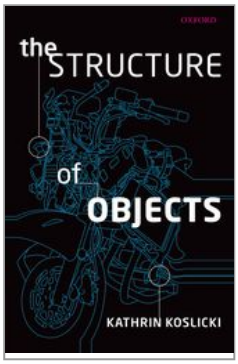

The Structure of Objects
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Aristotle's Refinements of Plato's Theory

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Abstract and Keywords

This chapter examines Aristotle's refinements of Plato's theory of composition. Aristotle is generally sympathetic to the Platonic outlook, but differs over the details. In some cases, Aristotle's more nuanced approach avoids certain of the downfalls of Plato's theory. In other cases, however, the added complexities introduced by Aristotle actually lead to further difficulties of their own. Given that the positive account of composition that is presented in Chapter 7 is broadly Aristotelian in spirit, the overarching goal of this chapter is to find inspiration in Aristotle's insights into matters of mereology, and to separate those features in his treatment of parts and wholes that are timeless and can be taken over by the modern-day mereologist from those that are best left behind.

Keywords: one, many, divisibility, quantity, measure, principle of unity, Metaphysics, total, actuality, potentiality

§VI.1 Introductory Remarks

In the previous chapter, we explored Verity Harte's illuminating exposition of Plato's structure-based theory of parts and wholes (Harte 2002). Plato's aim in his more mature mereological writings is to develop an alternative to the ontologically innocent, Lewis-style Composition-as-Identity model, put forth in ancient times by the notoriously commitment-shy Eleatic philosophers, the followers of Parmenides and Zeno. As against this deflationary conception of composition, Plato ascribes to wholes the following full-blooded characteristics: they are (i) genuinely *unified*; (ii) *ontologically committing*; (iii) governed by a *restricted* notion of composition; (iv) comprised of the two components of *structure* and *content*; (v) ontologically *prior* to their parts; (vi) *normative* and

teleological in nature; as well as (vii) inherently *intelligible* and the *proper objects of science*. And while the contemporary reader will no doubt find some elements of Plato's account off-putting or problematic, especially those features that depend on his endorsement of a cosmic (and at times explicitly theological) teleology, the core features of Plato's mereology proper (features (i), (ii), (iii) and (iv)) are nevertheless surprisingly compelling and in outline correct.

Our task now is to examine Aristotle's refinements of Plato's theory of composition. Aristotle is generally sympathetic to the Platonic outlook, but differs over the details. In some cases, Aristotle's more nuanced approach avoids certain of the downfalls of Plato's theory; in other cases, however, the added complexities introduced by Aristotle actually lead to further difficulties of their own. Given that my own account of composition, as it will be presented in Chapter VII, is broadly Aristotelian in spirit, the overarching goal of this chapter, as of the preceding one, will be once again to find inspiration in Aristotle's insights into matters of mereology and to separate those features in his treatment of parts and wholes that are timeless and can be taken over by the modern-day mereologist from those that are best left behind. Those readers who are more interested in the conceptual issues arising from Aristotle's analysis of parthood and composition, and less so in the textual details, may wish to proceed directly from the end of Section VI.3 to the beginning of Section **(p.123)** VI.5, which recapitulates the main conclusions established in the intervening sections.[1]

§VI.2 The Centrality of “Part” and “Whole” in the Aristotelian Corpus

As in Plato's case, Aristotle's works do not include a separate treatise devoted exclusively to the discussion of mereology as such. However, applications of the notions of “part”, “whole”, and related mereological concepts are ubiquitous throughout the Aristotelian corpus: in his logical writings, as well as in his writings on first and second philosophy (i.e., metaphysics, theology, mathematics and what we would now regard as natural science, i.e., physics, biology, chemistry, psychology, astronomy, and the like); even in his discussions of dialectic and speech as well as in his treatises on moral and political philosophy, the relations of “part” and “whole” are of central importance. As an illustration of Aristotle's use of “part” and “whole” in the logical treatises, consider for example the mereological technical vocabulary he employs in the *Prior Analytics* and the *Posterior Analytics* to distinguish *particular* statements from *universal* statements (viz., κατὰμέρος or, literally, “with respect to the part” and ἐπὶμέρους, or, literally, “over” or “by the part”, are his technical terms for “particular”; καθόλου or, literally, “according to the whole”, is his technical term for “universal”); similar uses of the part relation can be found whenever Aristotle is concerned either with matters of ontology or with the characterization of reasoning and the different forms of verbal expression thereof, as he is, for example, in treatises like the *Topics* and the *Rhetoric*. In the *Politics*, he is of course especially interested in the *parts* of communities and

households; in the ethical treatises, with the *parts* of virtue and the moral character. The *parts* of the soul are on the forefront of Aristotle's mind in *De Anima*;[2] the *parts* of living things are everywhere discussed in the biological treatises, e.g., *On Plants*, *History of Animals*, *Movement of Animals*, *Generation of Animals*, and, of course, **(p.124)** *Parts of Animals*. The *parts* of things that undergo change are his focus in the chemical treatises, e.g., *On Generation and Corruption* and *Meteorology*. The *parts* of time, magnitude, and the like, are at issue in the *Physics*; and those of the heavens in *On the Heavens*. Early remarks on the *parts* of substances can be found in the *Categories*; Aristotle's more mature views on the same topic, i.e., the *parts* of substance in its various possible manifestations as essence, substratum, definition, universal, genus, form, compound, etc., take up large sections of the central books of the *Metaphysics*, especially Book H, as well as the notorious Book Z.

The examples just given all illustrate Aristotle's *applications* of his mereological concepts. With the exception of a few scattered remarks here and there (e.g., in the *Categories*, *Topics*, *Physics*, and *On Plants*), the only extended examination of the concepts, “part”, “whole” and related notions *as such* is confined to the *Metaphysics*; and, within the *Metaphysics*, especially to Book Δ, the “Philosophical Lexicon”, which unfortunately, as it does in this case, often raises at least as many questions as it answers. Since Aristotle's discussion in *Met*. Δ is his most extensive treatment of mereology as such, it will be most practical in what follows to focus on his remarks there, though it is impossible to make sense of what he says in *Met*. Δ without taking into consideration the views expounded elsewhere. Assuming that the “Philosophical Lexicon” in Book Δ collects together concepts which occupy some sort of privileged role in an understanding of Aristotle's views (on any subject), it is a good indication of the centrality of the mereological concepts, “part” and “whole”, to Aristotle's philosophy that the corresponding sections in Δ.25 and Δ.26 implicitly or explicitly rely upon almost every single other entry in Book Δ. The notions “part” and “whole” are also listed by Aristotle in *Met*. Γ.2 as among the attributes of *being qua being* (along with the different senses of “same” and “other”, “prior” and “posterior”, “genus” and “species”, and the like). Since both of the concepts, “part” and “whole”, are intimately tied up with that of “one” (τὸἕν, also translated as “unity”), it is not surprising that the study of parthood and composition would be included among the responsibilities of those who are concerned with the study of being qua being, given the close connection Aristotle draws in Book Γ between being and unity: in particular, being (τὸὄν) and one, he says, are “the same”, though they don't have the same definition; there are as many kinds of being as there are of unity; and the primary sense of “one”, as of “being”, is that which applies to substance, all other uses being somehow parasitic on this primary use.[3]

(p.125) §VI.3 The Problem of the One and the Many

Aristotle is of course aware of the problem that puzzled his contemporaries and predecessors, of how something that has *many* parts can at the same time be *one*. He states this problem very clearly in *Physics* I.2, where it is listed as among the questions concerning parts and wholes to be dealt with (somewhere):

> There is, indeed, a difficulty about part and whole, perhaps not relevant to the present argument, yet deserving consideration on its own account—namely, whether the part and the whole are *one* or *more than one*, and in what way they can be one or many, and, if they are more than one, in what way they are more than one.
>
> (*Phy*. I.2, 185b11–14)[4]

As we observed in the preceding chapter, Plato's eventual answer to the Problem of the One and the Many—after some early flirtations with the Pluralizing Parts Principle and the accompanying Composition-as-Identity model—is that genuine wholes (i.e., the "good mixtures" as opposed to the "unblended disasters") are unqualifiedly one and not many. In a revealing passage from *Topics* VI.13, to which Harte (1994) draws our attention, Aristotle is inclined to agree with Plato's rejection of the Composition-as-Identity model, at least as an across-the-board theory of composition; in the context of discussing the various ways in which arguments can go wrong by failing to *define* objects properly, Aristotle clearly disassociates himself from the deflationary conception of composition, at least as far as those objects (like houses) are concerned whose existence and identity depends on the *manner* in which their parts are *arranged*, and not merely on the presence of these parts:

> In general, too, all the ways of showing that the whole is not the same as [the sum of][5] its parts are useful in meeting the type [of argument] just described; for a man who defines in this way seems to assert that the parts are the same as the whole. The arguments are particularly appropriate in cases where the process of putting the parts together is obvious, as in a house and other things of that sort; for there, clearly, you may have the parts and yet not have the whole, so that parts and whole cannot be the same.
>
> (*Topics* VI.13, 150a15–20)[6]

(p.126) Instead, Aristotle recommends that in these cases the proper procedure is to define an object by stating "not merely that it is made *from these things*, but that it is made from them *in such and such a way*" (ibid., 150b20–25).

While these passages from *Topics* VI.13–14 provide a good partial glimpse into what is to follow, they of course do not occur in a context in which it would be appropriate to explore different theories of parthood and composition in great depth, since the aim of the treatise is to teach us, by means of practical advice and rules of thumb, how to "reason from reputable opinions about any subject" and to avoid inconsistencies in the process (*Topics* I.1, 100a20ff). In fact, Aristotle's reaction to the Problem of the One and the Many is subtle and

difficult to characterize; it requires us to pay attention, among other things, to his distinction among the different uses of the terms employed in the question "Is a whole one or many, i.e., as many as its parts?": for, in typical Aristotelian manner, something can be said to be *one* (or *many*) in a particular way, but not in another; something can also be said to *be* in a particular way and not in another; and, as it turns out, even the terms "part" and "whole", are spoken of in many ways.

§VI.4 A Reading of the Text

§VI.4.1 One, Divisibility, Part, Quantity and Measure

To be *one*, in Aristotle's view, is at bottom to be *indivisible* (ἀδιαίρετον); this is the core meaning of the term "one", and the common thread that ties together all the different uses of the term he discerns.[7] Terms like "unit", "unified" and "unity", all of which are simply different English renditions tracing back to the single underlying Greek term for "one" (τὸ ἕν), are thus also inseparably linked to the notion of *divisibility* (or the lack thereof). The notion of *divisibility*, on the other hand, immediately takes us (first and foremost)[8] into the domain of **(p. 127)** *quantity* and is in turn associated with the notions of *part* and *measure*.[9] For any *division* is always in its barest form at least a division of a quantity into subquantities which are its *parts*; each of these is *one* by some *measure*; and to say into *how much* or *how many* of the measures in question a thing can be divided is to approach the thing from a *quantitative* perspective. (Aristotle views both what can be counted or enumerated, i.e., "plurality" or "number", as well as what can be measured, i.e., "magnitude", as falling into the category of quantity; they are different species of quantity.)[10, 11] In some cases, a division into parts proceeds by means of additional non-quantitative considerations, in which case the door is opened for further comparisons among objects that are not purely quantitative. (The distinction between purely quantitative divisions and divisions that introduce further considerations that are not purely quantitative will be clarified further below.)

To illustrate, consider for example the syllable "ba". To ask, "Is it one or many? And if many, how many?" is, so to speak, to hold a conceptual ruler against the syllable in question and to evaluate it from a quantitative perspective, i.e., from a perspective that yields an answer to a "how much" or "how many" question. But in order for the quantitative evaluation to be executable, first a unit of measurement, i.e., something that counts as one or indivisible in the context at hand, must be supplied: this unit of measurement determines by what principle the division into parts is to proceed. Thus, by means of the measure "letter", "ba" is divisible into *two* parts, "a" and "b", each of which is in turn indivisible, i.e., one or a unit, by the same measure, "letter", since neither "a" nor "b" is itself further divisible into letters; by means of the measure "syllable", on the other hand, "ba" is itself indivisible, i.e., a unit or one, since it does not further consist of parts that are themselves syllables.[12] If, on the other hand, we were to try to divide the letters "a" and "b" into parts by means of the measure **(p.128)**

“syllable”, I take it the result would be either “0” or “inapplicable”, but at any rate not anything that would be regarded as a numerical answer according to ancient conceptions of number. Thus, depending on the way in which the “how much” or “how many” question at issue is formulated, we may, if the question can be answered at all, obtain either the answer “one” or the answer “many” (e.g., “two”) with respect to one and the same thing: in this way, “ba” comes out to be *one* with respect to the measure “syllable”, but *many* with respect to the measure “letter”.

In general, then, an object, for Aristotle, can be one or indivisible *in one way*, i.e., with respect to a particular measure, but not *in another*, i.e., with respect to a distinct measure, without contradiction, as long as the measures in question are distinct. Beyond being one or indivisible *in a particular way*, i.e., with respect to some measure or other, however, it presumably makes no sense to classify something as being *simply* one or indivisible in some absolute or unqualified sense (unless of course we mean by “absolutely one”, one with respect to *all* conceivable measures); for a thing cannot be evaluated quantitatively without specifying some unit of measurement by means of which the division into parts is to proceed. In this respect, the term “one” is completely in line with the other implicitly relativized central terms of Aristotle's philosophy, e.g., “being” and “good”, just as we would expect given the gist of *Met*. Γ.2 as well as Aristotle's general anti-Platonist tendencies.

These distinctions are helpful in clarifying and sharpening our understanding of the question, “Is it one or many? And if many, how many?”, when asked about any particular thing. The original difficulty concerning the One and the Many can now be transformed, with all the requisite qualifications made explicit, into the question of how something that is *many* in *any* respect *at all* can nevertheless manage to be *one* in *any* respect *at all*. How, for example, can “ba” be *one* anything (e.g., syllable) despite the fact that it is also *many* somethings (e.g., letters)? As we observed in the preceding chapter, Plato's answer to this question is “structure” in the sense of what is mathematically expressible (number, ratio, measure, proportion), imposed on content within the context of a teleologically ordered cosmos; our goal in the following sections will be to understand how Aristotle accounts for the (relativized) unity within each thing that is also a (relativized) plurality and what conception of parthood and composition guides his response to the Problem of the One and the Many.

§VI.4.2 Kinds of Measure and Principles of Unity

Given the immediate conceptual connections between “one”, “divisibility”, “part”, “measure” and “quantity”, we may read Aristotle's distinction among **(p. 129)** the different uses of the term “one” (and, correspondingly, “many”), as indicating different sorts of *mereological* constellations.[13] For one thing, these different uses of “one” and “many” in effect yield a broad division among different *kinds* of measure: each kind of measure tells us about a particular

respect in which a thing may be one or indivisible into parts and therefore contrasts with other respects in which the very same thing may be many (i.e., divisible into parts). Since the ways of being one or indivisible are thus complemented by ways of being many or divisible, we may expect the different uses of “one” and “many” to resurface again in the different uses of the terms “part” and “whole”, as we will in fact observe below. At the same time, each of the different uses of the term, “one”, in turn points us towards a particular *principle of unity*, i.e., something within the object which accounts for the fact that it is one (i.e., indivisible) in a particular way, despite the fact that it may be many (i.e., divisible into parts) in other ways. The question of precisely how many ways “one” is spoken of in the different contexts in which Aristotle discusses this topic (especially *Met*. Δ.6, Γ.2, I.1 and N.1) raises difficult interpretive issues; I will try in what follows to be as brief as possible in my discussion of detailed textual matters.

Broadly speaking, something can be one in the following four ways. First, it can be one (1) by being indivisible *in number* (in the way in which Socrates is one by virtue of being one human being). Secondly, something can be one (2) by being indivisible in *kind*; and this either by being (2.1) indivisible *in species* (in the way in which Socrates and Coriscus are one in virtue of each of them being one human being); or (2.2) by being indivisible *in genus* (in the way in which Socrates and Fido are one in virtue of each of them being one animal). Finally, things can be one (3) by being *analogically* indivisible (in the way in **(p.130)** which, say, 1:2 and 2:4 are one in virtue of each of them exhibiting the ratio one-half).[14 , 15 , 16]

Things whose *matter* is one are indivisible in the first way (viz., numerically one). Things whose *formula* (i.e., *definition*) is one are indivisible in the second way (viz., specifically one): thus, the term “human being”, as Aristotle would put it, when applied to Socrates and Coriscus, is used “synonymously” or in the same way in both cases (as contrasted, say, with the term's application to a *picture* of a human being). Though he doesn't do so in this particular context, Aristotle **(p. 131)** might also characterize the similarity between Socrates and Coriscus by appeal to the fact that they have the same kind of *soul*, viz., a characteristically *human* soul, which is their form. Things which are indivisible by virtue of a higher category are indivisible in the third way (viz., generically one): again, the term “animal”, when applied to both Socrates and Fido, is used synonymously, or with the same definition, in both cases. The similarity between Socrates and Fido may also be traced once more to the similarity between their respective forms, since both have souls that are characteristic of animals (as opposed to plants). Finally, things which are indivisible by virtue of the presence of a single relation are indivisible in the fourth way (viz., analogically one).

These broad varieties of being one yield a certain kind of ordering. Being one in the first way is being one *to a higher degree* than being one in any of the other ways, since being numerically one *entails* being one in all of the other ways, but not vice versa. Similarly, being specifically one *entails* being generically and analogically one, but not vice versa: Socrates and Coriscus, objects that are specifically one, are also automatically one in genus and by analogy, but are not indivisible with respect to their matter (viz., Socrates's body is distinct from Coriscus' body). Thus, the objects that fall into the category of being one in number, by this ranking, are one to the highest degree; those that are one in species, to the second highest degree; and so forth. This ranking is implicitly associated with the following broad division into distinct kinds of measure: objects that are one in sense (3) are indivisible only by means of a measure which falls under the general heading *relation*; those that are one in sense (2.1) and (2.2) are indivisible by means of the previous measure as well as a (qualitative) measure which falls under the general heading, *kind*, i.e., either *species* or *genus*; finally, objects that are one in sense (1) are indivisible by means of all the previous measures as well as the measure *matter*. Thus, an object like Socrates, who is indivisible in matter, species, genus and relation, is indivisible to the highest degree by the ordering suggested in Δ.6.

Some of these broad divisions into different kinds of measure or being one themselves come in different varieties, in particular (1) being one in number, i.e., by virtue of being indivisible with respect to matter. Something can be indivisible in this way either (1.1) *by accident* [17] or (1.2) *by its own nature*. Of **(p.132)** those things which are numerically one by their own nature, some are so (1.2.1) by being *continuous* (συνεχές). Among the things that are indivisible by virtue of being continuous, some are so (1.2.1.1) *by art*, others (1.2.1.2) *by nature*.[18, 19, 20] Things that are one in this way, by being continuous, *move* together, i.e., their *movements* are *indivisible* in time. Among the things that are continuous, some are so merely by *contact* (i.e., by having their boundaries *touch*), in the way in which, say, a bundle of wood is one; others are so by being "a whole" or "whole", in the way in which, for example, a shoe is one:[21, 22] objects of this kind are indivisible not only with respect to their matter (as are all objects that are numerically one in sense (1)), but also in virtue of having a single *form* (as in the case of those objects in (2.1) which are indivisible in species); the parts **(p.133)** of such objects are arranged in a particular way, as demanded by their form.[23] (Since Aristotle's use of the term "whole" in Δ.6 is actually narrower than his use of the term in the entry for "whole" in Δ.26, I will refer to the Δ.6 wholes as "high-level wholes".)

In sum, then, "one" is spoken of in the following ways:[24]

(1)	**One in number**: indivisible in matter				
	(1.1)	By accident (musical, Coriscus)			
	(1.2)	By the thing's own nature			
		(1.2.1)	Continuous: indivisible in movement		
			(1.2.1.1)	By art	
				(1.2.1.1.1)	Heap: indivisible by contact (bundle of sticks)
				(1.2.1.1.2)	High-level whole: indivisible by virtue of form (shoe)
			(1.2.1.2)	By nature	
				(1.2.1.2.1)	Heap: indivisible by contact (ivy/tree-trunk ???)
				(1.2.1.2.2)	High-level whole: indivisible by virtue of form (Socrates)
		(1.2.2)	Discrete (language, music ???)		
(2)	**One in kind**:				
	(2.1)	One in species: indivisible in virtue of form (human beings)			

	(2.2)	One in genus: indivisible by higher category (animals)
(3)	**One by analogy**: indivisible by relation (ratios)	

(p.134) Each of these varieties of unity, in turn, points to a particular *principle of unity*, i.e., something within the object that *makes* it one.[25] In particular, what holds together the parts of an object that is one (in a particular way) may be either (i), in the case of a heap, whatever it is that enforces the *contact* among the parts (e.g., bands, glue, and the like in the case of artificial heaps); or (ii) the presence of a single *form* (as in all other cases except (2.2) and (3)); or (iii) the presence of a higher category, i.e., the *genus* (as in the case of (2.2)); or (iv) the presence of a single *relation* (as in the case of (3)).[26] Some varieties of unity may be brought about either by *art*, as in the case of the bundle or the shoe, or by *nature*, as in the case of the individual human being, Socrates. With the help of additional machinery which has not yet been introduced in Δ.6, Aristotle will eventually introduce a further ranking by means of which objects whose parts are held together *artificially* will come out to be one to a lesser degree than objects whose parts are held together *naturally*; moreover, objects whose parts are held together by the presence of *a single form* will turn out to be one to a higher degree than objects whose unity results from some other source (i.e., through mere contact or through the sharing of a genus or a relation). Aristotle's motivations for this additional ranking will become apparent below. At the same time, we should note that no matter how low the musical Coriscus, the bundle of wood, the shoe and the analogy will eventually place in the final ordering of unities, these entities are nevertheless explicitly listed by Aristotle in Δ.6 as exhibiting particular varieties of unity; correspondingly, principles of unity may be as pedestrian as a bit of glue or as ephemeral as a mathematical ratio.

§VI.4.3 The Ways of Being a Part: *Met*. Δ.25

In the context of considering the different varieties of being one, as they are laid out in Δ.6, we have already encountered several general sorts of measures by means of which divisions into parts may proceed: objects that are one in number are not divisible into parts by any of the measures suggested in Δ.6; **(p.135)** species are divisible into objects that are one in number; genera are divisible into species; objects that are analogically one are divisible in one or more of the aforementioned ways, i.e., numerically, specifically or generically. Aristotle's entries for “part” and “whole” in Δ.25–26 introduce still further refinements into this already complex picture: for even those objects that were initially classified as being one to the highest degree by the measures introduced in Δ.6 (viz., the musical Coriscus, the bundle of sticks, the shoe and Socrates) as well as the principles of unity themselves (in particular, form) now themselves turn out to be not completely indivisible in every conceivable way.[27] Since the entry for “part” in Δ.25 is relatively brief, I will cite it first in full and then comment on each section in detail (the numbering and italics are Ross'):

> We call a part (1) that into which a quantity can in any way be divided; for that which is taken from a quantity *qua* quantity is always called a part of it, e.g., two is called in a sense a part of three. – (2) It means, of the parts in the first sense, only those which measure the whole; this is why two,

> though in one sense it is, in another is not, a part of three. – (3) The elements into which the kind [εἶδος] might be divided apart from the quantity, are also called parts of it; for which reason we say the species are parts of the genus. – (4) Those into which the whole is divided, or of which it consists—"the whole" meaning either the form [εἶδος] or that which has the form; e.g., of the bronze sphere or of the bronze cube both the bronze —i.e. the matter in which the form is—and the characteristic angle are parts. – (5) Those in the formula which explains a thing are parts of the whole; this is why the genus is called a part of the species [εἶδος], though in another sense the species is part of the genus.
>
> (*Met*. Δ.25, 1023b12–25)[28]

Senses (1), (2) and (3) are more or less familiar to us already from the preceding sections. Since the core meaning of "one" turns out to be "indivisible into parts by some measure, primarily with respect to quantity and secondarily with respect to other categories", we can also expect there to be correspondingly unadorned varieties of parthood, which apply to objects as viewed from a quantitative **(p.136)** perspective. This is the work done by Aristotle's first two senses of "part": (1) "that into which a quantity can *in any way* be divided" and (2) "those [parts] which measure the whole", to which I add, "in a particular, *non-arbitrary*, way", since strictly speaking any division into parts measures the whole in some way or other. Thus, Aristotle begins his exploration of the varieties of parthood by considering two ways in which objects, when viewed from a quantitative perspective, may be divided into parts, i.e., their subquantities, the second being somewhat more restrictive than the first. These first two senses of "part" would be of use primarily to the mathematician or the physicist, i.e., to someone who views objects quantitatively, as unit, number, point, line, surface, plane, solid, magnitude, and the like. (Notice the arithmetical examples.)[29] However, given Aristotle's views on the inseparability of quantities from substances,[30] the objects studied in this way by the mathematician and the physicist are the *very same* objects, when approached from a particular quantitative perspective, as those to which the more loaded uses of "part" apply as well (i.e., the bundles of sticks, shoes, human beings, and the like). Thus, when viewed by the mathematician or the physicist purely as a geometrical solid, say, or as a physical magnitude, any arbitrary division of the quantity associated with the substance, Socrates, into subquantities, by sense (1) itself counts as a part of that quantity; sense (2), while still viewing Socrates in a purely quantitative fashion, imposes further (mathematical or physical) restrictions on what sorts of conditions a subquantity must satisfy (e.g., division by a certain factor) in order to count as a part of the larger quantity.[31]

(p.137) With sense (3), Aristotle now moves beyond the purely quantitative perspective, into the domain of quality,[32] to the parts of kinds (εἶδος), i.e., species as well as genera.[33] This sort of division into parts picks up on what I

referred to earlier, in the context of the varieties of unity and plurality developed in Δ.6, as senses (2.1) and (2.2), viz., being one in kind, specifically or generically. Thus, the species, human being, has as its parts, the individual human beings, Socrates and Coriscus, who are divisible with respect to their matter (since their bodies are distinct), but indivisible with respect to their form (since both of their souls are characteristically human); the genus, animal, in turn has as its parts the species, human being and dog, which are distinguishable both by their matter (since their bodies are not only numerically distinct but also different in kind) and by their form (since the human soul is different in kind from the canine soul).

This exhausts the portion of Δ.25 which overlaps in content with the varieties of one and many, as laid out in Δ.6; we now move on to the ways in which even those objects which are counted as indivisible by all the measures introduced in Δ.6 may nevertheless be divisible into parts: in particular, those objects that are one in number by being materially indivisible (viz., the musical Coriscus, the bundle of wood, the shoe and Socrates); as well as form itself, which as a principle of unity played a central role in Δ.6 in holding together the parts of other objects (viz., the shoe and Socrates).

The fourth sense of "part" spells out the way in which a *whole* is further divisible into parts. There are apparently two cases to consider: wholes which *are* forms (εἶδος)[34] and wholes which *have* form, i.e., the sorts of objects that Aristotle often refers to as "compounds" (i.e., τὸσύνθετον, literally, "that which **(p.138)** is put together"; or simply τὸἐξ ὧν, literally, "that out of them").[35] Only the first case ("wholes as compounds") is really addressed by sense (4); I identify the second case ("wholes as forms") with the remaining sense of "part", sense (5). Those wholes which are explicitly addressed by sense (4) (wholes which have form), illustrated here by means of a bronze sphere and a bronze cube, are said to have as parts both their *matter* (the bronze) and their *form* (the characteristic angle). Notice that Aristotle explicitly takes the form and the matter to be part of the compound *according to a single sense of "part"*;[36] in other words, we do not find in Δ.25, where Aristotle's explicit business is to say in how many ways "part" is spoken of, *two separate* entries along the lines of " . . . and 'part' is spoken of in *one* way as the matter is part of the compound, in *another* as the form is part of the compound".[37]

Finally, we come to the fifth sense of "part", which concerns the mereological structure of what Aristotle calls the "formula" (λόγος): according to this sense of "part", we are told, the genus is part of the species (εἶδος), though we have of course already encountered another sense of "part" (sense (3)), according to which, conversely, the species is part of the genus. I read the current notion of parthood as applying to form (εἶδος), i.e., as filling out the promissory note mentioned in the context of the previous sense of "part", sense (4).[38] What underlies this sense of parthood is Aristotle's doctrine that the

"definition" (ὁρισμός), which is the "formula of the essence", is composed of a genus and a differentia. To illustrate, the species or form, human being, according to Aristotle, may be defined as rational animal, i.e., by stating the genus (animal) under which the species in question falls, along with a differentiating characteristic (rational), whose job it is to pick out the **(p.139)** particular species in question from among all the other species (dog, bird, horse, etc.) which fall under the same genus. Definitions play a central role all across the Aristotelian corpus, since they are the primary objects of scientific knowledge.

In sum, then, "part" according to Δ.25 is spoken of in the following five ways:

(1)	**Arbitrary Subquantity:**	A given quantity has among its parts all of the subquantities into which it can be arbitrarily divided.
(2)	**Non-Arbitrary Subquantity:**	A given quantity has among its parts all of the subquantities into which it can be divided in non-arbitrary ways.
(3)	**Species and Genera:**	Species have as their parts objects that are numerically one; genera have as their parts the species that fall under them.
(4)	**Wholes as Compounds:**	Wholes which *have* form have as their parts both the matter and the form of which they consist.
(5)	**Wholes as Forms:**	Wholes which *are* forms have as their parts the parts of their definitions, i.e., the genus and the differentia.[39 , 40]

§VI.4.4 The Ways of Being a Whole: *Met*. Δ.26

While much of the content of Δ.26 overlaps with material with which we are already familiar from Δ.6 and Δ.25, Aristotle's entry for "whole" plays an **(p. 140)** important role in introducing several new key ideas which supply his account of parthood and composition with its characteristically *normative* and *teleological* flavor; the additional machinery furnished by Δ.26 also allows us to accommodate several categories of objects which we have not yet encountered as well as to draw even more fine-grained distinctions among the categories of objects which have already been recognized in Δ.6 and Δ.25.

§VI.4.4.1 Wholes and Totals

I begin with the second half of Δ.26, which, as is to be expected, takes its subject matter to be certain kinds of *quantities*:

> Again, as quantities have a beginning and a middle and an end, those to which the position [θέσις] does not make a difference are called totals [πᾶν], and those to which it does, wholes [ὅλον], [. . .]. Water and all liquids and number are called totals, but “the whole number” or “the whole water” one does not speak of, except by an extension of meaning. To things, to which *qua* one the term “total” is applied, the term “all” [πάντα] is applied when they are treated as separate; “this total number” [πᾶς οὗτος ὁ ἀριθμός], “all these units” [πᾶσαι αὗται αἱ μονάδες].
>
> (1024a1–10; Ross' italics)

All quantities, according to Aristotle, have what he calls “a beginning, a middle and an end”, i.e., a certain *order* in which their parts are arranged, e.g., from first to last. But for some among these quantities it matters (viz., to their existence and identity) *which* part goes *where* in the arrangement of parts (viz., these are the entities for which the *position* (θέσις) of their parts makes a difference); others could have their parts shuffled around and rearranged without thereby ceasing to exist: the former are *wholes*; the latter *totals* (literally, “alls”). I interpret totals as the Aristotelian equivalent of CEM-style mereological sums or aggregates; they should be read as falling exclusively under those senses of “part”, (1) and (2), which, when applied to quantities, yield arbitrary or non-arbitrary divisions into subquantities. Aristotle's examples here for the category of “pure” totals are water and all liquids as well as number.[41] He notes that the *adjectival* use of “whole” does not apply to those entities which belong into the category of “pure” totals: **(p.141)** for example, we do not naturally say, in Greek or English, “the whole water” or “the whole oil”.[42]

In sum, then, the second half of Δ.26 introduces the following criterion by means of which to distinguish *wholes* from *totals*: wholes are objects whose identity and existence depends on the *position* (θέσις) of their parts; totals are objects whose parts may be shuffled around and rearranged without affecting the identity and existence of the total in question.[43] Even though Aristotle does not explicitly bring up *form* in the formulation of his criterion, we may infer from what he says in Δ.6 and elsewhere that, for those (high-level) wholes that are unified under a single form, it is in fact their formal component that dictates *which* part must go *where* in the order of the parts; for those objects (e.g., bundles of wood) which are not unified under a single form, if they qualify as (low-level) wholes at all, the order among the parts is enforced by means of whatever principle of unity holds together their parts (e.g., bands or bits of glue).[44]

(p.142) §VI.4.4.2 Degrees of Wholeness

Up to this point, Aristotle has proposed a means by which to distinguish wholes from a different variety of quantities external to them (viz., the totals), which fail to satisfy even the minimal requirement placed on wholes (viz., that the *position*

of their parts must make a difference to their existence and identity). The first half of Δ.26 now introduces additional criteria by which to distinguish among the different varieties of wholes: as in the case of unity, wholeness will similarly turn out to be a notion of *degree*, "wholeness being in fact a sort of oneness" (1023b36). I begin by citing the first half of Δ.26 in full:

> We call a whole (1) that from which is absent none of the parts of which it is said to be naturally a whole, and (2) that which so contains the things it contains that they form a unity; and this in two senses—either as each and all one, or as making up the unity between them. For (a) that which is true of a whole class[45] and is said to hold good as a whole (which implies that it is a kind of whole) is true of a whole in the sense that it contains many things by being predicated of each, and that each and all of them, e.g. man, horse, god, are one, because all are living things. But (b) the continuous [συνεχές][46] and limited [πεπερασμένον][47] is a whole, when there is a unity consisting of several parts present in it, especially if they are present only potentially, but, failing this, even if they are present actually. Of these things themselves, those which are so by nature are wholes in a higher degree than those which are so by art, as we said in the case of unity also, wholeness being in fact a sort of oneness.
>
> (1023b26–36)

Aristotle's characterization of wholes in (1) as "that from which is absent none of the parts of which it is said to be naturally a whole" is most easily approached by considering the *adjectival* use of the term "whole", from which its substantive uses, as in "*a* whole", are presumably derived. We have already encountered earlier a similar conceptual connection between the adjectival use of the term "one", and the nominal forms that are based on it (e.g., those that might be rendered into English as "unity", "unit", "the one", "a one", and the like): to **(p. 143)** be one, for Aristotle, is always to be one *something-or-other*, where the concept to be supplied indicates the respect in which the object in question is measured to be indivisible. Similarly, to be *a* whole, Aristotle seems to think, is to be a whole *something-or-other*, where again the concept to be supplied determines our expectations as to the *number* and *variety* of parts the object in question will in all likelihood have; these are the parts which *ought* not to be absent or missing, if the object in question is to count as one *whole* something-or-other as opposed to being merely a *partial* manifestation thereof.[48] To illustrate, if I ask you, say, to save the *whole* cake for me, I expect to find the cake in roughly the condition it was in when first taken out of the oven, plus or minus a few crumbs or microscopic particles; once (sufficiently large) pieces of the cake have been eaten or otherwise removed, the object before us is no longer a *whole* cake, though it may have survived these changes, as a partial or *incomplete* manifestation of what once was a whole or *complete* cake.

Aristotle's conception of wholes, as indicated by his characterization in (1) as “that from which is absent none of the parts of which it is said to be naturally a whole”, given his other theoretical commitments, immediately leads, as in Plato's case, to a *normative* and *teleological* conception of what it means to be a whole: to be a whole (according to the substantival form of the term) is to be a whole something-or-other (according to the adjectival form of the term), i.e., a whole specimen of a particular kind; and to be a whole specimen of a particular kind is to be a *complete* or *perfect* manifestation of the kind in question, i.e., one that is not missing any of the *important* parts, according to some standard of importance, which members of that kind may normally be expected to have.[49] And while Δ.26 itself does not have more to say on the question of how we would determine the number and variety of parts a given whole *ought* to have, or what the standard of importance might be by means of which the parts of a thing are to be ranked, we may infer from what Aristotle says elsewhere that his answer to this question would refer us to the *characteristic activity* associated with the *kind* to which the object in question belongs; as we know, for example, from his remarks on teleology and hypothetical necessity in contexts like *Phy*. II.8 and *PA* I.1, the number and variety of parts a normal member of a species can be expected to have, respecting the constraints of necessity, are just those which allow it to carry out its characteristic activity *best*.

(p.144) The idea that for every whole there is a certain number and variety of parts which it ought not to be missing raises the question of how it nevertheless seems plainly to be possible for many wholes to survive a considerable amount of fluctuation in their mereological make-up. Notice for example that I found it necessary, in this connection, to add the qualification “sufficiently large” in my illustration above to distinguish (in this case merely by size) the sorts of parts whose detachment still leaves us with a whole cake from those whose removal would turn the once complete cake into a partial or incomplete cake. Aristotle is sensitive to the fact that the normative and teleological criterion for wholes he has just proposed in (1) creates the need for the introduction of a hierarchical ordering among the parts of an object; he speaks to this issue in the following chapter, Δ.27, the entry for what he calls “mutilated” (κολοβόν): there, he attempts to propose a criterion, first, for which *objects* can be mutilated by the removal of parts and, secondly, for which among the *parts* of these objects are such that their removal leads to mutilation.[50]

Aristotle's further characterization of wholes in (2) as “that which so contains the things it contains that they form a unity”, as it stands, is relatively weak, given the upshot of Δ.6 and Δ.25, since we encountered there a **(p.145)** wide variety of objects that are regarded as having parts and as exhibiting some sort of unity, in whatever weak sense of the term. Thus, unless further qualifications are added, Aristotle's characterization of wholes in (2), on its own, does not obviously differentiate among the following entities: artificial heaps such as the bundle of wood; natural heaps such as (arguably) the ivy and the tree-trunk;

artificial high-level wholes such as the shoe; natural high-level wholes such as Socrates; discrete quantities like words and musical scales; as well as qualitative classifications of objects that are numerically one such as the species, human being, and the genus, animal.[51 , 52] With “wholeness being in fact a sort of oneness”, any object that has parts at all and whose parts are held together by means of some principle of unity may be expected to count as a whole, though wholeness, like oneness, will naturally come in degrees depending on the nature of the principle of unity at work.

The relative weakness of the conception of wholes at work in (2) is in fact confirmed in the two-fold distinction that follows, according to which objects that have parts and exhibit some form of unity count as wholes (2.a) “either as each and all one” or (2.b) “as making up the unity between them”. The first category is tailored to account for the etymological connection between the word for whole (ὅλον) and the word for *universal* (καθόλου), which Aristotle takes quite seriously. In this sense of “whole”, for example, the universal, living thing, counts as a whole because it yields a mechanism for collecting together under a single qualitative heading all of the things of which it is predicated, i.e., man, horse, god, etc. This category of wholes thus corresponds to sense (2) of “one” (being one in kind, either in species or genus) and sense (3) of “part” (“the elements into which the kind might be divided”).

Despite the fact that universals are explicitly classified as wholes by (2.a), it is quite obvious that Aristotle regards such entities as being wholes to a lesser degree from that exhibited by category (2.b), viz., wholes that are “continuous” [“συνεχές”] and “limited” [“πεπερασμένον”].[53] For the parts of a universal are **(p.146)** already in and of themselves objects that exhibit some variety of unity (“each and all of them, e.g. man, horse, god, are one”), whereas wholes of type (2.b) are apparently different in this respect, “making up the unity between them”. Thus, Aristotle may be read as taking the whole-status of universals as being derivative of that exhibited by those numerically one objects that are being collected together under a single qualitative heading by means of the universal.[54]

Category (2.b), wholes that are continuous and limited, is now subdivided further by means of the single most powerful device in Aristotle's teleological toolkit, which has up to this point not made an appearance, the distinction between what is *actual* and what is *potential*: for among wholes of type (2.b), Aristotle says, some are such that their parts are present in them only *potentially*, while others are such that their parts are present in them *actually*; the former are wholes to a higher degree than the latter.[55] Furthermore, each kind of whole can come about either by *nature* or by *art*; again, the former are wholes to a higher degree than the latter.

Unfortunately, Aristotle is less than generous with examples to illustrate the subdivisions of category (2.b). I take the category of wholes whose parts are present in them only potentially to include our earlier natural and artificial high-level wholes (Socrates and the shoe) which are unified under a single **(p.147)** form. It is less obvious how to construe the category of wholes whose parts are present in them actually; Aristotle might have in mind here the natural and artificial heaps distinguished earlier, such as the bundle of wood and the ivy around the tree-trunk, whose parts are not unified under a single form.[56 , 57]

Although Aristotle does not explicitly bring up form in Δ.26, we know from what he says elsewhere that it is in fact the presence of form which accounts for the fact that those wholes that are unified under a single form have their parts present in them only potentially. In this way, the distinction between actuality and potentiality is closely aligned with Aristotle's "Homonymy Principle", with which we are already familiar from the preceding chapter and according to which a severed hand (say) is a "hand" in name alone. In general, by the Homonymy Principle, no object that is *not* already part of a whole that is unified under a single form can survive *becoming* part of such a whole; and no object that *is* already part of such a whole can survive *ceasing* to be part of it. The reason underlying this radical doctrine is that any such transformation would essentially involve a change in *kind membership* (e.g., a change from being an object that plays a **(p.148)** certain characteristic role within a living human organism, to being an object which is not tied in this way into the functioning of a living human organism); and no single object could survive such a change in kind membership.[58] Since the very same hand that *is* part of a living human organism could never enjoy an existence separate from the organism of which it is part, its presence within the organism is only *potential*. (For if it were present in the organism *actually*, there would be no reason for it not to be able to exist separately from the whole of which it is part; as a result, however, the whole would be *that* much less unified.)[59] Aristotle's teleological apparatus thus leads to the consequence, which is bound to be surprising from a modern perspective, that those wholes which are unified under a single form do not have any parts at all *actually*; they do so only *potentially*.[60] For this reason, wholes of this kind are wholes to a higher degree than wholes of other kinds, since they are *one* (or indivisible into parts) to a higher degree than other wholes, "wholeness being in fact a sort of oneness".[61]

(p.149) In sum, then, Aristotle proposes in Δ.26 the following characterization of wholes:

(1)	**Wholes as Complete:**			A whole is a complete or perfect (i.e., unmutilated) specimen of a particular kind.
(2)	**Wholes as Unities:**			Anything that has parts and is one is a whole to some degree.
	(2.a)	**Universals:**		Universals are wholes because they provide a mechanism for collecting together objects that are in themselves already one under a single qualitative heading.
	(2.b)	**Continuous and Limited Wholes:**		The parts of continuous and limited wholes together make up a unity.
		(2.b.i)	**Single Form:**	Wholes that are continuous and limited are wholes to a higher degree when their parts are present in them only *potentially*.

		(2.b.ii)	**No Single Form:**	Wholes that are continuous and limited are wholes to a lesser degree when their parts are present in them *actually*.[62]
(3)	**Wholes vs. Totals:**			Quantities are wholes when the *position* of their parts makes a difference to their existence and identity; totals otherwise.

Given the different criteria for being a whole, and those for being a whole to a higher or lesser degree, we can furthermore rank the different entities which I **(p.150)** have used as illustrations throughout this chapter in the following way, starting with highest-degree wholes and ending with quantities that are not wholes at all:

(1)	**Wholes as Forms** [63]			(Definition = genus + differentia)
(2)	**Wholes as Matter/Form Compounds:**			(high-level wholes)
	(2.1)	Continuous Compounds:		
		(2.1.1)	Natural	(Socrates)
		(2.2.1)	Artificial	(shoe)
	(2.2)	Discrete Compounds:[64]		
		(2.2.1)	Natural	(???)
		(2.2.2)	Artificial	(music, language)
(3)	**Wholes as Heaps:**			(lower-level wholes)
	(3.1)	Natural Heaps		(ivy/tree-trunk)
	(3.2)	Artificial Heaps		(bundle of wood)
(4)	**Wholes as Universals**			(human being, animal, living thing)
(5)	**Totals**			(numbers, liquids)[65]

§VI.5 Summary of Sections VI.3–4: The Highlights

In the preceding sections, I have focused mainly on the entries for “one”, “part” and “whole” in Book Δ of the *Metaphysics*, the so-called “Philosophical Lexicon”. Despite the relative brevity and density of these texts, the resulting mereology is remarkably subtle and wide-ranging in its application. Before I turn to some conceptual issues which I see as arising from Aristotle's analysis of parthood and composition, I want to restate the highlights of Sections III–IV; I will do so by **(p. 151)** showing in what way, using the vocabulary of the preceding chapter, Aristotle's mereology agrees with the main features of the Platonic account, according to which wholes are (i) genuinely *unified*; (ii) *ontologically committing*; (iii) governed by a *restricted* notion of composition; (iv) comprised of the two components of *structure* and *content*; (v) ontologically *prior* to their parts; (vi) *normative* and *teleological* in nature; as well as (vii) inherently *intelligible* and the *proper objects of science*.

(i) *Unity*. Aristotelian wholes, like their Platonic counterparts, are genuinely unified, though we need to qualify Aristotle's answer to the question “Are wholes one or many, as many as their parts?” in two respects. First, the notions “one” and “many”, in Aristotle's view, must always be understood as being relativized to a particular *measure*. Aristotle takes the core meaning of “one” to be “indivisible (into parts)” and, correspondingly, that of “many” to be “divisible (into parts)”, where a division into parts always proceeds by means of some measure; the measure in question indicates the respect in which the object, which is to be evaluated from a quantitative or other perspective, is judged to be one (indivisible) or many (divisible). The result of this explicit or implicit relativization of the notions “one” and “many” is that one and the same object can be measured to be one or indivisible into parts in one respect, while being measured to be many or divisible into parts in another respect. While it is therefore true to say that Aristotelian wholes are always one or indivisible into parts *in some respect*, they tend to be at the same time many or divisible into parts in other respects. Thus, Aristotle would respond to the initial question posed by the Problem of the One and the Many, “Are wholes one or many, as many as their parts?”, in a characteristically qualified manner, by answering, without contradiction, “Wholes are both one and many, as many as their parts”, depending on the measure by means of which a particular division into parts proceeds.

Secondly, we saw that Aristotle's answer to the Problem of the One and the Many must be qualified by taking note of the particular *principle of unity* by means of which the parts of a given whole are held together. For wholes, in Aristotle's view, come in many different varieties, almost as many varieties as objects that are one or unified; and wholeness, like oneness or unity, is a notion of *degree*, depending on the strength of the particular principle of unity by means of which the parts of the object in question are held together. Though Aristotle sometimes uses the term “whole” in a stricter sense which applies only

those wholes that are unified under a single form, he also allows for a relatively permissive use of the term according to which anything that has parts and is one, in whatever weak sense of the term “one” counts as a whole. This weaker use of the term “whole”, on my reading of Aristotle, encompasses entities as varied as the following: Aristotelian forms, in the guise of definitions, whose parts are the genus and the differentia; the entities I have termed artificial or natural “heaps”, whose parts are not unified under a single form, e.g., the bundle of wood and (arguably) **(p.152)** the ivy growing around a tree-trunk; those I have termed natural or artificial “high-level wholes”, which are continuous and whose parts are unified under a single form, e.g., the shoe and Socrates; the so-called “discrete quantities”, such as words and musical scales; as well as the “universals”, e.g., the species, human being, and the genera, animal or living thing, which provide a mechanism for collecting other objects together under a single qualitative heading. The only entities which seem to be *excluded* from whole status, under this weak construal of the term, are the so-called “accidental unities”, e.g., the musical Coriscus, and the analogies, e.g., the relation between 1:2 and 2:4, neither of which indicate a genuinely mereological constellation of their own; as well as the so-called “totals”, e.g., numbers and liquids, from the second half of the chapter on wholes in Δ.26, which fail to satisfy even the minimum requirement placed on wholes, viz., that the *position* of their parts must make a difference to their existence and identity. In sum, then, while Aristotle agrees with the Platonic position that wholes are genuinely unified, Aristotle's solution to the Problem of the One and the Many yields an implicitly *relativized* conception of wholes as well as one which allows for *degrees* of wholeness, corresponding to the strength of the principle of unity by means of which the parts of an object are held together: depending on the particular category of entity in question, principles of unity can range from bits of glue or bands holding together individual wooden sticks into the shape of a bundle, to full-fledged and teleologically loaded Aristotelian forms.

(ii) *Ontological Commitment*. As can be gleaned even from Aristotle's early remarks in *Topics* VI.13 cited above, as well as from the regress argument in *Met*. Z.17 discussed in the previous chapter, Aristotle in general agrees with the Platonic account that wholes must be numerically distinct from their parts, insofar as their parts can have a separate existence from the whole at all: since the existence and identity of a whole depends on the manner in which their parts are arranged, Aristotle reasons (by implicitly appealing to a Leibniz's Law-style argument) that a whole cannot be numerically identical simply to its parts, when these parts can also be found in different arrangements. (This much is true, I take it, even of natural and artificial heaps.)

This picture is complicated, however, by the introduction of Aristotle's teleological apparatus, in particular the powerful actual/potential distinction and its accompanying Homonymy Principle, according to which (say) a severed hand is a “hand” in name alone and an “eye” that cannot see is an “eye” only in an

extended sense of the term. For the parts of those wholes which are unified under a single form cannot even exist separately from the whole of which they are part, since such a transformation would involve a change in kind membership which no single entity can survive; the parts of such wholes (other than form) maintain a merely *potential* presence within the whole of which they are part, with the surprising consequence that wholes that are unified under a single form, despite appearances, *actually* have no parts at all and are for this **(p.153)** reason *that* much more unified.[66] Since for these wholes the question of the separate existence of their parts does not even arise, Aristotle now takes himself to have the option of holding that the parts of such high-level wholes are not distinguishable from the whole of which they are parts, though their *mode* of existence is different, the parts existing merely potentially within the whole, while the whole is capable of existing actually.[67] However, the mysterious oneness or sameness between matter/form compounds and their merely potentially existing parts is so teleologically, and otherwise, loaded that, to put it mildly, it is a far cry from the ontological innocence of the Lewis-style or Eleatic approach to mereology; in this sense, then, I take it that we are quite justified in regarding Aristotelian wholes as carrying considerable ontological commitment.[68]

(iii) *Restricted Composition*. A full answer to the question of whether and how Aristotle's mereology utilizes a restricted conception of composition depends in **(p.154)** part on how we resolve a difficult issue which I have deliberately not brought up so far, viz., the question of whether Aristotle's system utilizes several distinct notions of parthood and composition and, if so, how many. I will be suggesting below that Aristotle may have to be interpreted as making use of several distinct notions of parthood and composition, to avoid the prospect of having to give up on certain non-negotiable formal properties of the part relation. For now, however, it is sufficient to recall that, among the entities we encountered in the previous sections, the only plausible candidates for a CEM-style unrestricted notion of composition are the mathematician's and physicist's quantities that are governed by sense (1) of “part”, according to which any *arbitrary* division of a quantity into subquantities yields a division into parts. All other entities discussed above, it is safe to say, are governed by a restricted notion of parthood and composition of some sort. Sense (2) of “part”, for example, explicitly requires that the divisions of a quantity into subquantities that are governed by it must be *non*-arbitrary; moreover, quite obviously not every plurality of objects gives rise to something Aristotle would consider a species or a genus, a matter/form compound, a form, a discrete quantity, or even a heap. Thus, even without committing ourselves explicitly on the precise number of distinct notions of parthood and composition that are at work in Aristotle's mereology and the nature of their restrictions, we may conclude that the great majority of them are restricted.

(iv) *Structure/Content Dichotomy*. One of the most central features of Platonic wholes, as they were characterized in the previous chapter, is their dichotomous nature: they consist of *structure* (which, for Plato, is that which is mathematically expressible: number, measure, ratio, proportion, and the like) and *content* (that on which structure is imposed); both of these components, according to the "wholes as composed of structure" model I endorsed, are to be viewed as *parts* of the whole. Since Aristotelian wholes come in so many different varieties, it is difficult to discern in all of them a single uniform dichotomous nature: even though the parts of all wholes are held together by some principle of unity, it is not equally natural in all cases to take the principle of unity itself to be a *proper part* of the whole in question. (The case of universals comes to mind in this connection; however, perhaps in part for this very reason, these entities were also seen to be assigned a secondary, possibly derivative, whole status.) At the same time, Aristotle's high-level wholes, which are in any event those that are of primary interest to us given the purposes of this discussion, nicely conform to the Platonic picture: those wholes that are unified under a single form quite clearly display the two-fold nature of a Platonic whole, with the structure-role being played this time by Aristotelian *forms* and the content-role being played by Aristotle's concept of *matter*. The matter/form distinction is of course extremely difficult to characterize, and I won't attempt an adequate treatment here. We may be content to characterize matter, in this context, in the same negative terms which were used in relation to Platonic content, as "that on which form may **(p.155)** be imposed", noting that Aristotle's conception of matter in general (i.e., with the exception of the controversial "prime matter") seems to conform quite well to the "less murky" conception of content suggested in the previous chapter, according to which content is best thought of as being in itself already structured. The range of entities which can be found to be designated as matter is extremely wide and varied, and often includes entities that are surprisingly "unstuff-like"; the following are representative examples: the four elements (i.e., earth, air, fire and water); the so-called "homoiomerous substances" (e.g., flesh, blood, marrow, hair, and the like); the so-called "anhomoiomerous substances" (e.g., arms, legs, eyes, hearts, brains, and the like); anything that underlies change, as in *Phy*. I (e.g., the musical man who turns unmusical); the premises of an argument; the parts of mathematical objects (e.g., the half line is at times identified as the matter for the whole line); and even the genus, as it appears in the definition (e.g., animal is sometimes, apparently, regarded as the matter underlying the differentia, rational, in the definition of human being as rational animal).[69]

Aristotelian forms, unlike Platonic structure, in most cases cannot be captured in purely mathematical terms.[70] In contrast to Plato's *cosmic* teleology, which sometimes appears to be explicitly theological (at least according to the literal reading of the *Timaeus*), each Aristotelian form, so to speak, already has its own, *localized*, teleological content built into it. If we think of Aristotle's universe as

being divided into different *kinds* of entities, each of which contributes to the teleological ordering of the cosmos by performing a certain *characteristic activity* of its own, then we may conceive of Aristotelian forms as having the job roughly of capturing in teleological terms the particular activity characteristic of each object.[71] In most cases, with the possible exception of the so-called "totals", an object's ability to fulfil its teleological role requires that its parts be *arranged* in a certain specific manner; in these cases, the task of form, then, includes a specification of the particular arrangement of parts that is required for the object's ability to carry out its characteristic function. In this vein, for example, a house is defined in *Met*. H.2 as bricks, stones and timbers (the matter) arranged in such **(p.156)** a way as to provide a covering for bodies and chattels (the form and end). And while Aristotle's teleology, like Plato's, ultimately has a theological component as well (as is laid out in *Met*. Λ), Aristotle's God, whose activity is thought ceaselessly thinking itself, enters into the mereology only in a relatively remote way, by inspiring other objects, as their object of desire, to be as much like him in their activities as they can be, given their own natures.

In sum, then, while we may ascribe to all Aristotelian wholes some principle of unity which holds together their parts, the Platonic dichotomy of structure and content applies most straightforwardly to high-level Aristotelian wholes, whose components are form and matter. Aristotelian forms, however, must be read quite differently from the mathematical conception of structure prevalent in Plato, with each of them already containing their own localized teleological content, tailored to the particular kind of object at issue and its characteristic activity.

(v) *Priority of Wholes over Parts*. Given Aristotle's actual/potential distinction and the closely aligned Homonymy Principle, high-level Aristotelian wholes are ontologically prior to their parts, in the sense distinguished in the previous chapter: no single object can survive either becoming part of a high-level whole of which it is not already part or ceasing to be part of a high-level whole of which it is already part, since such a transformation would involve a change in kind membership which no single object can survive. The same radical doctrine, however, does not obviously apply to other wholes, since it is connected specifically with the presence of form as principle of unity.

(vi) *Normativity and Teleology*. Aristotle conceives of wholes as *complete* or *perfect* (i.e., *unmutilated*) specimens of a particular kind, as is best made explicit by considering the adjectival use of the term "whole" (as in "Please save the *whole* cake for me"). To this extent, all wholes have a certain number and variety of parts which they *ought* not to be missing if they are to be *normal* members of the species to which they belong; these are the parts which, respecting the constraints of necessity, allow each object to carry out its characteristic activity best. In addition, high-level wholes, whose parts are unified under a single form,

satisfy further teleological conditions, as brought out by the actual/potential distinction and the accompanying Homonymy Principle, since their parts are incapable of even carrying on a separate existence outside the whole to which they belong. Thus, Aristotle's conception of parthood and composition, like Plato's, is quite explicitly normative and teleological, though they differ on how the details are to be filled in.

(vii) *Proper Objects of Science*. Again, Aristotle's mereology requires a qualified answer to the question of whether wholes are inherently intelligible and the proper objects of science. As he explains primarily in *Posterior Analytics* and certain sections of the *Metaphysics*, the proper objects of scientific knowledge are first and foremost universals with which Aristotelian forms, in the guise of definitions, are sometimes identified. Thus, it is not the form/matter compounds **(p.157)** or high-level wholes that are in the first instance the proper objects of science, since they are primarily objects of perception; rather, the proper objects of science are those wholes, i.e., the forms and universals, whose status in Aristotle's mereology was seen in the previous remarks to be problematic in various respects.

To summarize, then, Aristotle's account of wholeness centers on the following three criteria. (1) *Completeness*: Wholes are complete or perfect (i.e., unmutilated) specimens of a particular kind; (2) *Unity*: their parts are held together by some principle of unity of whatever degree of strength; and (3) *Position*: the position of their parts makes a difference to their existence and identity. Wholes are furthermore ranked into higher or lower kinds, depending in part on whether they are *continuous* (in the sense that their parts share boundaries) and whether their parts are held together by the presence of a *single form*. With the proper qualifications added, we may conclude that Aristotelian wholes share the seven characteristic features of Plato's mereology: they are (i) genuinely *unified*; (ii) *ontologically committing*; (iii) governed by a *restricted* notion of composition; (iv) comprised of the two components of *structure* and *content*; (v) ontologically *prior* to their parts; (vi) *normative* and *teleological* in nature; as well as (vii) inherently *intelligible* and the *proper objects of science*. Since Aristotle's wholes come in so many different varieties, not all wholes satisfy all of these characteristics to the same extent; however, it is fair to say that, in every respect other than the epistemological concerns of (vii), Aristotelian high-level wholes, the compounds of matter and form, are closest to the Platonic conception.

§VI.6 Discussion

§VI.6.1 The Formal Properties of Parthood

In the remainder of this chapter, I want to raise in particular two conceptual difficulties which I see as arising from Aristotle's mereology: the first concerns the sheer complexity of Aristotle's system. The preceding sections have shown Aristotle's ontology to be mereologically nested in multiple, complex ways;

moreover, the range of entities to be covered by his relatively brief remarks on mereology proper is simply enormous and includes anything ranging from numbers, universals and definitions to liquids, bundles of wood, shoes and human beings. We may wonder whether the ambitious scope and complexity of Aristotle's system is not in itself problematic.

Consider the following difficulty. According to Aristotle's account of parthood and composition, we know that high-level wholes, i.e., matter/form compounds such as Socrates and Coriscus, have among their proper parts their form and their matter. Form, in the guise of definition, in turn is said to be composed of a genus **(p.158)** and a differentia; in this case, rational and animal. Thus, by transitivity, Socrates and Coriscus apparently have among their proper parts the genus, animal, and the differentia, rational. However, Socrates and Coriscus, as individual human beings, are also themselves proper parts of the species, human being, which in turn is a proper part of the genus, animal. Thus, it seems to be a consequence of Aristotle's remarks not only that the genus, animal, turns out to be a proper part of Socrates and Coriscus, but also, contra the *asymmetry* of the proper part relation, that Socrates and Coriscus turn out to be proper parts of the genus, animal, as well. At the same time, of course, Aristotle would not want to *identify* Socrates and Coriscus with each other or with the genus, animal, which after all also has among its parts lots of other individual human beings, along with all the other living things that are animals, i.e., the dogs, birds, horses, and the like. Nor should it turn out, by transitivity, that Socrates is a *proper part* of Coriscus or, vice versa, that Coriscus is a proper part of Socrates. Something clearly has to give.

Aristotle has several options at this juncture. First, he could reject certain of the formal properties of the part relation, such as the *transitivity* of parthood or the *asymmetry* of proper parthood. I will not seriously entertain this first option, since (following Simons 1987) I take these to be among the non-negotiable formal core of the part relation.

Secondly, Aristotle could argue that the above line of reasoning turns on *mis-identifying* some of the members of the purported chain of mereologically nested entities, which eventually leads to trouble with the formal properties of parthood. For example, he could propose in this connection that form, in the sense in which it is a proper part of any matter/form compound, is *not* to be identified with definition. Given my remarks in the following section concerning the problematic mereological status of form, I take this second option to be quite plausible, though it is not one Aristotle could endorse lightheartedly, given the epistemic and other pressures he apparently feels, in certain contexts (such as *Met*. Z), to identify form with definition.

Thirdly, Aristotle could resolve the above difficulty by suggesting that the sense of “part” in which, say, form is part of an individual human being is not the same sense as that in which, say, Socrates is part of the species, human being: in other words, according to this proposal, Aristotle might reject the claim that the purported chain of mereologically nested entities identified above is in fact chained together by a single relation of parthood. Although this is a live option, I recommend, given the results of our discussion of Kit Fine's work in Chapter IV, that it is best avoided if other solutions are available, since it ultimately leads to a proliferation of primitive, *sui generis* relations of parthood and composition, whose formal characteristics must be explicitly imposed on them by means of distinct bodies of postulates.

In sum, then, while the objection raised in this section is not fatal to Aristotle's mereology, it does require him to incur certain costs: definitions, matter/form **(p.159)** compounds, species, and genera cannot be straightforwardly understood as being ordered by means of a single asymmetric and transitive relation of proper parthood.

§VI.6.2 In Search of the Ultimate Mereological Atom

Finally, I want to turn to an issue to which I have alluded many times already in the preceding sections: the difficult status of *form* within Aristotle's mereology. Like Harte (1994), I take this to be a central, and quite possibly *the* central, problem to which Aristotle's analysis of parthood and composition leads; moreover, it is a problem not just for his mereology proper but for his metaphysics at large.

Form is by no means the only principle of unity Aristotle recognizes, since Aristotelian principles of unity come in many different varieties, ranging from bits of glue, which enforce physical contact, to the qualitative similarities captured by universals. Nevertheless, form was identified in the preceding sections as the most powerful principle of unity, in the sense that those wholes that are unified by form *actually* have no parts at all, but do so only *potentially*; to this extent, such objects are wholes to a higher degree than other objects which are not unified by means of form, precisely because they are *one* (or indivisible into parts) to a higher degree than other objects. It is fair to say, then, that the unity of a high-level whole or matter/form compound is, in this sense, *borrowed* from form: such objects inherit their status as highly unified objects from the forms which act as their principles of unity.

At the same time, however, Aristotle seems to be committed to the view that forms themselves, at least in the guise of definitions, are *mereologically complex*: the parts of form are repeatedly identified as the parts of definition, the genus and the differentia. This of course gives rise to the following difficulty: if form in fact has parts, and all mereologically complex objects that are genuinely unified must have their parts held together by means of some

principle of unity, then what, if anything, could act as the *further* principle of unity which holds together the parts of form? Unless this quandary can be put to rest in some way, either by meeting it head-on or by rejecting some of its presuppositions, the unity of form is called into question and, with it, also that of matter/form compounds, which depend on form as their source of unity.[72]

(p.160) At least in part to blame for Aristotle's ambivalent attitude concerning the mereological status of form is the conceptual connection he sets up right from the start between the notions, “one” and “indivisible into parts”: for, given this link, only an object that is a true *mereological atom*, i.e., one that is indivisible relative to *all* conceivable measures by means of which other objects turn out to be mereologically complex, could ever put to rest the continued demand for further principles of unity, by claiming to have its unity in a primitive and underived manner. All other objects are found to be many or divisible into parts by some measure; and we may thus continue to ask about these objects from what source they derive their unity. There is thus, according to my reading, at least a strand within Aristotle according to which he has launched himself on a search for the ultimate mereological atom; and, despite the close ties between form and definition, there is evidence that Aristotle would like this search to end with form: on this view, form, and in general all things which are *without matter*, and which, for this reason, are viewed as *pure actuality*, are *simple*, and therefore lack all mereological and ontological complexity.

This suspicion is confirmed by consulting two crucial texts, which also constitute the most detailed development of *examples* of Aristotelian forms, viz., the discussion of the soul in *De Anima* and that of God in *Met*. Λ. In *Met*. Λ.7, for example, Aristotle is quite explicitly concerned to establish that God, the unmoved mover, is *without parts* (ἀμερής) and *indivisible* (ἀδιαίρετος), as the following passage illustrates:

> It is clear then from what has been said that there is a substance which is eternal and unmovable and separate from sensible things. It has been shown also that this substance cannot have any magnitude, but is *without parts* [ἀμερής] and *indivisible* [ἀδιαίρετος].
>
> (1073a3–7; my italics)

Moreover, Aristotle goes to considerable lengths to argue in *Met*. Λ.9 that the unmoved mover's activity (thought thinking itself) is directed at an object (the unmoved mover himself) which is not *composite* (σύνθετον):

> A further question is left—whether the object of the thought is *composite* [σύνθετον]; for if it were, thought would change in passing from *part* to *part* of the whole. We **(p.161)** answer that *everything which has not matter is indivisible*. As human thought, or rather the thought of composite objects, is in a certain period of time (for it does not possess the good at this moment or that, but its best, being something *different* from it, is

> attained only in a whole period of time), so throughout eternity is the thought which has *itself* for its object.
>
> (1075a5–10; last two italics are Ross')

As this passage illustrates, Aristotle's rationale for viewing the unmoved mover as incomposite is quite general and can thus be read as applying to *all* form: form is incomposite and hence indivisible and without parts, he states, precisely because it is completely free of matter, i.e., pure actuality.[73] According to this reasoning, then, it is a thing's association with matter which leads to its mereological complexity.

On the face of it, Aristotle's discussion of the form of *non-divine* living things, i.e, the soul, in *De Anima*, seems to conflict with this reading, since he there does seem to speak quite overtly of the soul as having *parts*. For example, the human soul is said to have as parts the faculties responsible for nourishment and growth, locomotion, perception and thought. However, when we look more closely at the text, we see that, in contexts in which he is being careful about his choice of words, Aristotle in fact expresses some uneasiness concerning the practice of referring to these "powers", "potentialities" or "capacities" (δυνάμεις) of the human body as *parts* of the soul in the strict mereological sense. For example, in *DA* III.9–10, Aristotle explicitly worries that, if the faculties really were to be viewed as genuine parts, the soul would, as a result of this view, be divided into an absurdly large number of parts:

> Those who distinguish parts [μέρη] in the soul, if they distinguish and divide in accordance with differences of power [δυνάμεις], find themselves with a very large number of parts, a nutritive, a sensitive, an intellective, a deliberative, and now an appetitive part; for these are more different from one another than the faculties of desire and passion.
>
> (*DA* III.10, 433b1–4)

In fact, as the following passage from *DA* I.5 seems to indicate, one of the reasons for Aristotle's reluctance to consider the faculties of the soul as, strictly speaking, parts of it, is precisely his awareness of the potential regress that would result from a conception of the soul as itself mereologically complex:

> Some hold that the soul is divisible [μεριστήν], and that we think with one part and desire with another. If, then, its nature admits of its being divided, what can it be that **(p.162)** holds the parts together? Surely not the body; on the contrary it seems rather to be the soul that holds the body together; at any rate when the soul departs the body disintegrates and decays. If, then, there is something else which makes the soul one, this would have the best right to the name of soul, and we shall have to repeat for it the question: Is *it* one or multipartite? If it is one, why not at once admit that

> *the soul* is one? If it has parts, once more the question must be put: What holds *its* parts together, and so *ad infinitum*?
>
> (411b5–14; Smith's italics)

This passage suggests that, despite Aristotle's loose way of speaking of powers as parts, he in fact takes it to be the best remedy against a potential regress of principles of unity simply to let the buck stop with form: if forms are mereologically simple, then the unity of the soul needs no further account, since it has no parts relative to any applicable measure.[74]

In sum, then, according to the reading I have suggested in the preceding paragraphs, both Aristotle's discussion of the unmoved mover in *Met*. Λ as well as, despite first appearances, his discussion of the soul in *De Anima*, confirms the suspicion that form, in contexts in which it is *not* thought of as the object represented in a definition, plays the role of the ultimate mereological atom within Aristotle's system; it is precisely because of its mereological simplicity that form can perform the crucial tasks of putting to rest the potential regress consisting in an endless demand for further principles of unity.

§VI.7 Concluding Remarks

The focus of this chapter has been Aristotle's theory of parthood and composition, particularly as it is laid out in two brief chapters in the "Philosophical Lexicon", **(p.163)** Book Δ of the *Metaphysics*. With the proper qualifications added, we found that Aristotle's account agrees in its main structural features with that developed by Plato, according to whom wholes have the following seven characteristics: they are (i) genuinely *unified*; (ii) *ontologically committing*; (iii) governed by a *restricted* notion of composition; (iv) comprised of the two components of *structure* and *content*; (v) ontologically *prior* to their parts; (vi) *normative* and *teleological* in nature; as well as (vii) inherently *intelligible* and the *proper objects of science*.

But we also encountered several important modifications and refinements Aristotle adds to the Platonic picture, with the result that the mereology Aristotle offers is enormously ambitious in its scope and complexity. To appreciate the intended reach and subtlety of the theory, one need only consider the range of entities that are to be accommodated by the theory and which are assigned a distinct status in it: definitions; shoes and human beings; music and language; ivy growing around a tree-trunk; bundles of wood; universals; as well as liquids and numbers.

Among the many ideas in Plato's writings on parts and wholes which Aristotle must have found attractive are, first, the close connection Plato discerns between the notions "part" and "measure"; and, secondly, the idea, suggested by the adjectival use of the term "whole", that a whole is in some sense not lacking any parts. Both of these ideas are incorporated and expanded by Aristotle into a conception of wholes that has the following main features. Unlike our

contemporary usage of the term, a whole in Aristotle's view is not simply any object that has parts; for some mereologically complex objects are what he calls “totals” (e.g., liquids and numbers). Rather, a whole must satisfy the following conditions: (1) *Completeness*: a whole is a *complete* or *unmutilated* specimen of a kind; (2) *Unity*: its parts must be held together and made *one* by some principle of unity; and (3) *Position*: the *position* of the parts must make a difference to the existence and identity of the object in question. Since Aristotle takes the notions of “one” and “many” to be implicitly *relativized*, a single object can be, without contradiction, both one (or indivisible into parts) according to one measure and many (or divisible into parts) according to a distinct measure. Moreover, wholeness in Aristotle's view turns out to be a notion of *degree*, depending on the strength of the particular principle of unity which is at work in holding together the parts of an object, “wholeness being in fact a sort of oneness”. The strongest principles of unity are those which result in wholes that are *continuous* (in the sense that their parts share boundaries) and, among those, the champion is *form*: wholes that are unified by a single form achieve such a high degree of unity that, in a particularly radical turn of Aristotle's theory, they in fact do not have any parts at all *actually*, but do so only *potentially*. His distinction between potentiality and actuality is among the main innovations Aristotle brings to bear on the Platonic theory of parthood and composition; along with the closely associated Homonymy Principle, this powerful device accounts for much of the teleological content that characterizes high-level Aristotelian wholes. The one feature with **(p.164)** respect to which Aristotle's account departs most strongly from Plato's is in its separation of the mereology from the *epistemology*: being a whole, in Aristotle's view, does not automatically confer upon an entity an epistemically privileged status as inherently intelligible or the proper object of science; in fact, those wholes that have these features tend to be those which are least straightforwardly accommodated by his mereology.

Among the conceptual difficulties to which Aristotle's system gives rise, I singled out the following two in particular. First, due to the fact that his ontology is mereologically nested in multiple, complex ways, Aristotle incurs the risk of either having to abandon some of the non-negotiable formal properties of the part relation or of generating a proliferation of distinct, primitive, *sui generis* relations of parthood and composition, each governed by its own body of postulates. Secondly, even though forms in many ways play the starring role in Aristotle's metaphysics, their mereological status is, to put it mildly, quite unresolved. I suggested that, due to some of his theoretical commitments, Aristotle has launched himself on a search for the ultimate mereological atom, which will put to rest the continued demand for further principles of unity; the best candidate to end this search seems to be form, despite the fact that Aristotle is at the same time driven to view forms, in the guise of definitions, as mereologically complex.

Notes:

(1) Aristotle's mereology as such has not received much attention in the literature, although parts and wholes do come up in connection with his theory of substance. Given the already considerable length of this chapter, I cannot in the present context provide an adequate discussion of the secondary literature; the following list provides a small selection of works relevant to the issues discussed in this chapter: Barnes (1986); Bogaard (1979); Bostock (1994); Burnyeat (2001); Burnyeat et al. (1979, 1984); Charles (1992, 1994); Driscoll (1981); Fine (1983, 1992, 1994c, 1995c, 1998); Frede and Patzig (1988); Furth (1985, 1986); Gill (1989); Halper (1989); Hamlyn (1993); Harte (1994, 1996); Haslanger (1994b); Kirwan (1971); Lewis, F. A. (1991, 1994, 1995a, 1995b); Loux (1991); Makin (1988); Mignucci (2000); Reeve (2000); Rorty (1973); Scaltsas (1985, 1994); Shields (1999); Wedin (2000); Witt (1989, 2003).

(2) Though I will suggest at the end of this chapter that we should not take Aristotle's talk of powers as parts of the soul literally in *De Anima*.

(3) Though this doctrine of the so-called “focal meaning” of “one” as being that which applies to substance seems to contradict what Aristotle says in many other places, when he speaks of the primary sense of “one” as that which applies to *quantity* (τὸποσόν, literally, “the how much”): being one in the strictest sense, we are often told, is a kind of *measure* (μέτρον τι), primarily of quantity, and secondarily of quality (see, for example, *Met*. I.1, 1053b4–8). The relation between substance and quantity as well as the different senses of “one” will concern us shortly.

(4) Unless otherwise noted, all translations come from Barnes (1984); and all italics can be assumed to be mine, unless otherwise specified.

(5) The words “the sum of” are added in the translation.

(6) Again, notice Aristotle's appeal to a Leibniz's Law-style argument for the non-identity of wholes and their parts; we came across the same argument already in the context of the regress argument passage from *Met*. Z.17, discussed in the preceding chapter.

(7) See, for example, *Met*. Δ.6, 1016b3–4: “For in general those things that do not admit of *division* (διαίρεσις) are *one* insofar as they do not admit of it, . . . ”. His continuation of the sentence illustrates the *adjectival* use of the term “one”, which will also become important when we turn to the notion of “whole” below: “ . . . e.g., if something *qua* man does not admit of division, it is one man; if *qua* animal, it is one animal; if *qua* magnitude, it is one magnitude” (ibid., 1016b5–6; Ross' italics); in other words, to be *one* is always to be one *something-or-other*; the “something-or-other” in question supplies the *measure*, by means of which

the thing in question is judged to be one, i.e., indivisible. For the connection between “one” and “indivisible”, see also *Met* I.1, 1052b16.

(8) To be one, Aristotle says in *Met*. I.1, is to be the first measure of a kind, above all of quantity; from there, the notion is extended to other categories, especially that of quality (see e.g. 1052b18–20). As will become apparent shortly, I take Aristotle to mean by “quantitatively one” roughly what we would nowadays call *numerical identity*; by “qualitatively one”, *qualitative identity* or *similarity*, though the precise nature of the relationship between Aristotle's concepts of being, oneness and sameness and our concept of identity is controversial.

(9) See, for example, *Met*. Δ.13, 1020a7–8: “We call a *quantity* that which is *divisible* into two or more constituent parts of which each is by nature a *one* and a “this”.” (Though the word “part” is here added in the translation.) For an explicit connection between “part” (μέρος) and the notions of “quantity” and “measure”, on the other hand, see for example *Met*. Z.10, 1034b32–33: “Perhaps, we should rather say that ‘part’ is used in several senses. One of these is ‘that which *measures* another thing in respect of *quantity*’.” Parts are explicitly identified as measures also in *Phy*. IV.10, 218a6–7, as well as in the entry for “part” in Δ.25. The one itself is called a measure, for example, in *Met*. I.1., 1053a18 et al., as well as in N.1, 1087b33, et al. The terminology of “measure” as connected with parthood is of course familiar already from Plato, especially the sections of the *Theaetetus* mentioned in the previous chapter.

(10) “A quantity is a *plurality* (πλῆθος) if it is *numerable* (ἀριθμητόν), a *magnitude* (μέγεθος) if it is *measurable* (μετρητόν).” (*Met*. Δ.13, 1020a8–10)

(11) In the case of magnitude, the division into parts, each of which counts as one by some measure, concerns such dimensions as depth, width, breadth, height, weight, speed, and the like (see e.g. *Met*. I.1, 1052b24ff).

(12) Illustrations of this kind are used, for example, in *Met*. N.1.

(13) I take Aristotle's *mereological* construal of the different uses of “one” (with the possible exception of being one by accident and being one by analogy) to be one of his most central anti-Platonist moves. For among his biggest complaints against Platonic forms is that they are incapable of playing the explanatory and causal roles they are intended to play, since they are too far removed, so to speak, from the objects which they are supposed to reach; moreover, the relation by means of which the connection between Platonic forms and sensible particulars is supposed to be established, viz., that of “participation”, in Aristotle's mind, remains too obscure to accomplish this task. By contrast, Aristotle's own ontology is mereologically nested in multiple, complex ways, with the result that the causally and explanatorily active principles typically end up being “in” the objects that depend on them in these ways. In the discussion of

the different senses of “in” in *Phy*. IV.3, only two are explicitly identified as mereological; given his remarks in *Met*. Δ and elsewhere, however, I take others to be implicitly mereological as well. As our discussion of Kit Fine's work in Chapter IV brought out, Aristotle's anti-Platonist strategy would in general be aided by a mereological analysis of the relevant senses of “in”, since he is otherwise committed to his own population of primitive, mysterious “participation” relations.

(14) As I read it, this fourth kind of unity is one among two varieties of unity which cannot be traced directly to a *mereological* constellation of their own peculiar kind (the second being the accidental unity exhibited by a substance and its accidents, e.g., the musical Coriscus, which will be introduced below); this is why analogies (and accidental unities) are not reflected again in separate entries under “part” and “whole” in Δ.25–26. Since, for this reason, they are not immediately relevant to our purposes, these varieties of being one will not receive much attention in what follows.

(15) This is how Aristotle summarizes the results of his entry for “one” in *Met* Δ. 6 at 1016b31ff (though the example illustrating the final kind of unity, being one by analogy, is mine); the exercise of attempting to map this summary onto the remarks that precede it is not entirely straightforward and I won't attempt to carry it out here. (My numbering is different from Ross'.) The listing of the different uses of “one” in Δ.6 is reasonably close to that of *Met*. I.1, though the detailed commentary required to show this would take us beyond the scope of the present inquiry. *Met*. N.1 focuses more on the common core in the meaning of “one” as a measure which underlies all the different uses of the term distinguished in Δ.6 and I.1. In contrast, I take the concerns of Γ.2 to be different from those of Δ.6 and I.1 and closer to those of the *Categories*, in the sense that Aristotle is there primarily interested in uncovering the sorts of ontological *dependence* relations which all non-substances bear to substances. In this context, the use of “one” with respect to substance is primary, because quantities are quantities *of* substances. (More on this below.)

(16) We can now make sense of the terminology we encountered earlier, according to which one is a measure, first and foremost, of quantity and only secondarily of other categories, in particular quality. A division into parts is always, at least, a division of a quantity into its subquantities: in this sense, any division involves objects that are *one in number* (number being a species of quantity); I take the relation of being one in number as corresponding roughly to our current notion of *numerical identity*, i.e., the relation each thing bears to itself and nothing else. Since the relation of being numerically one, which is at issue in sense (1), is explicitly linked to the presence of matter, one wonders if those entities that are not straightforwardly material (the species, genus and ratio) can be numerically one in any way that is not parasitic on the material indivisibility of those objects that fall under them. (Although Aristotle does have

a notion of “intelligible matter”, which he uses to account for the particularity of objects that are not material in any ordinary sense, this notion seems to be reserved for the objects of mathematics; the precise application of the notion of intelligible matter, however, is also a matter of scholarly controversy.) Senses (2.1), (2.2) and (3), on the other hand, exemplify Aristotle's extension of the notion of one as measure into other categories: senses (2.1) and (2.2), being indivisible in kind, either in species or in genus, yield a notion of one as a measure of *quality* (picking up on Aristotle's classification of species and genera in *Cat*.5 as a certain kind of “qualification”); sense (3), being indivisible by analogy, illustrates the notion of one as measure as applied to the category of *relation*. In contemporary terms, senses (2.1), (2.2) and (3) would all be classified as different sorts of relations of *similarity* or *qualitative identity*.

(17) (1.1) Musical and Coriscus may be one in the first of these two ways, if being musical is an accident of the substance, Coriscus; similarly, musical and just may be one in this way, if they are both accidents of a single substance, Coriscus.

(18) (1.2.1.1) A bundle that is made one in virtue of having its parts brought into *contact* with one another by a band, or a piece of wood that is made one by means of glue is one by art. In what follows, I will refer to such things as bundles and glued together pieces of wood as *heaps*, though this use of the term may not exactly correspond to the occurrence of the term (σωρός) we encountered in the context of the regress argument in Z.17. There, Aristotle sounds as though heaps lack a principle of unity altogether and are thus not one in any sense of the term, even the weakest. What the Δ.6 bundles of wood have in common with the Z.17 heaps, however, is that both lack *form* as a unifying principle; since this is the feature I want to emphasize in the present context, I will use the term “heap” accordingly to encompass entities that are one in number, mereologically complex and not unified under a single form, though this leaves open whether the entity in question may nevertheless be unified by some other, weaker principle of unity. I take it that the ontological difference between, say, some pieces of wood that are merely stacked on top of one another without being held together by a band, on the one hand, and some pieces of wood that are stacked on top of one another and held together by a band, on the other hand, is not so significant in Aristotle's eyes as to prohibit us from using the term “heap”, in both cases; for, in the terminology of the previous chapter, the band which acts as the principle of unity in the case of the bundle of wood is of the same ontological type as the elements, i.e., the individual wooden sticks, it holds together.

(19) (1.2.1.2) A line, even if it is bent, or a part of a body, e.g., a leg or an arm, is one by being naturally continuous.

(20) “Continuity” is defined elsewhere as the *sharing of boundaries* (see *Cat*.6; *Phy*. V.3; *Met*. K.12). For example, in *Cat*.6, language is defined as a quantity that is *discrete*, i.e., non-continuous, because its parts, the syllables, do not share a common boundary; similarly for number. Examples of quantities that are *continuous*, on the other hand, include lines (whose parts are points); surfaces (whose parts are lines); bodies (whose parts are surfaces); as well as time (whose parts are the past and the future, bounded by the present); and place (whose parts are further places).

(21) It is not entirely clear whether Aristotle thinks that *all* wholes are continuous; given his remarks in the entry for “whole” in *Met*. Δ.26, I gather that he does *not*, since he there lists the universal as a kind of whole, no doubt due to the etymological connection mentioned above between the word for “whole” (ὅλον), and the word for “universal” (καθόλου). He does, however, regard continuity, i.e., the sharing of boundaries among the parts, as a mark of those objects that are wholes to the highest degree.

(22) The status of artifacts within Aristotle's ontology is of course highly controversial, and I will not try to take a position on this complicated question; I am simply helping myself to Aristotle's own examples.

(23) I have not explicitly accommodated the use of “one” numbered as (2.b) in Ross' translation of Δ.6, viz., things that are called “one” by having the same *kind* of matter or substratum. In this way, Aristotle says, wine and water are said to be one, respectively; so are oil and wine as well as all things that can be melted (since they consist of a high proportion of water). I do not view this sense of “one” as introducing further distinctions that are not already covered by the remaining uses that are already listed in the main text. It seems, rather, to be a different variety of sense (2), with some elements of sense (1) mixed in; thus, all things that can be melted are one because they ultimately derive from the same *kind* of matter. (See also sense (1) of “from” (ἐκ) in Δ.24.)

(24) As this figure brings out, Aristotle's discussion of the different uses of “one” in Δ.6 and I.1 leaves open several questions, indicated above in the form of question marks. For example, he does not explicitly say in these passages whether there are things that are numerically one by virtue of being naturally continuous heaps (and, if so, how the contact among the parts would be enforced in such cases). A possible example for an entity of this kind would be ivy growing around a tree-trunk: the contact is enforced by natural growth; but the entities in question lack a single form. Moreover, he does not explicitly settle whether there may be ways of being one by virtue of a thing's own nature without being continuous (and, again, what the principle of unity in such cases would be). Possible examples of this category include language and music, which he thinks of as *discrete* quantities. Some of these questions will be resolved in

the entries for “part” and “whole” in Δ.25 and Δ.26, to which we will turn shortly.

(25) In this way, there are obvious connections between the entry for “one” in Δ. 6, on the one hand, and, among other things, those in Δ.1, 2, 3, 4, 8 on “principle” (ἀρχή), “cause” (αἴτιον), “element” (στοιχεῖον), “nature” (φύσις), “substance” (οὐσία), on the other.

(26) Even the case of the musical Coriscus may present us with a mereological constellation, depending on how seriously we take Aristotle when he speaks, as he occasionally does, of the accidents of a substance as being *part* of the substance in which they inhere, and this despite the fact that he is, in the *Categories*, at pains to distinguish the relation that holds between substances and their accidents, viz., the relation of *inherence*, from that of parthood. (For textual evidence that Aristotle may regard accidents as parts of their substances, in addition to the passage with which we are currently concerned at *Met*. Δ.6, 1015b25, see also *Phy*. IV.3, where white is apparently said to be in the man as a part, as well as, arguably, *Met*. Δ.11, 1018b33.) His use of “part” as applying to the accidents of a substance may, however, be more of a figure of speech, since it is not listed as one of the official senses of “part” in Δ.25. The principle of unity which holds together the many “parts”, if we may call them that, in this case is just whatever holds together the substance of which they are accidents, i.e., the single form.

(27) Form, though it is mentioned only in passing in Δ.6, would be classified as indivisible by all of the measures introduced there that apply to it: it is specifically, generically and analogically one. The notion of being numerically one is explicitly linked by Aristotle in Δ.6 with the presence of matter and hence does not (at least not in any straightforward sense) apply to form, which lacks matter. (In fact, whether form really is completely free of matter is a difficult question and depends on how definitions are viewed; however, it is certainly true that there is at least one official strand within Aristotelian doctrine according to which form is pure actuality and hence lacks matter, which is linked with potentiality.) But Δ.6 does not provide us with any means by which form could be classified as being one *to a higher degree* than the musical Coriscus, the bundle of sticks, the shoe and Socrates. Aristotle actually mentions at 1016a34–35 that form, in the sense of definition (λόγος), *is* divisible into parts, but does not pause to tell us whether there is a way of being one that is peculiar to form and qualifies it as being so to a higher degree than anything else.

(28) We have already encountered sense (4) in the preceding chapter, where this section of Δ.25 was cited to confirm that Aristotle does in fact explicitly identify both the form and matter of which a whole consists as parts of the whole; this in

turn was used as evidence against Harte's reading of the regress argument in Z. 17 and the accompanying “wholes as identical with structures” model.

(29) There is, however, also a way of reading sense (2), according to which it is the general heading under which all of the more specialized senses of “part”, which are yet to be stated, can be subsumed: for, in a way, senses (3), (4) and (5) all divide certain kinds of quantities into certain kinds of subquantities in non-arbitrary ways; however, they do so by introducing further considerations that are not purely quantitative.

(30) See for example *Met*. Z.1, where the *Categories* doctrine, according to which quantities are quantities *of* substances, is repeated. In *Met*. B.5, such entities as points, numbers, bodies and planes (all of which are normally counted as quantities) are classified as the *boundaries* of substances, and hence as not themselves substances (but see the entry for “substance” in Δ.8, which seems to contradict this by listing such things as numbers, lines, planes and bodies as substances). In Book M, it is argued at length, contra the Platonists, that mathematical objects cannot exist separately and hence are not substances; similar views can be found in Book Λ as well as in *Phy*. II.2: one of Aristotle's main motivations for this belief is that he wants to avoid the result that two numerically distinct bodies or solids may occupy the same place at the same time (see, for example, *Met*. M.2 for considerations of this sort).

(31) The first sense of “part” is the closest thing we find in Aristotle to a CEM-style system; notice, however, that he does not take this notion to provide anything close to an exhaustive mereological analysis of what I have called earlier “ordinary material objects”, i.e., such things as the bundles, shoes and human beings that we came across in the last section; it is, after all, only the very first step and the least loaded sense of “part” Aristotle recognizes in Δ.25. However, given his actual/potential distinction (according to which a thing and its matter are numerically identical), as well as his doctrine of the categories (according to which all non-substances stand in dependence relations to substances), Aristotle is not committed to numerically distinct, spatio-temporally coinciding objects: each region of space-time is always occupied *actually* only by a single object; all other ways of characterizing the contents of a particular region of space-time are just different ways of viewing this single object. Thus, the only example of a “free-floating” mereological sum, so to speak, in Aristotle's system would be something along the lines of, say, a quantity of water that fills a bathtub; entities of this kind are what he will later (in Δ.26) call “totals” (literally, “alls”).

(32) Thus, I read Aristotle's otherwise somewhat puzzling remark at 1023b17, “apart from the quantity” (ἄνευτοῦποσοῦ, literally, “without the quantity”), as his

way of notifying the reader that he is now moving from the purely quantitative senses of “part” onto more loaded senses.

(33) Reading “εἶδος” in the purely classificatory way that would be employed, say, by a biologist.

(34) It is actually extremely rare that Aristotle refers to form explicitly as a whole, even though he does fairly frequently speak of the parts of form or essence, in the sense of definition. Even though Aristotle recognizes a more deflationary sense of “whole” (similar to our current modern use of the term), according to which anything that is one (even in the weakest sense) and has parts is a whole, he more frequently uses the term “whole” in a more full-blooded fashion, according to which it means just what it does in sense (4) of “part”, viz., something that is unified under a single form. (This is also the sense of “whole” we encountered in Δ.6 and Z.17.) According to the first, deflationary, sense of “whole”, even heaps might count as wholes, merely because they have parts and they are one in some, albeit exceedingly weak, sense; but according to the second, more loaded sense, heaps would not count as wholes, since their parts are not unified under a single form. Aristotle would be reluctant to consider forms as wholes according to the second, more full-blooded sense of “whole”, since this would seem to get him started on a *regress*: for what, then, is the single form under which the parts of form are unified? On the other hand, we can assume that Aristotle would be equally reluctant to classify forms alongside heaps. We will have occasion below to return to the mereological status of forms, which turns out to be a central difficulty for Aristotle.

(35) This mereological sense of “out” or “from” (ἐκ) is the counterpart of one of the mereological senses of “in” (ἐν), viz., that according to which the form and the matter are both *in* the compound. See also related senses of “have” (ἔχειν) in Δ.23.

(36) This is in line with my attribution of the Weak Supplementation Principle to Aristotle in the preceding chapter: according to WSP, a whole cannot consist of a single proper part, in the way in which, for example, a singleton set would, if its only member were a part of it.

(37) Form is also spoken of as part of a compound, for example, at *Met*. Z.9, 1034a21–30, and very explicitly at Δ.18, 1022a32: “ . . . for the soul, in which life directly resides, is a part of the man”. Both matter and form are often spoken of as being “in” the compound in a way that seems quite overtly mereological, as, for example, at Z.8, 1033b13–19. Matter is spoken of as part of the compound, for example at Z.7, 1032b32–33. In general, *Met*. Z.7–9 is a good place to find this kind of language, since Aristotle is there explicitly concerned with the question of how compounds of matter and form are brought into existence from (ἐκ) pre-existing ingredients. (See also Harte 1994 for a helpful discussion of the

connections between the entries for “part” and “whole” in Δ.25–26 and the entry for “from” which immediately precedes them in Δ.24.)

(38) Just to remind those readers who are not able to consult the text: the single Greek word “εἶδος” may be translated either as “species” or “kind” (e.g., in sense (3) of “part”) or as “form” (e.g., in sense (4) and (5) of “part”); thus, all three uses of the term are found in Δ.25. Besides “εἶδος”, Aristotle also uses another term to talk about form, viz., “μορφή”, sometimes translated as “shape”.

(39) Why is there no separate entry for the parts of matter? I take it that the sense in which matter has parts is already accommodated by sense (1), since matter, when conceived of in the absence of form, is *infinitely divisible*, i.e., divisible in arbitrary ways, into parts of the same kind. (More on this below.) Aristotle seems to feel that matter, when conceived of in the absence of form, is inherently many (in number). For example, upon the death of a human being, the (now numerically distinct, qualitatively similar) body, when no longer unified by means of a single human form, literally falls apart into many pieces; see, for example, *Met*. M.2, 1077a21–23: “For things in our perceptible world are one in virtue of soul, or of a part of soul, or of something else, reasonably enough; when these are not present, the thing is a plurality, and splits up into parts.”

(40) Since the analogy does not correspond to a mereological constellation of its own, it is not represented in Δ.25 as introducing a special sense of “part”, i.e., a particular kind of measure, of its own. The musical Coriscus belongs in the same category as Coriscus simply, if we do not take Aristotle's use of “part” as applying to the accidents of a substance seriously. The species, human being, and the genus, animal, belong under sense (3); Socrates and the shoe belong under sense (4), since they both are regarded as wholes which have form. The bundle of wood, though somewhat less straightforward to place than the other examples, is most naturally accommodated either under sense (2), i.e., as providing a non-arbitrary division of a quantity into subquantities or as falling somewhere between sense (2) and sense (3), since this case introduces a division into parts which proceeds not purely by means of quantitative considerations.

Since some of the entities that were viewed as indivisible by any of the measures introduced in Δ.6 now turn out to be divisible by some measure, we may wonder by means of what new *measures* these previously indivisible objects have now become divisible. Given my placement of the bundle of wood under sense (2), the measure by means of which it is divisible is “non-arbitrary subquantity” (in this case, “individual wooden stick”). The shoe and Socrates, on the other hand, are divisible by the measure “constituent only separable in thought”, since Aristotle believes that the constituents of which the compound consists, matter and form, are never actually found separately but can only be distinguished in analysis. Finally, form is divisible by means of the measure “constituent that figures in the

definition”, since it is considered to be mereologically complex when approached through the angle of the definitory formula.

(41) What underlies these examples is, first, Aristotle's non-atomic conception of the so-called “simple bodies” (i.e., earth, air, fire and water) and everything that is made out of them on the next higher level of composition (i.e., the so-called “homoiomerous substances”, e.g., flesh, bone, marrow, blood, etc., as well as what he calls here the “liquids”, i.e., wine, oil, and the like), which he views as being infinitely divisible into parts of the same kind. Secondly, Aristotle conceives of number as an aggregate of discrete “ones” or “units”, each of which itself is not a number (since one is not a number, according to the Greek conception). This aggregative conception of number is at work in the last sentence of this section: “To things, to which *qua* one the term ‘total’ is applied, the term ‘all’ is applied when they are treated as separate; ‘this total number’, ‘all these units'.” Since a number is an aggregate of units, we may refer to these units either separately as “all of them” or “every one of them” (i.e., speaking of the units) or as “all of it” (i.e., speaking of the number). Thus, in the language of Δ.6, even the totals may exhibit a (very weak) sort of unity, since we may at least *speak* of the *many* units as *one* number. Aristotle's point here does not come across in English as naturally as it does in Greek, since we do not share his aggregative conception of number and (connectedly) “number” is used in English exclusively as a count noun (in fact, some might say, “number” is the paradigmatic count noun); thus, English actually permits us to say “this whole number”. Given our *atomic* conception of liquids such as water, however, we may substitute, for example, for “all these units” and “this whole number”, respectively, “all these water molecules” (i.e., singling out the individual units) and “all this water” (i.e., singling out the total quantity).

(42) Surprisingly, Aristotle also allows for a mixed category: entities which are *both* wholes *and* totals, or which at least “admit of both descriptions”, e.g., wax and coat. Since wholes and totals have contradictory characteristics (depending on whether or not the position of their parts makes a difference to their identity and existence), it is difficult to see how one and the same object could be described both as a whole and as a total. He characterizes the “mixed” category as having the following feature: they are objects “whose nature [φύσις] remains the same after transposition [μεταθέσει], but whose form [μορφή] does not” (1024a3–5). (The Greek word “μορφή”, translated here as “form”, could of course also be translated simply as “shape”.) To make sense of this category, as I read it, will require reference to Aristotle's distinction between “actuality” and “potentiality”, which is perhaps the most central novel idea introduced in the first half of Δ.26; I will therefore postpone discussion of the “mixed” category until this distinction has been introduced.

(43) Since the criterion for being a whole, offered in the second half of Δ.26, turns on the notion of position (θέσις), there is a connection between Aristotle's entry for “whole” in Δ.26 and his entry for “disposition” (διάθεσις) in Δ.19; this connection is pursued in Harte (1994).

(44) This is not to say that totals lack a single form: if they lack a single form, then the category of totals would have collapsed into the category of what I have been calling “heaps” (i.e., the category into which bundles of wood belong). If, on the other hand, totals have a single form, they nevertheless differ in significant ways from artificial and natural non-heaps: at least in the case of homoiomerous substances such as liquids, every part of the total has *the same* form as the total of which it is a part (though this may not be true of numbers). Although Aristotle seems somewhat reluctant to apply his hylomorphic machinery all the way down to the simple bodies and the homoiomerous substances formed out of them, he does in the end speak in *On Generation and Corruption* of such things as, say, the form of flesh (a ratio or proportion of elements, reminiscent of Platonic structure) and the form of water (a certain combination of capacities). If, then, the category of totals should be kept distinct from that of heaps, we must recognize that the job of an object's formal component is not always to indicate a specific arrangement among the parts of an object, in cases in which the object's ability to perform its teleological role does not impose stringent requirements to this effect. Thus, while the job of form, on this more general conception, is always to characterize in teleological terms the particular activity characteristic of the object in question, only sometimes does the performance of this activity require that particular parts occupy specific positions in the order of parts.

(45) There is no separate word in the text that corresponds to Ross' “class”, only the word used for “universal” (καθόλου), which as mentioned earlier contains the word for “whole” (ὅλον).

(46) Aristotle's notion of continuity is reminiscent of Fine's requirement of *spatio-temporal proximity*.

(47) This verbal form is related to the noun (πέρας) Plato uses for “limit” in the *Philebus*.

(48) This sense of “whole” is already familiar to us from Plato, who also at times characterizes wholes as “that from which no part is lacking” or “that from which nothing is absent” (see, e.g., *Tht*. 205a4–7 and *Parm*. 137c7–8).

(49) This connection between wholeness and completion comes out, for example, in Aristotle's entry for “complete” (τέλειον) in Δ.16, where he states that “each thing is complete and every substance is complete, when in respect of its proper

kind of excellence it lacks no part of its natural magnitude" (1021b20–23). Also relevant in this respect is the entry for "limit" (πέρας) in Δ.17.

(50) Thus, once we recognize the normative and teleological flavor of Aristotle's conception of wholes, it makes perfect sense that there should be an entry for "mutilated", which otherwise might appear puzzling: Kirwan (1993, p. 177), for example, complains with respect to this entry that "the reason for its inclusion here is a mystery".

The *objects* to which the notion of mutilation applies must be (i) *wholes* by the criterion of the second half of Δ.26 (i.e., the position of their parts must make a difference to their existence and identity); (ii) they must be *continuous* (i.e., their parts must share boundaries); and (iii) they must consist of *unlike* parts. Criteria (i) and (ii) rule out numbers, which are totals, not wholes, and which are discrete, not continuous; criteria (i) and (iii) rule out homoiomerous substances like water and fire, which again are classified in Δ.26 as totals, not wholes, and which consist of like parts. Criterion (ii) rules out musical scales, which apparently are wholes in the sense of (i) (in that the position of their parts makes a difference to their existence and identity) and which consist of unlike parts, but which are discrete, not continuous. This leaves such objects as the cup and the man, wholes that are continuous and consist of unlike parts, as examples of things which can be mutilated by removing certain of their parts.

Among the *parts* of such objects, removal of those which satisfy the following criteria leads to mutilation: (i) the *substance* of the object must remain despite the removal of the part (i.e., the part in question may not be *essential* to the survival of the object in question; a mutilated cup is still a cup); (ii) the portion that remains may not be *equal* to the part that is removed (i.e., an object that has been cut in half is something worse than mutilated); (iii) the part may not be *any chance* part (i.e., a part whose removal is of no consequence whatsoever for the object's ability to carry out its characteristic activity); and, finally, (iv) the part must be such that it cannot be *regenerated*. Aristotle's concern in proposing these criteria is to provide a systematic explanation of why, for example, a cup is (apparently) considered mutilated when its handle is broken off, but not when a hole has been bored through it; and for why a man is considered mutilated when he has lost an extremity, but not when he has lost his hair or some of his flesh. In the interest of space, I will not comment on the success of these criteria; my purpose here was mainly to expose the teleological and normative force inherent in Aristotle's characterization of wholes in (1) as "that from which no (important) parts are missing", and to point out the way in which this criterion creates the need for the otherwise puzzling entry for "mutilated" in Δ.27.

(51) The musical Coriscus and the analogy have already been excluded earlier since they were suspected not to present us with a genuine mereological constellation of their own.

(52) Whether the so-called “totals”, entities like numbers and liquids, also belong on this list depends on whether or not even these entities are viewed as exhibiting an exceedingly weak sort of unity; the resolution of this question depends on how strongly the “*qua* one” (ὸ*mega*ζἐφ’ ἑνί) in the second half of Δ.26 (at 1024a9) is read. If totals lack unity altogether, this would seem to spell trouble for Aristotle's view in Γ.2 that “being” and “one” are interchangeable, i.e., that to be is always to be one and vice versa. Independently of how this question is resolved, however, totals are of course excluded from whole status in any event, at least by means of the criterion proposed in the second half of Δ.26, since the *position* of their parts does not make a difference to their existence and identity.

(53) “Limit” is defined in Δ.17, first, as a kind of boundary; but from there it is extended to apply also to the form, end, substance and essence of a thing; “limit”, Aristotle thinks, has all the same senses as “beginning” or “principle” (“ἀρχή”), but more besides. Compared to its prominence in Plato's *Philebus*, however, the notion of “limit” plays a surprisingly subordinate role in Aristotle's metaphysics. Unlike Plato, Aristotle also does not conceive of this notion in purely mathematical terms, but (as its extensions to notions like form, end, substance and essence indicate) as teleologically loaded in the more localized manner that is characteristic of Aristotle's system.

(54) As further evidence for the potentially derivative whole-status of universals, Aristotle also seems to be of two minds as to whether wholes that are not continuous satisfy the completeness criterion. The chapter on mutilation in Δ.27 is restricted explicitly only to wholes which are continuous; however, in Δ.26 itself Aristotle sounds as though *all* wholes satisfy criterion (1). For the sake of simplicity, I will in what follows comply with the terminology of Δ.26 and characterize *all* wholes as being complete, in the sense of unmutilated. In the final analysis, however, it may turn out that this criterion only applies to wholes that are continuous. Similar skepticism might be raised as to whether universals satisfy criterion (3), which concerns the position of the parts of a whole; the answer to this question depends on what sorts of entities Aristotelian universals are taken to be, a question on which I remain entirely neutral.

(55) The primary meaning of “potentiality” (δύναμις), as it is explained, for example, in Δ.12, is the “source of movement or change in another thing or in the same thing *qua* other”. An actuality (ἐνεργεῖα or ἐντελεχείᾳ) is the realization or coming to pass of a change or movement for which a potentiality existed (though this may not reflect the real order of definition); for all change or movement, in Aristotle's view, is from what is potential to what is actual. For example, an architect or builder has the potentiality to build a house, if he can initiate changes or movements which eventually lead to an actual house. In *De Anima*, Aristotle adds a further layer of complexity to his actual/potential distinction: in *DA* II.5, (i) a “*first* potentiality” is defined roughly as the capacity

to acquire a capacity (in this sense, all humans are speakers of French); (ii) a "*second* potentiality", which is simultaneously a "*first* actuality", is roughly the result of having acquired a capacity, without currently exercising it (in this sense, only those who have studied French are speakers of French); (iii) finally, a "*second* actuality" is the result of exercising the acquired capacity (in this sense, only those who are currently speaking French are speakers of French). With this added machinery, the soul can now be defined as a first actuality (i.e., a second potentiality) of a natural, organized body having life potentially (in the sense of first potentiality) within it. The intermediary layer of second potentiality/first actuality, at least on the surface, averts the outcome that the soul, which as the form of the organism should come out to be pure actuality, turns into pure potentiality.

(56) If those wholes whose parts are present in them actually really are the natural and artificial heaps, it is difficult to see how to set this category apart from the category (2.a) universals; for the distinction between the two categories was supposed to be that in the case of (2.a) each of the parts is already one, while in the case of (2.b) the parts together make up a unity. But if each individual wooden stick is actually present in the bundle, and not merely potentially, then how is the bundle of wood different in this respect from, say, the species, human being, or the genus, animal, both of which have as actually existing parts the objects that fall under them? The obvious difference between them is of course that the parts of universals are merely *qualitatively* one, whereas the parts of entities in category (2.b) add up to something that is also *numerically* one. Since Aristotle is not explicit on this point, however, this possible way of spelling out the difference between (2.a) and (2.b) is mere speculation on my part. And while this reading of the difference between (2.a) and (2.b) has the advantage of allowing us to distinguish universals from heaps, it also makes the placement of discrete quantities like words and musical scales in the scheme of Δ.26 more difficult. Since category (2.b) seems to be explicitly restricted to wholes that are *continuous*, it is not clear where words and musical scales should go, if, as seems plausible, not all of them are to be subsumed under the category of totals (as are numbers). In fact, as in Plato, we find linguistic entities (such as syllables) to be among Aristotle's favorite examples for form/matter compounds.

(57) Since form, in the guise of definition, was listed as a particular kind of whole in Δ.25, one might expect there to be a place for form also in Δ.26; but it is not obvious how to accommodate form within the scheme of Δ.26. Since form, if anything, should exhibit a higher degree of unity from that exhibited by other entities, it cannot be assigned to category (2.a); for wholes of type (2.a) apparently exhibit a lesser degree of unity from that of their parts. If category (2.b) really is to be restricted to wholes that are continuous, it is not clear how form is to fit that description, since the parts of definitions don't obviously share boundaries. Even if we relax this requirement (which might be a good idea at

any rate, given the difficulty concerning the placement of discrete quantities like words and musical scales), however, it is still not clear whether definitions should be viewed as having their parts present in them *potentially* or *actually*. Since wholes whose parts are present in them only potentially are wholes to a higher degree than those whose parts are present in them actually, one would tend to assign definitions to the former category. However, Aristotle greatly struggles with the question of whether definitions display the same hylomorphic structure as, say, the shoe and Socrates; as mentioned earlier, Aristotle is aware of the potential regress lurking in a straightforwardly hylomorphic conception of definitions and feels conflicting pressures with respect to this question.

(58) See, for example, Aristotle's remark at 1014b22–26, concerning the distinction between mere “contact” and “organic unity” Δ.4, the entry for “nature” (φύσις): “Organic unity differs from contact; for in the latter case there need not be anything besides the contact, but in organic unities there is something identical in both parts, which makes them grow together instead of merely touching, and be one in respect of continuity and quantity, though not of quality.” I take it that the thing which the organically unified parts have in common is *form*; in this sense, then, the human form, for example, is “spread” throughout the human body, and all of the merely potentially existing parts of the body have a share in the same form, despite the fact that they of course each have their own separate jobs to fulfil within the organism of which they are part. If one and the same object could become separated from the living body whose form it shares, the object in question would therefore have to undergo a change in its form; but no single object can persist through a change of this kind.

(59) See, for example, Z.13, 1039a3–11: “ . . . a substance cannot consist of substances present in it actually (for things that are thus actually two are never actually one, though if they are *potentially* two, they can be one, e.g. the double line consists of two halves—potentially; for the *actualization* of the halves divides them from one another; therefore if the substance is one, it will not consist of substances present in it); and according to the argument which Democritus states rightly; he says one thing cannot come from two nor two from one; . . . ” (Ross' italics). This is one reason why heaps cannot be substances. (In addition to heaps, Aristotle is of course divided with respect to almost all of the items that are listed as wholes in this chapter as to whether they should count as substances and which, among them, are primary; thus, being a whole and being a substance, primary or otherwise, are in general two very different things.)

(60) One might think, not entirely without justification, “so much the worse for the actual/potential distinction”, if the parts that make their presence in the human being felt as much as, say, an eye, an arm, a heart, a brain, and so forth, only maintain a potential existence within the organism. Nevertheless, strange as it may sound to modern ears, it is in fact Aristotle's view that wholes that are unified under a single form have no parts actually, but do so only potentially.

Aristotle is aware that some might react to this position with surprise or incredulity; he remarks for example at Z.16, 1040b10–16: “One might suppose especially that the parts of living things and the corresponding parts of the soul are both, i.e. exist both actually and potentially, because they have sources of movement in something in their joints; for which reason some animals live when divided. Yet all the parts must exist only potentially, when they are one and continuous by nature,—not by force or even by growing together, for such a phenomenon is an abnormality.”

(61) And natural wholes that are unified under a single form are wholes to a higher degree than artificial wholes that are so unified, presumably because the artificial whole, but not the natural whole, will be fashioned out of pre-existing ingredients (though, by the Homonymy Principle, the pre-existing ingredients even of artificial non-heaps cannot be identical to those objects which eventually function as the matter for the newly created artifact): in the case of a living organism, on the other hand, there is not even a qualitatively similar, albeit numerically distinct, pre-existing heap of flesh, bones, blood, hair, etc., out of which the future human being will be formed; rather, the matter of the human being grows and comes into existence along with the human being himself. The generation of living things is actually a complicated matter for Aristotle and is addressed in more detail in *On the Generation of Animals*; in *Met*. H.4, for example, Aristotle identifies the menstrual fluid contributed by the maternal parent as the material cause of a human being; the semen contributed by the father as the efficient cause; the formal and final cause, i.e., the essence and end, of the human being are also apparently somehow associated with the semen contributed by the paternal parent. In the case of natural and artificial heaps, a different story will have to be told as to why the former are wholes to a higher degree than the latter, presumably having to do with the nature of the relation (e.g., growth versus glue) which holds together the parts in each case.

(62) Each of category (2.b.i) and (2.b.ii) is further subdivided into wholes that are natural and wholes that are artificial, with the former being wholes to a higher degree than the latter.

(63) I rank forms highest in this ordering not because of anything that Aristotle has explicitly said which would justify this ranking, but simply because I take it that this would be his desire and because form is the source of unity for other objects. We will turn to the problematic status of form in Aristotle's mereology shortly.

(64) The category of discrete compounds is not explicitly represented in Δ.26 and is my insertion, based on Aristotle's remarks and his use of examples elsewhere. I'm unsure of what would count as a good example for a naturally formed discrete compound.

(65) Given the distinction between potentiality and actuality, we can now explain the puzzling mixed category of “whole/totals” from the second half of Δ.26 as follows: what Aristotle might have in mind there is that one and the same object can be described both as a total, e.g., as wax or cloth, when we speak of it simply as matter, and as a whole, e.g., as a candle or a coat, when we speak of it as a matter/form compound. Since wholes and totals have contradictory properties (depending on whether or not the position of their parts matters to their existence and identity), some such additional qualification as the different modes of existence, potential versus actual, may be expected to be at work in this category to prevent outright inconsistency. Given this reading, I don't list the whole/totals as a separate category in the scheme of Δ.26, since they do not introduce a kind of entity that is not already covered by the other entries.

(66) Although I take it to be part of official Aristotelian doctrine, given the entry for “part” in Δ.25 as well as other passages cited earlier, that form is a proper part of any matter/form compound, it is undeniable that Aristotle also often uses the term “part” to single out merely the potentially existing matter portion of a matter/form compound. It is this use of the term “part” that is most conducive to Harte's reading of the regress argument in Z.17, which takes “part” to be synonymous with “element” (which in turn is identified with “matter”), as well as the accompanying “wholes as identical to structures” model she endorses. Among the numerous passages in which this use of the term “part” is prevalent, see for example *Phy*. VII.5, 250a24–25, where Aristotle states, apparently only focusing on high-level wholes, that “no part even exists otherwise than potentially in the whole”; see also the entry for “cause” (αἴτιον) in Δ.2, where Aristotle speaks of the parts as the material causes of the whole; as well as the entry for “prior” and “posterior” in Δ.11, especially 1019a8 ff. However, while I acknowledge that Aristotle often uses the term “part” in this way, I take this usage to be mere shorthand for singling out the *non-formal* parts of a matter/form compound.

(67) At the same time, however, he also explicitly takes its matter to be merely one constituent of the matter/form compound, the other constituent being form. I will not attempt to explain how, by means of his actual/potential distinction and the accompanying Homonymy Principle, Aristotle takes himself to be able to say, without inconsistency, *both* that matter is a proper part of a matter/form compound *and* that a matter/form compound is not distinguishable from its matter. (As a consequence of this combination of views, the Weak Supplementation Principle, which I earlier ascribed to Aristotle in the context of our discussion of the regress argument in Z.17, would also have be modified to reflect the actual/potential distinction in something like the following way: a whole cannot be composed of a single *actual* or *potential* part.) For relevant discussion, see, for example, *Met*. Z.10, which concerns the ways in which parts and wholes are prior or posterior to one another. I have here merely stated in its starkest outlines what I take to be Aristotle's view, without attempting to

elaborate on it. Since, as I indicated already in my discussion of the Platonic account in the previous chapter, I take the teleological content of their respective positions to be conceptually separable from the mereology *per se*, an analysis of Aristotle's theory of parthood and composition need not enter very far into the complexities of the actual/potential distinction or the closely related Homonymy Principle, which would in any case require a book-length treatment of its own. For an interesting discussion of *Met*. H.6, in which the actual/potential distinction is brought to bear, among other things, on the question of the unity of matter/form compounds, see Haslanger (1994b) and Harte (1996).

(68) For the unity between a thing and its matter, see, for example, *DA* II.1, 412b4–9: “That is why we can dismiss as unnecessary the question whether the soul and the body are one: it is as though we were to ask whether the wax and its shape are one, or generally the matter of a thing and that of which it is the matter. Unity has many senses (as many as ‘is’ has), but the proper one is that of actuality.” Similar remarks can be found, for example, in *Met*. H.6, among other places.

(69) Though there is a great scholarly controversy surrounding the question of how literally to take Aristotle when he seems to designate the genus as the matter of the definition; as I mentioned earlier, a straightforwardly hylomorphic conception of definitions, among other things, threatens to give rise to an endless demand for further principles of unity.

(70) An interesting exception to this generalization is the form of homoiomerous substances such as flesh and blood, which in *On Generation and Corruption* is characterized as a *ratio* of elements. Despite the, at least in part, overtly mathematical content of these Aristotelian forms, Aristotle nevertheless seems to want to distance himself at all costs from Platonic structure, as can be seen, for example, in an almost comical passage from *Met*. N.5, whose purpose is to argue that number is never a cause of substance or being in any sense of “cause” (see 1092b8 ff).

(71) I am here trying to remain as neutral as possible with respect to the different scholarly controversies surrounding the nature of form, such as the question of whether Aristotelian forms are to be viewed as universal or particular. My purpose here is merely to point out some general distinguishing features of Aristotelian forms, which differentiate them from Platonic structure, as it was characterized in the preceding chapter.

(72) Moreover, the problem just described is still with us, even if we ascribe to Aristotle the view (despite his occasional apparent pronouncements to the contrary) that form and definition cannot literally be *identified* (in the contemporary metaphysician's sense of numerical identity): for definitions after all are plausibly construed as *linguistic* entities (comparable to, according to

Aristotle, but nevertheless of course different from, say, literary works like *The Iliad*), while forms presumably are not plausibly so construed. In that case, then, it might seem that, since definition and form are not literally identical, we need not expect the mereological structure of the one to mirror exactly that of the other. Unfortunately, Aristotle puts obstacles in the way of this possible escape route by endorsing a fairly strong *correspondence* principle between the *parts* of a definition or formula and the *parts* of the object described by it:

> Since a definition is a formula, and every formula has parts, and *as the formula is to the thing, so is the part of the formula to the part of the thing*, . . .
>
> (*Met*. Z.10, 1034b20–22)

Thus, the recognition that forms and definitions belong to distinct ontological categories (the latter being a linguistic entity, or formula (λόγος), the former being what is properly described by at least some of these linguistic constructions) therefore does not remove the worry concerning the unity of form, since Aristotle holds in addition that the association between forms and definitions requires that the mereological structure of definitions accurately reflect the mereological structure of the objects described by them.

(73) The current reasoning does not apply to mathematical objects which, according to Aristotle, have a kind of matter (viz., “intelligible matter”). Similar passages to the effect that entities without matter have their unity an underived primitive manner can also be found in *Met*. H.6, though there is some dispute among the commentators as to the exact nature of the entities Aristotle had in mind in this context (e.g., form/essence vs. the highest genera in the categories).

(74) Though this reading goes against the tenor of this passage, Aristotle could also be taken as suggesting another option: that the soul is mereologically complex and in fact contains a part which holds together the remaining parts. At least in the case of the human soul, the most plausible candidate for a part of the soul which could simultaneously act as the principle of unity holding together the remainder of the parts is of course the active intellect, which is discussed primarily in *DA* III.5. In a sense, this possibility merely brings us back to the preceding remarks concerning the incomposite nature of the unmoved mover, as described in *Met*. Λ: for Aristotle conceives of the active intellect as that faculty within us by means of which we most resemble God; though with some hesitation, he sometimes speaks of it as possibly separable from the body (and hence completely free of any association with matter) and is similarly concerned to establish (e.g., in *DA* III.6) that this faculty and its activity are not divisible into parts. This second option is thus not incompatible with my reading, but merely adds another layer of complexity to Aristotle's conception of high-level wholes or matter/form compounds: for it now turns out that those forms, which hold together the parts of a matter/form compound, are themselves hylomorphically complex and contain within themselves another principle of

unity, a higher-order form, so to speak, which holds together the parts of the lower-level form. The search for the ultimate mereological atom, then, according to this second reading, does not end until we reach something which is completely free of any association with matter, viz., the higher-level form or principle of unity. Since it is not obvious, however, how we would account for the unity of form in the case of plants and non-human animals, on this reading (since they lack a God-like component in their souls), Aristotle might in fact be better served by taking the first route and letting the buck simply stop with form.