, a principle of being. Such a principle is form (*Meta* 1041b8). In addition, imperfect beings, i.e. mobile substances, must have matter. In other words, it is precisely because mobile substance is imperfect that it must have matter. And so we see here in Aristotle a beautiful convergence of physical, metaphysical and ethical themes. Imperfect being must have a principle of imperfection, which is matter; because matter is a principle of change, imperfect being, which is convertible with mobile being, is the subject matter of physics; and because matter keeps imperfect being from completely perfecting itself, mobile substance can only ever attain an imperfect imitation of the perfection of being exhibited by the unmoved mover.

Of course, one could accept this interpretation without accepting the characterization of form and matter that I have provided. But these characterizations do suit the purposes at hand very well. According to the interpretation in chapters 4 and 6, prime matter as such is intimately related to extension the enforming of which accounts for the plurality of material substances. It is, in other words, linked to diversity. Furthermore, characterizing prime matter in this way coheres with Aristotle's views about what the unmoved mover must lack. For, according to Aristotle, the unmoved mover, as a result of its being perfectly actual, lacks potentiality (*Meta.* 1072b9); and as a result of its causing eternal motion and hence being unmovable, lacks extension (*Phys.* 267b27). But because prime matter is the ultimate principle of potentiality, and because it is so intimately linked to extension, the fact that the unmoved mover must lack prime matter eliminates extension and potentiality from it in a single conceptual stroke.

Form-m as characterized in chapters 3 and 4 also coheres with the picture that is developing. For, in the first instance, form-m is a principle of unity and the being of material substances. So it can be the principle of actuality and perfection that imperfect substances must have to be substances. And indeed, because it is so intimately linked with activity, the fact that material substances imitate the unmoved mover in virtue of their activities finds a perfect explanation. Form-m, as the source of a material substance's activities, is at one and the same

time, the cause of a material substance's being a member of a kind, and hence of that material substance's existing, as well as the cause of a material substance's imitating the unmoved mover, and hence of that material substance's instantiating the degree of perfection of being that its nature allows.

Additionally, if one progresses along the conceptual path introduced by the idea of form-m, one will arrive at the concept of the unmoved mover. A form-m is a principle of dynamical activities. Now, in the material world, a gap exists between the principle and the activity—the actualizing of the activity need not always occur. Various reasons for this gap might be proposed; but the most Aristotelian reason would be the fact that a principle of dynamical activities must exist in matter. Matter, so to speak, holds form back. Its presence must be overcome. A principle of activity enmeshed in matter must expend an effort to realize the activity for which it is a principle. And without an eternal source of power for such an effort, the effort will not always be forthcoming.

To speak of an effort required to overcome matter is of course to speak metaphorically; but I have already noted that Aristotle such language in his discussion of the unmoved mover and actuality in the *Metaphysics*. So, to continue with this metaphorical language, if there were any gap between the unmoved mover's actuality and his potentiality for that actuality, an effort would be required in order to actualize the potentiality. But, because the unmoved mover has no share in potentiality and hence no share in matter, the gap between the potency for an activity and the activity itself vanishes leaving in its wake an effortless, seamless eternal activity. Of course, the activity cannot be dynamical—it cannot involve the spatial world. For such an activity would require matter. Rather, the activity is pure thought thinking itself. And so, the idea of form-m, when carried to its conceptual extreme, leads directly to the idea of the unmoved over.⁷

7 According to the interpretation I am offering, Aristotle's hylomorphism and the principle of plenitude intertwine so as both to explain the existence of the main genera of the Aristotelian sciences and to generate several of the main contours of Aristotle's categorial scheme. Yet, a large question, namely what is substance. Now, anyone familiar with the literature on this topic knows what a thorny question this is; so thorny, in fact, that I certainly cannot hope to provide an adequate treatment of it in this book. I will, however,

indicate what sort of view I think is required for the present interpretation. I do think that the view is in fact Aristotle's; but a defense of such a claim must wait for another occasion.

In order to disentangle Aristotle's apparently conflicting attitudes about the nature of primary substance, I think it best to focus on the concept of completeness (τέλειος). Some being, x , is complete if and only if no part of x is outside of x (*Meta* 1021b12-15). Aristotle's ontology, then, contains three types of complete beings – species, i.e. forms- c , material composites, and the unmoved movers. A species is complete in the following sense – a definition of it is non-relational. For instance, the definition of human is rational animal. This is quite unlike the specification of what a form- m is. For instance, a soul, which is a paradigmatic instance of a form- m , is the first actuality of *a body potentially possessing life*. The fact that the specification of what a soul is essentially involves the fact that a soul is of some other thing, namely a body, makes such an entity a relative in Aristotle's technical sense of that term (*Catg.* 6a137). Likewise, a material composite is complete. When specifying what, for instance, Socrates is, one would say – he is human. On an Aristotelian view of universals, being human is not extrinsic to what instantiates it. Hence, what Socrates is does not involve anything extrinsic to Socrates. Finally, an unmoved mover, though it is like a form- m in that it is linked to activity, is completely divorced from matter. An unmoved mover is, if you like, a form- m without the m . Hence, what it is is not essentially tied to something extrinsic to it; and so it too is complete. Unlike forms- c and material composites, both matter and forms- m are essentially tied to things extrinsic to them. I have already mentioned why this is so with form- m : a form- m is essentially related to the matter that is extrinsic to it. Likewise, matter, as I argued in chapter 4, is essentially tied to the form that enforms it. Hence, both types of entity are incomplete.

What, then, is the relation between a complete being and substance? I think it is as follows. For Aristotle, a material composite always was the paradigmatic instance of a substance. In the *Categories*, he ignores the complications having to do with form and matter. Hence, the only two types of substance are material composites and their species. And because of their particularity, the honor of being primary substance is bestowed upon material composites. Forms- m and matter, however, are, according to Aristotle, also substances (*Meta.* 1029a3). Why? A case can be made, I think, that the reason is as follows: (i) form and matter are principles of substance; and (ii) Aristotle often accepts a view according to which a principle of F can (and often should) be designated an F , though such a designation is derivative upon that which is most properly an F . Hence, form- m and matter are substance, though they derive their substance-hood from being the principles of what is most prop-

SECTION III

SOME META-INTERPRETIVE ISSUES

Attributing PP to Aristotle results in a deeply unified interpretation of some of the basic structures in his metaphysical system. And this, it seems to me at any rate, counts considerably in its favor. There are, however, four questions that are very pertinent to these issues and whose force may very well disincite someone from accepting the interpretation I am offering. First, why would Aristotle have accepted such a principle? Second, why did he not explicitly profess allegiance to the principle? Third, if Aristotle did intend to explain the existence of motion from theses concerning being, is he not committed to a kind of Platonic doctrine according to which physics is part of metaphysics. Finally, is there not something a bit suspect about thinking that Aristotle would have deduced the various genera that are the subject of his sciences? After all, *a priori*, there seems to be no obvious reason why there could not have been more species that exhibit more degrees of perfection than the ones that Aristotle focuses on. I conclude this paper with some possible answers to these questions.

erly substance, namely a material composite. Furthermore, form-m, because it is prior to matter in the sense that what matter is depends on form, is, of those entities derivatively named substance, primary. This is the conclusion Aristotle reaches at the end of *Metaphysics* VII.

Despite the fact that form-m is in one sense primary substance, however, there is the question as to what the primary instance of substantiality is among complete beings. And indeed, one might think that this is the most important question concerning substance, for it is only complete beings that have what it takes to be non-derivatively called substance. Only a complete being can be self-sufficient, for to be complete is to contain within oneself what one is. And being self-sufficient is, so to speak, what being a substance is all about. So, to determine what type of entity is substance in the most important, i.e. non-derivative, sense of 'substance', one must find that type that is, among complete beings, primary. And here, it is clear that Aristotle thinks that particularity is necessary to be primary substance among complete beings. This is implicit in his treatment of substance in the *Categories* and explicit in his argumentation in *Metaphysics* VII 13. Hence, among complete beings, those entities that are particulars are primary substances. As a result, both material composites and the unmoved movers are primary substances—both types are particulars; and both types are complete.

The answer to the first question, I think, lies in the fact that the principle of plenitude is an expression of metaphysical optimism. As such, it is the natural accompaniment of two attitudes that arguably both Plato and Aristotle shared: (i) an epistemological optimism that complete knowledge of the world is possible; and (ii) an onto-ethical view according to which one's being is perfected to the extent that one has knowledge. Accepting (i) and (ii) makes it difficult not to accept plenitude. For, imperfection at the most general structure of the world would create an insurmountable epistemological difficulty. If being qua being is not perfectible, then everything's being must always remain imperfect. Hence, if something's being is perfected to the extent that it approaches complete knowledge of the world, complete knowledge of the world would be impossible. Thus, if complete knowledge is possible and something's being is perfected to the extent that it has knowledge, then being qua being must be perfectible. So, accepting of (i) and (ii) requires accepting at least the perfectibility of being if not the instantiation of every degree of perfection.

Of course, this line of reasoning can only be part of the story, since it leaves open the possibility that there is only a single being whose being is perfect. So, why might Aristotle have thought that every degree of the perfection of being must be instantiated? Here, I think, one must turn from particular entities in Aristotle's worldview to the world as a whole. It is possible to think that the world as a whole is a kind of unity that can itself exhibit degrees of perfection of being. Furthermore, it is plausible to suppose that Aristotle would have held that the world as a whole exhibits ontological perfection. Indeed, this, like the belief in the existence of a single entity whose being is perfected, is a natural accompaniment of unbridled epistemological and metaphysical optimism. But, it is not implausible to hold that the being of the world is more perfect in so far as every degree of being in it is instantiated. Qua being, such a world is richer than one lacking a degree of being. To use an Aristotelian metaphor, a general without an army is a less perfect unity than a general with an army (*Meta.* 1075a15). Generals should lead – and to lead, they must have soldiers. Hence, were one to accept the ontological perfection of the world as such, then one has reason to believe in the plenitude of being. And, as I have said, it seems to me

that Aristotle would have believed in the ontological perfection of the world as such.

These reasons for thinking that Aristotle accepted plenitude provide the beginning of an answer to the second question, namely why did Aristotle not explicitly state and accept PP. Although I have been talking as if the acceptance of plenitude was somehow at the forefront of Aristotle's mind in his metaphysical speculation, I do not in fact think this to be the case. If Aristotle's acceptance of plenitude resulted from his metaphysical and epistemological optimism, we should not necessarily expect to find him explicitly stating the principle. Such optimism, it seems to me, would most likely have been hidden from him simply because he lived at a time during which it would have been entirely natural to be optimistic. Indeed, his own intellectual successes would surely have added fuel to his optimistic outlook. And it is commonplace that the optimism of the young is often only visible to the old.

Indeed, I am inclined to view plenitude as something like an unarticulated regulative principle for Aristotle. Alternatively, one might say that such a principle was part of the formal element of his worldview, the matter being the world itself. In other words, I wish to suggest that the idea that being comes in degrees of perfection was a pervasive lens through which Aristotle as well as at least some of his philosophical predecessors viewed the world and that such a lens served to structure their theorizing. As a result, Aristotle would not have articulated the principle explicitly; nonetheless, its presence as a structuring force would have permeated his entire system.

Viewing plenitude in this way allows one to answer the third and fourth questions I have raised. Because plenitude is a regulative principle, it would not figure into the kind of deductions that constitute the Aristotelian sciences. As a result, plenitude, like the principle of non-contradiction, provides a general parameter within which Aristotelian science proceeds. So, even though I earlier recreated a syllogism that looks like it might allow one to deduce the existence of motion from doctrines concerning the nature of being, such a recreation was really for heuristic purposes – it makes very clear that there is a strong connection between plenitude and motion. Hence, physics is not literally part of metaphysics, for Aristotle. Nonetheless, one can see very

clearly via the syllogism I recreated how plenitude acts as a general parameter for his other sciences.⁸

An example of the way in which an implicit acceptance of the perfectibility of being served to structure Aristotle's thought, it seems to me, occurs in Aristotle's biological treatises. Aristotle accepted what later came to be called the *scala naturae*, i.e. the view that biological kinds exhibit degrees of what might be called biological perfection. In addition, Aristotle appealed to what he took to be a natural phenomenon, namely vital heat, which itself comes in degrees, in his attempts to explain the varying degrees of complexity that one finds in the biological realm. In his biological studies, therefore, Aristotle implicitly accepted the idea that being comes in degrees of perfection, and with such a presupposition not only provided taxonomies that exhibit degrees of perfection but also found a physical mechanism that is in part responsible for them.⁹

With this view of plenitude in hand, we can offer an answer to the last question I raised. Because plenitude is a regulative principle, we should not expect to see convincing deductions of the genera that Aristotelian sciences study. Rather, we should expect that Aristotle would have looked to the world to see what genera it contains and then to see those genera in the light of plenitude. We should, in other words, expect Aristotle to think that such genera represented various degrees of the perfection of being; and as I argued previously, we can see such an attitude in Aristotle.

One last comment about the extent to which we should see PP as a regulative principle is in order. As I have mentioned, Hintikka interprets plenitude modally. According to him, Aristotle accepts the doctrine that something is possible if and only if it occurs at some time. Such a modal principle, however, is not only suspect in its own right – surely something could be possible without ever occurring – but is in fact controverted by Aristotle himself. Aristotle claims that there

8 There is considerable difficulty in determining when Aristotle allows principles from one science to be used in another. Cf. R.J. Hankinson "Aristotle on Kind Crossing", in *Philosophy and the Sciences in Antiquity*, Bob Sharples ed. (Ashgate 2005).

9 I discuss this topic at length in "Living Capacities and Vital Heat in Aristotle", *Ancient Philosophy* 24 (2004), pp. 365-379.

could be a coat that could be cut up but never is (*De Int.* 19a12-14). To be sure, Hintikka goes to considerable length to explain why Aristotle would have accepted a modal form of plenitude that allows for the sort of exception Aristotle alludes to. And he is joined in this pursuit by Sarah Waterlow.¹⁰ Both Hintikka and Waterlow try to find some form of the modal principle which is not so obviously counterintuitive and which can be seen as arising from Aristotle's logical concerns.

In my view, Hintikka and Waterlow are misguided precisely because they do not see that plenitude is a regulative principle for Aristotle. Given that the world is ordered via degrees of perfection, one might very well expect to find that as a general rule of thumb possibilities end up being instantiated at some time or other, especially if those possibilities are relativized to types. It would be odd in an ontologically perfect world were some type to have a potentiality that was never actualized. And indeed, when the possibility in question seems very deeply embedded in the structure of the world, one might think that plenitude begins to shift from the mere regulative to the contentful. So, for instance, given the centrality of the motions of the heavenly planets in the structure of the world, we should expect that if it is possible that they cease moving, they will. And Aristotle does appeal to such principles in his demonstrations of the existence of the unmoved mover in *Physics* VIII. One should not expect, however, to find in Aristotle some set of theses, metaphysical or otherwise, that would entail what is at any rate a highly suspect modal principle, just as one should not expect to find an *a priori* deduction of the genera that the sciences study.

If I am right, therefore, an appreciation of the way plenitude influenced Aristotle's thought is crucial in understanding his approach to various inquiries. Aristotle would not have explicitly stated plenitude but his allegiance to it would nonetheless be visible. And indeed, I think one can see it in his works, not on the surface, but below it acting as an anchor to his theorizing. To use Aristotelian terminology at this point, according to the interpretation I am advocating Aristotle

10 Sarah Waterlow, *Passage and Possibility* (Oxford: Clarendon Press 1982). I should note that Waterlow disagrees with Hintikka on several important interpretive and philosophical issues. But her general approach to plenitude in Aristotle is similar to Hintikka's. In particular, she overlooks the possibility that plenitude is not doctrinal for Aristotle but rather regulative.

tle's explicit doctrines are the matter of his philosophical system and plenitude its form. To interpret Aristotle without plenitude in mind, therefore, is to do something that from an Aristotelian perspective is problematic – it is to treat the matter of his system while ignoring its form.

CONCLUSION

It is worth concluding with a brief recapitulation of the way in which Aristotle's categorial scheme and his hylomorphism unfold from the principle of plenitude and then a brief discussion of the principle of plenitude itself. At the top of the Aristotelian worldview is a being that is, qua being, perfect. It is, of course, somewhat anthropomorphic to insist that such a being is thinking. But, let us grant such a contention. It then seems that such a being must be as Aristotle characterizes it. In the first instance, its activity must not be infected with any potentiality. Hence, its object cannot change. And, if we accept the view that such a being is the most noble of beings and hence that its object must be the most noble of all objects, then we do arrive rather directly at Aristotle's view that the unmoved mover is thinking itself.

Now, the unmoved mover is, for Aristotle, a teleological principle and hence is a principle of the order of the world. As a kind of being, then, it is aptly characterized as very much like a form-m. The only difference between a form-m and the unmoved mover resides in the fact that the unmoved mover is complete (τέλειος) insofar as no part of it lies outside of itself (*Meta.* 1021b12-15). Hence, it stands in contrast to forms-m, like the soul, which are essentially related to some matter.

The principle of plenitude, however, requires substances that are, qua being, imperfect and hence capable of change. Now, Aristotle argues that change in place is the primary type of change (*Phys.* 260a20-261a26). His arguments are contentious; but let us grant them for the moment. Then, every being whose being is imperfect must have the matter that allows for change in place. What could such a matter be? Extension. Extension, however, as I argued in chapter 4, does not stand at the limits of potentiality. Instead, de-structured extension does. So, if we accept the principle of plenitude, we are forced to admit that underlying extension is prime matter. Only in this way is every de-

gree of the perfection of being instantiated. Between prime matter and the unmoved mover, then, are the varying types of substances whose degrees of perfection depend on the extent to which they imitate the unmoved mover. Such imitation, however, essentially involves some sort of activity and so requires a principle of such activity, namely form-m.

In this way both form-m and matter are introduced into the world. And with these hylomorphic principles, it is possible to see the way in which the categorial scheme unfolds. Substance is the fundamental type of being and is divided into its main species in the way I described above. In general, the connection between form-m and species membership is guaranteed by Aristotle's acceptance of a functional determination thesis and the fact that form-m is a principle of activity. Form-m, however, not only is the underlying principle that places substances into their respective species but also is responsible for the accidental activities of substances. Such accidental forms provide the basis for the category of quality and can be divided in the way I suggest in chapter 5. And, when form-m is abstracted from material substances, one arrives at the category of quantity. And the divisions in quantity can be explicated in the way I suggest in chapter 6.

It would seem, then, that the main contours of both Aristotle's hylomorphism and his categorial scheme can be seen as unfolding in a more or less systematic way from considerations concerning the perfectibility of being qua being. If one grants the principle of plenitude, then a rather stunning metaphysical system emerges that is in its *a priority* almost Spinozistic. With the principle of plenitude in hand, Aristotle has the resources to argue for (1) the existence of the unmoved mover (or at least some being whose being is perfect); (2) the existence of motion and hence the existence of form and matter; (3) the existence of the main branches of his science; (4) the existence of the subject matter of mathematics; and (5) the intra-categorial divisions in the categories of quantity and quality. Furthermore, with the appropriate conception of substance, Aristotle has the resources to avoid Spinozistic monism. Finally, Aristotle's categorial scheme – or at least part of it – can escape Kant's charge. Rather than being a hodge-podge list with no justification, Aristotle's categorial scheme reflects very deep facts about the nature of being.

Of course, it should not be altogether surprising if an unarticulated regulative principle that serves to structure a philosopher's thought will, when articulated explicitly, conflict with that philosopher's other explicitly stated positions. Interestingly, I think that this is the case with Aristotle. For, there is a philosophical difficulty that emerges if one accepts the interpretation I am offering. According to it, there is a fact about the world as such that ultimately grounds Aristotle's metaphysical system. But, the question now emerges: where in Aristotle's system of categories does the world fall? It certainly is not said-of anything. Nor is it present in anything. So it must be a primary substance. But in which genus does it fall? It is not in any of the genera that constitute the Aristotelian sciences. So, it would appear that the world as such does not have a place in Aristotle's categorial scheme at all. The categorial scheme, however, is meant to be an exhaustive classification of the kinds of being in the world. And so the inability to find the world's place in it presents a serious difficulty.

Thus, if Aristotle's metaphysical system ultimately owes its justification to the principle of plenitude which itself owes its justification to considerations about the perfectibility of the being of the world, Aristotle would indeed have climbed a ladder only to have then kicked it away. Of course, kicking a ladder out from under oneself is problematic only if one does not have anything to hold onto. And Aristotle might at this point appeal to a Kantian notion in order to avoid falling. He might try to argue that the concept of the world as a whole is an idea of pure reason; and like Kant, he might try to argue that as such, one should not expect it to fall within the purview of his categories.

Such a Kantian twist already begins the disintegration of the optimism that characterized Aristotle as I am interpreting him. Of course, Kant was not without his share of metaphysical optimism – according to Kant the idea of the world is at least a regulative ideal. To what degree, however, Kant's attitude can be considered optimistic and indeed to what degree his (as well as Aristotle's) optimism has subsequently been eroded are certainly topics for another occasion. occasion.

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