

Species and Genus as Mutual Parts in Aristotle: a Hylomorphic Account

Abstract

A genus contains its species, and the species implies its genus. Does it mean that the species is a part of the genus and also the genus is a part of the species? But how can they be part of each other without being identical? In the context of kinds, in what sense is 'part' applicable?

We argue that for Aristotle, a species and its genus are mutual parts, standing in different parthood relations to each other, viz. the genus is a prior part of its species, while the species is a posterior part of its genus. Furthermore, we show that prior and posterior parthood concerning the genus and its species is grounded on the relations between matter and form in a matter-form compound.

Keywords: Aristotle, species, genus, part, matter, form

Introduction

A horse is swishing its tail. The tail is a part of the horse. It is immediately discernible beside other salient bodily parts, all of which are parts of the horse. The horse is a whole containing each of the parts.

Imagine someone proposing that the horse is also included in its parts. Not only the tail is a part of the horse, but also the horse is a part of the tail. At any rate, a horse tail is a thing unlike any other. One can tell unmistakably that the flexible appendage at the rear end of the torso of a horse is a horse tail, not a dog tail, a snake or a horsetail tussock. Hence, somehow the horse could be a part of its tail. But how? Is 'part' the right word here?

A classical mereologist would point out that two things cannot be part of each other

without being identical.¹ The horse is not identical to its tail. Hence, if the tail is a part of the horse, the horse is not a part of the tail. Apparently, there is no mutual parthood between the horse and its tail.²

Let us consider horses in general: the species 'horse' of the genus 'animal'. Since there are other animals besides horses, the genus 'animal' divides into many distinct species. Thus, the species 'horse' is a part of the genus 'animal'. However, given that a horse is a certain kind of animal, viz. the definition of 'horse' contains a reference to the genus 'animal', being a horse entails being an animal or, to put it differently, 'animal' is contained within 'horse'. Hence, the genus 'animal' is also a part of the species 'horse'. Therefore, the genus 'animal' and the species 'horse' are part of each other.

How is this right? If, presumably, mutual parthood is disallowed in the case of the horse and its tail, why is it allowed in the case of the genus and its species? If 'animal' and 'horse' are part of each other, they are identical, but, surely, the species 'horse' and the genus 'animal' are distinct, for not all animals are horses. Again, a classical mereologist would dismiss the conundrum by excluding kinds (genera and species) from the domain of mereology.³

Why must mereology be so restricted? There are alternatives. In *Metaph.* Δ 25 and elsewhere, Aristotle explicitly endorses the claim that a species is a part of a genus, and, in a different way, the genus is a part of the species. We will take Aristotle's words seriously.

According to Aristotle, as we will show, the genus and its species are mutual parts

¹ The axiom of Antisymmetry: if two things are part of each other, then they are identical. Antisymmetry is among the generally accepted axioms in classical mereology.

² Hardly anyone is ready to accept mutual (i.e. symmetric) parthood in an unqualified sense. It would generate a mereological loop. An example is Borges's Aleph, referred to as an example by Cotnoir and Varzi (2021: 65): "I saw the earth in the Aleph and in the earth the Aleph once more and the earth in the Aleph [..]" (Borges, 1945: 283f).

³ Classical mereology is extensional and confines itself to classes or sums. Extensionality amounts to the thesis that no two composite things have identical proper parts (cf. Cotnoir and Varzi 2021: 27). Extensionality is implied in Antisymmetry (Cotnoir and Varzi 2021: 72).

without being identical, and their mutual parthood is conceivable by analogy to an animal and its body parts. Animals are matter-form compounds, where the form of the animal imbues matter with structure and function.

In our view, exploring how kinds can be part of each other in Aristotle offers an unbiased look at the nature of parthood. Parthood does not have to be uniform or apply to one type of object. Nor should one impose such an assumption on Aristotle.

Without claiming to offer more than a rough outline of Aristotle's hylomorphic mereology of kinds⁴, we will show the following:

- (i) genus and species are part of each other in different senses of 'part';
- (ii) species merely divide its genus and hence are posterior parts of it, whereas the genus constitutes its species and hence is a prior part of the species;
- (iii) the distinction between prior and posterior parts is grounded on the relations between matter and form in a matter-form compound;
- (iv) a plausible model for conceiving the mutual parthood of a genus and its species is the animal body.

2. A Part In Another Sense

To appropriately appreciate Aristotle's account of parthood pertaining to kinds a glance at *Metaph.* Δ 25 is required. In this passage, Aristotle lists various senses of 'part':

- (1) parts of quantity;
- (2) species as parts of a genus;

⁴ Aristotelian kinds have been studied thoroughly in relation to their division, classification and ontological status, but without much focus on their mereology (cf. Balme 1962; Balme 1987; Grene 1974; Lloyd 1962; Deslauriers 2007). Attention to the mereology of kinds is paid by studies on Medieval thinkers (cf. Arlig 2019). Despite acknowledging Aristotle's influence, his mereology of kinds and mereological hylomorphism in relation to kinds has remained in the shadows. In contemporary mereology, Aristotle's hylomorphism has been adapted in analysing the structure of concrete particulars (cf. Koslicki 2018; 2008; 2007; Fine 1999), not kinds.

(3) form and matter as parts of a matter-form compound;

(4) parts mentioned in the formula, i.e. the genus and the differentia.⁵

Aristotle's description of the fourth sense of 'part' is particularly important in understanding the mutual parthood of the genus and the species:

"The elements in the formula which explains a thing are parts of the whole; this is why the genus is called a part of the species, though in another sense (ἄλλως) the species is part of the genus."⁶ (Δ 25, 1023b22–25)

Let us examine this passage to provide a coherent interpretation of it.⁷ Particular attention must be paid to the phrase "in another sense" (ἄλλως), as without it the passage appears inconsistent.

Granted that the genus and the differentia "in the formula which explains a thing" refer to the parts of the thing itself, the genus is a part of the species.⁸ For example, the differentia 'two-footed' and the genus 'animal' are contained in the species 'man' (*De Int.* 11, 21a17–18). At the same time, since the genus is divided into its species, e.g. 'animal' is divided into 'man', 'horse' etc., the species is a part of the genus. Consequently, the genus and the species are part of each other.

If two things are part of each other, they are identical (Antisymmetry).⁹ By Antisymmetry, the genus and the species should be identical. Yet they are not. The species overlaps its genus, never completely coinciding with it. The species

⁵ In Δ 25 only genus is mentioned. The other constituent is the differentia (*Metaph.* Z 12, 1037b29–30; 1038a3–4).

⁶ Unless noted otherwise, all translations of Aristotle's texts are taken from Barnes' (1984) edition.

⁷ We have attempted to provide a brief analysis of this fragment previously [anonymized].

⁸ There is an isomorphism between the formula and the thing: "as the formula is to the thing, so is the part of the formula to the part of the thing" (*Metaph.* Z 10, 1034b21–22). If the formula is a definition of the species, it mentions the genus and the differentia. Given the isomorphism, the species itself consists of the genus and the differentia.

⁹ Aristotle appears to endorse Antisymmetry when he argues in *Phys.* Δ 3, 210a25–b17 that a whole can be said to be in itself in the sense that one part contains the other, e.g. a jar of wine is in itself because the wine is in the jar. The whole, however, cannot be in itself strictly speaking. If the whole were in itself strictly speaking, it would have to be in each of its parts. In that case, each part would be identical to the whole and thus both parts would be identical to each other, which is false.

comprises less than the genus (*Top.* Δ 6, 127a34), and conversely, the genus comprises more than the species (*Top.* Δ 1, 121b3–4, *Cat.* 5, 3b21–23).¹⁰ This is why the species implies its genus, whereas the genus does not imply its species.¹¹

Therefore, the genus and the species are not part of each other. A contradiction: the genus and the species are and are not part of each other.

To be sure, the contradiction is not real. At Δ 25, 1023b24–5, it is stated that, while the genus is a part of the species, *in another sense*, the species is part of the genus.

What does “in another sense” apply to?

Kinds as Classes (Extensions) or Properties (Intensions)

One way to understand the phrase “in another sense” is to assume that the list at Δ 25 of the senses in which things are said to be parts is a list of *things* that are parts, and not a list of *ways of being a part*. In that case, the phrase would apply to genus and species, and not to the parthood relation as such. It would require the terms ‘genus’ and ‘species’ to refer to different entities, i.e. classes in the second sense of ‘part’ and properties in the fourth sense. Thus, the second sense in which things are said to be parts, namely, the sense in which “the species are parts of the genus” would be the sense in which a sub-class is a part of a class, and, hence, the terms ‘genus’ and ‘species’ would refer to classes. In contrast, according to the fourth sense in which things are said to be parts, namely, the sense in which “the genus is called a part of the species” would be the sense in which one property (or concept) is a part of another, and, hence, the terms ‘genus’ and ‘species’ would refer to properties (or concepts).

¹⁰ The species is subordinate to its genus. Subordination is asymmetric. If a kind *A* is subordinate to a kind *B*, then *B* is not subordinate to *A* (cf. *Top.* Δ 2, 122b4–6). The superordinate kind (genus) applies to a greater amount of things than the subordinate kind (species) (*Cat.* 5, 3b21–23). If *A* and *B* apply to an equal amount of things then neither is the genus of the other, to wit, *A* is not the genus of *B* and *B* is not the genus of *A* (*Top.* Δ 1, 121b7–8).

¹¹ In Aristotelian parlance, the species participates in the genus but the genus does not participate in the species (*Top.* Δ 1, 121a12–13). Therefore “the genera are predicated of the species but the species are not predicated reciprocally of the genera” (*Cat.* 5, 2b20–21).

The rationale for such a reading is as follows. On the one hand, since the genus divides into subordinate species, parthood in the second sense is like class inclusion. On the other hand, since the species implies its genus, parthood in the fourth sense is like property entailment. Thus, for example, according to the second sense, the class of horses is a subclass of the class of animals, whereas, according to the fourth sense, the property of being a horse entails the property of being an animal (cf. Carnap 1947: 17).

It is commonly accepted that a class and a property are two different things associated with a predicate, i.e. its extension and its intension respectively.

Following Carnap's (1947: 1) definitions, the extension of a predicate is "the class of those individuals to which it applies", whereas the intension of a predicate is "the property which it expresses".¹² No property is a class, and no class is a property (albeit there can be classes of properties and classes themselves can have properties).¹³ Thus, the division of a genus into its species is extensional, since what gets divided is not a kind, but a class picked out by a kind, where a kind is equated to a property.¹⁴

According to the above-mentioned reading of Δ 25, the mutual parthood of a genus and its species dissolves by appeal to the ambiguity of the terms used to talk about kinds (i.e. 'genus' and 'species') as referring to either classes or properties. Namely, if the second sense in which things are said to be parts amounts to class inclusion

¹² The terms 'intension' and 'extension' have gained popularity due to Carnap (1947). The distinction itself appears in the Port-Royal *Logic* (1662) as a distinction between the comprehension and the extension of a concept. The comprehension of 'human' contains or implies 'animal' and other attributes which define human beings, while the extension of 'human' are the things to which 'human' applies.

¹³ Thus, the extension of 'horse' is a part of the extension of 'animal', for a class of horses is a subclass of a class of animals, and the intension of 'animal' is a part of the intension of 'horse', for the property of being a horse (horseness) implies the property of being an animal (animality). However, a class of horses is not a part of animality, and animality is not a part of the class of horses, and, likewise, horseness is not a part of the class of animals, and the class of animals is not a part of horseness. In brief, a horse is an animal, whereas horseness is as little an animal as animality is a horse.

¹⁴ Cf. Lloyd 1962: 78–79. Moravcsik (1973: 170–4) explores this option for Plato and provides persuasive evidence against it. We will see that the same is true for Aristotle.

and the fourth sense to property entailment then, depending on the relation in which a genus stands to its species, 'genus' and 'species' change their meaning from extensions in the second sense to intensions in the fourth sense. Since extensions and intensions are categorically distinct, the species and the genus in the second sense are separate from the species and the genus in the fourth sense, and therefore they are not part of each other. In other words, if 'genus' and 'species' refer to extensions, when the species is a part of the genus, and to intensions, when the genus is a part of the species, then the genus and the species are not part of each other. To say that they are is to equivocate. All we can say is that *in the intensional sense*, the genus is a part of the species and the species is not a part of the genus, while *in the extensional sense*, the genus is not a part of the species, but the species is a part of the genus.

It is a neat solution indeed,¹⁵ but it hardly is Aristotle's. For one thing, Aristotle does not set apart a kind and a class. Neither does he identify a kind with a class or with a property. Nor does he ever think that a kind is a property correlated with a class.

For Aristotle, a kind is not a class or extension. Extensions are determined by their members, whereas kinds (genera, species) determine their members. A class cannot lose even a single member, since it is nothing but its members, whereas it is immaterial to a kind how many members it has (as long as it has more than zero). If kinds were classes, kinds could not lose any member falling under them and remain the same kinds. Yet kinds can lose some of their members without themselves perishing.

Likewise, a kind is not a property or intension. Rather, kinds such as the species

¹⁵ Cohen (1973: 184) devises a similar solution for Platonic *eidē* arguing that "Plato uses *eidōs* in a systematically ambiguous way, sometimes meaning Form, sometimes meaning extension of a Form". According to Cohen (1973: 190), the animal is a part of man in the sense that "the intension animal is part of the intension man, whereas man is a part of the animal in the sense that the class of men is a part of the class of animals". Somewhat similarly, though concerning Aristotle's mereology, Koslicki (2008: 158; 2007: 138) proposes that some of the entities on Aristotle's list at Δ 25 might be misidentified if chained together mereologically, e.g. the form/species (*eidōs*) might not be the same thing throughout the list, and therefore, it might be false to assume that the elements of the formula (the genus and the differentia) are parts of it.

'horse' or the genus 'animal' are "secondary substances" that prescribe the properties of things falling under them (cf. *Cat.* 5, 2b29–37; 3b20–21). A thing has to belong to a kind to be anything at all.

Furthermore, a kind is not a property correlated with a class. If a kind were nothing other than such a property, then the differentia would also be a property correlated with a class. Hence we would have to countenance differentiae as kinds.¹⁶ But the differentia is like a cutting tool, not a container. It divides a kind into kinds, and these kinds do not share in their differentiae (cf. *Metaph.* Z 12, 1037b18–19).

Kinds as Relata of Different Parthood Relations

Aristotle is an old hand at dealing with "things said in many ways". Each entry in the *Metaphysics* Δ lists various senses of a given philosophical term. Notice that Δ 25 is dedicated to the senses of 'μέρος', not 'γένος' or 'εἶδος'.

The senses of 'γένος' are listed in *Metaph.* Δ 28, of which "genus as matter" is the concept of genus relevant to philosophers (Porph. *Isag.* 2.14–15), corresponding to both the second and fourth sense of 'part' in *Metaph.* Δ 25. (We will explore genus as matter in subsequent sections.)

An entry on the senses of 'εἶδος' is absent from Δ altogether. Grene (1974: 54) is right in taking it to be an indication that 'εἶδος' "has one sense, applicable in many contexts, rather than many senses". We believe that εἶδος is one of the primitive and fundamental concepts, not to be defined in Aristotle's system.

Since 'part' is the ambiguous term that is disambiguated in Δ 25, the phrase "in another sense" (1023b24–25) must apply to 'part', thereby indicating different sorts of parts, i.e. different parthood relations (not different objects as placeholders for a uniform concept of 'part'). The fact that Aristotle talks about parts undermines the idea to reduce parthood as a relation to objects that are parts, attaching ambiguity to

¹⁶ A similar argument that a kind is not a property correlated with a class is put forth by Moravcsik (1973: 173) concerning Plato's kinds.

the terms which stand in these parthood relations.

As we have observed, one take on the difference of parthood is to explain it away by reducing the parthood in the second sense to class inclusion and the parthood in the fourth sense to property entailment. In that case, 'genus' and 'species' change their meaning from classes to properties. However, unless we are mistaken in supposing that the ambiguity lies in 'part', it must be admitted that genus and species have changed the way they are parts without themselves changing from classes to properties. The genus 'animal' is a part of the species 'horse' as much as the species 'horse' is a part of the genus 'animal', just differently. According to our reading, the genus appearing in the second sense of 'part' is the very same genus as in the fourth sense of 'part', and the species in the second sense is the very same species as in the fourth sense, but, according to the second sense, the species is one sort of part of the genus and, according to the fourth sense, the genus is another sort of part of the species. A change of the parthood relation does not have to change the identity of its relata. Why should it not be possible for the same entities to stand in different parthood relations to one another?

Prior and Posterior Parts

A more detailed characterisation of the senses of 'part' appearing *Metaph.* Δ 25 is necessary for discerning an underlying distinction between parthood relations.

- 1) Parts arise from a quantitative division. Quantity *qua* quantity can be divided into parts in any way whatever, e.g. as two is a part of three, or into parts which measure it, e.g. as two is a measure of four.¹⁷ In general, any quantity is divisible into individual components (Δ 13, 1020a7–8), which constitute the whole quantity, i.e. the whole *qua* quantity using addition (cf. M 7, 1081b14). However, quantitative parts never constitute the whole *qua* substance, which has the quantity. Nothing can be composed of quantities (M 2, 1077a34–35).

¹⁷ An example of measuring parts is Alexander's (*In Metaph.* 423.39f).

- 2) Parts result from a non-quantitative division of a kind. A kind (εἶδος) can be divided “apart from quantity” (Δ 25, 1023b17) into subordinate kinds, i.e. a genus is divisible into its species. The parts, i.e. species that result from such a division merely divide, but do not constitute the whole, i.e. genus. Namely, the genus does not consist of its species, into which it is divided.
- 3) Parts are components that not only divide, but also constitute the whole (1023b20–21). Such parts are both principles and parts (ἀρχαὶ καὶ μέρη, Z 10, 1035a30). The whole is the form (εἶδος), i.e. species, or that which has the form, i.e. a matter-form compound (Δ 25, 1023b20). Parts in this sense are, then, form and matter that together make up the compound: the angle plus the bronze constitutes the bronze sphere (b20–22), the pupil plus the sight – the eye, the soul plus the body – the animal (cf. *De An.* B 1, 413a2–3).
- 4) Parts are elements in the formula, i.e. definition. The parts in the formula – the genus and the differentia – together constitute the formula and the species (εἶδος) to which the formula applies (cf. *Top.* Z 6, 143b8–9).¹⁸

In our view, the above-mentioned senses of ‘part’ entail a crucial distinction between parts (and, hence, parthood relations). To wit, there are parts that only divide the whole and parts that also constitute the whole. Parts that not only divide but also constitute the whole are **prior** to the whole, whereas parts that only divide but do not constitute the whole are **posterior** to it. Generally, parts, which are such that the whole is produced by their combination, are prior to the whole, whereas parts, which are produced by their separation from the whole, are posterior to the whole (*Metaph.* A 8, 988b32–34).

¹⁸ Notice that in *Metaph.* Δ 25, εἶδος appears in all senses of ‘part’ except for the quantitative sense. In the second sense of ‘part’, εἶδος is divided into εἶδη, in the third sense of ‘part’, εἶδος is divided into εἶδος and ὅλη, and in the fourth sense of ‘part’, εἶδος is divided into γένος and διαφορὰ. These are three ways of dividing εἶδος without quantity, representing εἶδος as a kind (genus) containing species, as a form in matter, and as a species made up of genus and differentia. Agreeing with Grene (1974: 53) that “somehow *eidōs* for Aristotle has one overarching meaning”, we choose to translate it in various ways depending on the context.

Priority and Posteriority

There are several senses of priority and posteriority respectively.¹⁹ Constituents are prior to the whole in the sense that they can exist separately from the whole (albeit not *qua* parts of the given whole), whereas the whole cannot exist without them. For example, fire and water, of which an animal is composed, exist before the animal (*Cat.* 8a9–11), and after the animal has deceased; the animal passes away dissolving into its elements. In general, “that which is prior to something else is not destroyed together with it” (*Metaph.* Z 15, 1040a21–22). Priority in this sense concerns principles and elements, as “the element of each thing is the first component immanent in each” (Δ 3, 1014b14–15).

In contrast, parts that are not constituents exist only after there exists the whole. In most cases, such parts cannot exist without the whole²⁰, while the whole can exist without them, albeit not without all of them. For example, a man can exist without a hand, but not without a heart or brain, whereas a severed hand cannot exist on its own; it is a hand in name only (cf. *Metaph.* Z 11, 1036b30–32).

At *Metaph.* Δ 11, 1019a1–4, Aristotle discerns priority and posteriority “in respect of nature and substance”:

“[Some things are called prior and posterior] in respect of nature and substance, i.e. those which can be without other things, while the others cannot be without them—a distinction which Plato used.”²¹

Accordingly, *A* is prior to *B* if and only if the being of *B* necessarily implies the being of *A*, whereas the being of *A* does not necessarily imply the being of *B* (*Cat.* 12, 14a31–32).²² Thus, what is prior is independent in being from what is posterior,

¹⁹ A detailed account of priority and posteriority is given in *Metaph.* Δ 11 and *Cat.* 12–13.

²⁰ In some cases, divisive parts can exist separately. For example, the half-line exists in actuality when the whole line is halved (Δ 11, 1019a8–11).

²¹ See also *Metaph.* M 2, 1077b2–3; *Phys.* Θ 7, 260b17–19.

²² To say that the being of *A* implies the being of *B*, whereas the being of *B* does not imply the being of *A*, is to say that *A* and *B* “are not convertible as to the implication of being” (*Cat.* 12, 14a29, our trans.).

whereas what is posterior is dependent in being on what is prior.

Priority and posteriority “in respect of nature and substance” directly pertains to the genus and the species. However, in this case, there is one important caveat: the sense of the independence/dependence in being ($\epsilon\tilde{\iota}\nu\alpha\iota$) has to be further refined, viz. it should be understood as the independence/dependence in essence (i.e. the ‘what it is to be’), not in being *simpliciter* or existence, or else Plato’s ontology looms large. For Aristotle, primary substances are existentially prior to their species, and the species are existentially prior to their genera, while the genera are essentially prior to the species, and the species are essentially prior to the primary substances falling under them.

The genus is naturally, i.e. essentially prior to the species, and the species is essentially posterior to the genus (cf. *Top.* Δ 2, 123a14–5) because the genus can be what it is without the species, while the species cannot be what it is without the genus. When the genus is eliminated the species is eliminated as well. Contrarily, when the species is eliminated its genus is not thereby eliminated.²³ If, for instance, something is a fish, *eo ipso* it is an animal, but “if there is an animal there is not necessarily a fish” (*Cat.* 13, 15a6–7).

Genus and Species as Prior vs. Posterior Parts

Now we have come closer to grasping how the genus and the species are part of each other in different senses. When the species is split into its prior parts we get its essential constituents (i.e. the genus and the differentia) without which it cannot be what it is (*Top.* Δ 2, 123a18–19; *Z* 4, 141b28–29). Thus, the genus is a prior part of the species.

When we focus on the genus, we discover that the genus also contains the species.

²³ The genus and the species “are not convertible as to the implication of being” (*Cat.* 13, 15a5–6, our trans.). If they did, they would be “simultaneous by nature”, i.e. neither prior nor posterior to one another. Simultaneous by nature are, e.g. species “resulting from the same division of the same genus” (*Cat.* 13, 15a3–4).

Does it mean that the species is a constituent of the genus? No. The genus does not consist of the species because it does not need the species to be what it is. The genus is divided into species as its posterior parts. Certainly, the genus could have been divided into prior parts, but in that case, it would have been divided *qua* species into its own genus and differentia. To rephrase, the species merely divide but do not constitute its genus because the genus may be what it is without its species, but not without its constituents, i.e. its own genus and differentia.

Notice that nothing prevents us from splitting the species into posterior parts, but in that case, the species would be divided *qua* genus into other species. If the species is not a genus but is *infima species* (i.e. the lowest level in a genus-species hierarchy) then its posterior parts are individuals. It is important to keep in mind that the division into individuals is not qualitative, but quantitative (cf. Alex. *In Metaph.* 424.11–12). In so far as we are concerned with qualitative division, the species is divisible either into genus and differentia (prior parts) or into subordinate species (posterior parts).

To sum up, when a genus **constitutes** a species, the genus is a **prior part** of the species, whereas, when a species **divides** a genus, the species is a **posterior part** of the genus.

The link between constitution and priority, and between division and posteriority, is corroborated by Boethius, who might have developed the idea by commenting on Porphyry's *Isagoge* and Aristotle's *Organon*. Boethius in the *De topicis differentiis* (III, 1196D) defines parts as "those things whose coming together produces the whole", implying that part mainly means constituent. Hereto he adds: "Those things which divide the whole are also called parts, but these are commonly called species or kinds" (trans. Stump 1978). Species are exceptional by the fact that they only divide, but do not constitute, the whole, i.e. the genus. In the *De Divisione* 879c, Boethius contrasts the genus to a proper whole by several distinguishing marks, one of which is that "we resolve a genus into things posterior but a whole into things prior"

(trans. Magee 1998). Things prior are constituents (cf. Boethius *In Cat.* 232d–233b) or resemble constituents (*De Div.* 887c), while species, being posterior to the genus, are merely divisive parts of the genus.

Boethius' distinction between proper wholes and genera must be the reason why Medieval philosophers separated integral wholes with their integral parts from universal wholes with their subjective parts.²⁴ Aquinas in his commentary on *Metaph.* Δ 25 affirms that part in the second sense is subjective, whereas parts in the other senses are integral (*Sententia Metaphysicae*, lib. 5, l. 21, n. 13). In Aquinas' terminology, the species is a subjective part of the genus, while the genus is an integral part of the species. More precisely, the genus is *pars integralis rationis substantiae*, i.e. *pars essentialis*, in contrast to the species that is merely *pars subjectiva totius universalis*.

Charles Sanders Peirce (1868: 417) remarks that the Medieval distinction between *partes subjectives* and *partes essentielles* is very much like the distinction between extension and intension ("comprehension", as he calls it, following the Port Royalists). Peirce (1868: 417) perceives the distinction already in Porphyry's *Isagoge*, vaguely referring to Porphyry's mention of an ancient doctrine (cf. *Isag.* 1.15; 8.1–3). A likely candidate for what Peirce had in mind is Porphyry's acknowledgement that "[...] genera are more extensive by containing the species under them, and species are more extensive than genera by their own differences" (*Isag.* 15.21–23, trans. Barnes). That is to say, genera are "more extensive" in virtue of their extension, while species are "more extensive" in virtue of their intension.

Apparently, at a certain point in the history of metaphysics and logic, the distinction between the two parthood relations recognized by the ancients collapsed into the

²⁴ A part is subjective if it is the subject of which the whole is predicated. For instance, in the sentence "A man is an animal", the genus 'animal' is predicated of the species 'man'. A universal whole is predicated of its subjective part, whereas an integral whole is never predicated of its integral part (*Sententia Metaphysicae* lib. 5. l. 21. n. 15). Thus, we must not predicate 'man' of 'animal', for not every animal is a man. We may only say that the 'animal' is a part of the 'man', thereby meaning that the 'animal' is an integral part of the definition of 'man'.

distinction between types of objects (extensions vs. intensions). Connecting all the dots, we may say that the division of a genus into species as its posterior parts reveals the extensionality of the genus–species relation, whereas the constitution of the species out of the genus and the differentia as its prior parts reveals the intensionality of the genus–species relation. The manner of cutting, either into prior or posterior parts, determines whether kinds behave intensionally or extensionally. In our view, the parthood relation (prior or posterior parthood) determines the aspect under which kinds are regarded (*qua* intensions or extensions). Thus, while having both extensional and intensional aspects, kinds do not have to be reduced to either extensions or intensions.²⁵

Our reading entails that we attribute to Aristotle a distinction between two parthood relations: prior parthood, which has to do with constitution, and posterior parthood, which operates primarily in division.

The positing of more than one parthood relation to deal with the division of kinds is controversial. For example, in his commentary on Porphyry's *Introduction*, Barnes has argued that it is either tautologous or confusing to speak of kinds in mereological terms and hence such "terms are best avoided" (Porphyry and Barnes 2003: 342). Barnes (2003: 341) writes:

"The term 'division' was taken to have several senses. [...] the division of a whole into its parts was properly called 'partition [μερισμός, *partitio*]', and 'division [διαίρεσις, *divisio*]' was properly reserved for division into species."

From this terminological observation, Barnes concludes that the sense of 'division' according to which a genus is split into its species is not a proper (mereological) division into parts.

We reply to this that the narrowing of mereology as only applicable to proper

²⁵ Muniz and Rudebusch (2018) have persuasively argued that Platonic kinds are entities with a dual nature: extensions in their members and intensions in their form, i.e. distinct identity. We believe that Aristotle's conception of kinds inherits this feature from Plato's view.

wholes hardly follows from the ambiguity of 'division' or 'part', or any other term. In addition, it is unclear what kind of operation *διαίρεσις* (*divisio*) is, if it is not a kind of division.

In what follows, we want to understand on a deeper level how a genus and a species can undergo these different divisions, as a result of which they bear different parthood relations to one another.

Matter and Form

Albeit the distinction between prior and posterior parthood explains how genus and species can be part of each other, the distinction itself and the relations between genus and species are grounded on the relations between matter and form in a matter-form compound.

Aristotle draws parallels between two systems:

- 1) genus, differentia, species;
- 2) matter, form, matter-form compound.

The first is concerned with classifications and definitions of things, and the second reveals their deep structure. Both systems are intimately connected, and the second is more fundamental than the first, viz. 'genus', 'differentia', and 'species' are explained in terms of 'matter', 'form', and 'matter-form compound'.²⁶

It is a commonplace Aristotelian doctrine that the second system is analogous to the first. In the words of Porphyry, "A genus is like matter, a difference like shape" (Porph. *Isag.* 15.6–7, trans. Barnes).²⁷

Let us examine more closely the link between the two systems on the one hand, and prior and posterior parthood on the other.

²⁶ We are following traditional unitarianism and reject the view that these are "two incompatible philosophical systems" (Graham 1987: 15).

²⁷ Cf. Boethius *De Divisione* 879c; Porphyry and Barnes 2003: 195–197; 257.

Genus as Matter

In a parenthetical remark, Aristotle defines ‘matter’ as follows: “by matter I mean that which, not being a ‘this’ actually, is potentially a ‘this’” (*Metaph.* H 1, 1042a27–28). Matter is only potentially a determinate something; in itself, it is indeterminate (Z 11, 1037a27). Matter needs the form to make a *this* out of it. Matter is always relative to the form (*Phys.* II 2, 194b8–9), which determines what matter is good for what kind of thing.

Albeit “the genus is the matter of that of which it is called the genus” (*Metaph.* I 8, 1058a23–24), the genus is not identical to matter in a matter-form compound (cf. Grene 1974: 57). The genus is merely *as matter* (ὡς ὕλη, *Metaph.* Δ 28, 1024b8, cf. Z 12, 1038a6), i.e. similar to matter in a particular way, viz. it is a substrate.

The substrate serves multiple roles. Firstly, it is that in which a quality or a form resides (cf. *Phys.* II 1, 192b34). Secondly, it is that out of which a thing can be generated (cf. *Phys.* I 7, 190b3–4; *Pol.* I 8, 1256a 8–9), therefore, it is a part of the thing of which it is the substrate. Namely, it is “that out of which as out of something present in the thing the thing comes to be” (τὸ ἐξ οὗ γίγνεται τι ἐνυπάρχοντος, *Phys.* II 3, 194b24, our trans.).

Genus and matter share both features of a substrate. Firstly, just as matter is the substrate for a quality or a form, so too the genus is the substrate for the differentiae (*Metaph.* Δ 6, 1016a26; Δ 28, 1024b3–4; 8–9). Secondly, just as matter is in the thing and that out of which the thing is, so too the genus is in its species and the species is out of it.

There are two important corollaries of the fact that matter and genus are substrates. Firstly, the same matter underlies different things and belongs to each of them. Likewise, the genus is the same in all of its species and severally belongs to each of them (cf. *Phys.* Δ 3, 210a19). Secondly, both matter and genus are hierarchically organized. Proximate matter comes from remote matter. Similarly, the lowest (most specific) species comes from the highest (most generic) genus. At Δ 24, 1023a26–29

Aristotle merges genus and matter, implying that bronze as the lowest species comes from water as the highest genus.²⁸

Differentia as Form

The differentia is like the form, a principle of being (*Metaph.* H 2, 1042b32–33). Just as the form is the cause in virtue of which the matter is a determinate something (Z 17, 1041b7–8), so the differentia is that in virtue of which the genus is narrowed down to a determinate species. The differentia constitutes the species out of the genus as matter: “the voice is genus and matter, but its differentiae make the species, i.e. the letters, out of it” (Z 12, 1038a6–8). The form and the differentia are that which integrate the thing into *one* thing – one compound or one species.

However, the form and the differentia not only integrate and constitute but also separate and divide. The form divides the world into actually separate unities (*Metaph.* Z 13, 1039a7). By unifying the matter into a whole, the form generates a separate thing that differs from other things. If there were no forms, there would be no countable things in actuality, no salient unities distinguishable from an undifferentiated mass. It would be a world of “all things together” (ὁμοῦ πάντα, *Metaph.* Λ 1, 1069b21). Similarly, the differentia separates the species from the rest of the genus. By forming the species out of the genus, the differentia divides the genus, and, by dividing the genus, the differentia constitutes the species, which falls under the genus (cf. Porph. *Isag.* 4,1.10.9f).

Thus, the differentia constitutes the species, divides the genus, and distinguishes one species from another. Every man is different from every other animal by having “otherness in their substance” (*Metaph.* Δ 9, 1018a14–5). The species ‘man’ has the same matter (i.e. the genus ‘animal’) as other species of the genus, but differs in form i.e. by its differentia. The animality of man, ox, horse etc. belongs equally to all species of the genus ‘animal’, whereas its specific, i.e. constitutive differentia (e.g.

²⁸ This is not to say that Aristotle conflates genus and matter. While water is both the genus and matter of bronze, and bronze is the matter of a statue, bronze is not the genus of the statue.

two-footedness) belongs exclusively to man. Thus, 'animal' is included in the definition of 'man' along with 'two-footed' if 'man' is defined as a two-footed animal.

Note that the constitutive differentia is a part of the species, for it makes the species out of the genus as matter, whereas the differentia is not a part of the genus (*Metaph.* K 1, 1059b33; *Top.* Δ 2, 122b20), for the genus is not made out of the differentiae that divide it. Likewise, the form is a part of the compound, whereas that very form is never a part of the matter of the compound, as the matter has its own form.

Similarly to the form, the differentia plays multiple roles. As Pierre (Petrus) Barbay (1680: 233) concisely puts it, the differentia 1) divides the genus 'animal', 2) constitutes the species 'man', 3) distinguishes 'man' from other species of 'animal'. The differentia is like the cutter (*differentia divisiva*), the edge of the pattern piece (*differentia constitutiva*), and the pattern (*differentia distinctiva*). Division, constitution, and differentiation are different operations simultaneously performed by the same entity.

The differentia divides the genus into species, which then are posterior parts of the genus. At the same time, by making the species out of the genus, i.e. by being species-producing (εἰδοποιός, *Top.* Z 6, 143b8), the differentia is a prior part of the species and turns the genus into another prior part of the species, so that it makes the species together with the genus (143b9). Having constituted the species, the differentia distinguishes the species from other species of the genus.

The Form and the Division into Prior Parts

To understand something as what it is, one must consider its form. The form is the essence revealed in the definition, which specifies the constituents, i.e. prior parts of the thing. The form enables the division into prior parts because the definition of the form renders prior parts. Looking at the essence of a thing *eo ipso* requires dividing that thing into prior parts.

In the case of an animal, it is necessary to include a reference to its matter in the definition, for anything that moves requires matter, and “an animal is something perceptible, and it is not possible to define it without reference to movement” (*Metaph.* Z 11, 1036b28–29). Reference to matter can be secured by choosing the *differentiae* carefully.

When ‘man’ is defined as a two-footed animal, ‘two-footed’ indicates the capacity to move on two feet, indirectly referring to matter. The number and shape of legs (and other limbs and organs) are determined by the form (i.e. soul and its powers), which, in turn, is revealed in the definition by the *differentia* delineating the species.

Various animals share the same powers, but only some powers are unique to each species (*PA* A 1, 641b7–10). It is the unique powers that we are looking for in our striving for complete definitions, “[f]or it is not the whole soul that constitutes the animal nature, but only some part or parts of it” (*PA* A 1, 641b9–10). The *differentiae* peculiar to each animal species express themselves in matter as bodily organs, members, and systems (cf. *Metaph.* E 1, 1026a1–3). “The *differentia* is the form in matter” (Ἔστι δ' ἡ διαφορὰ τὸ εἶδος ἐν τῇ ὕλη, *PA* I 3, 643a24, our trans.). Notice that it is a form *in* matter, not *out of* matter, as matter is not a part of the form, but a substrate for the form. Two-footedness itself does not have any feet; it is the animal who does. Nonetheless, ‘two-footed’ indirectly refers to matter, suggesting that matter is a prior part of the thing, i.e. matter-form compound. ‘Two-footed’, just as ‘snub’, is “bound up with matter” (*Metaph.* E 1, 1025b32–33).

In the case of a human being, however, we do not care so much about locomotion (and hence two-footedness as such), but rather about the thinking faculty (and hence rationality), as it belongs to none other animal but man (*PA* A 1, 641b7–8). Strictly speaking, two-footedness is a *proprium* – a necessary, but not an essential property. Nevertheless, the *differentia* ‘two-footed’ is usable in the definition because it sets human beings apart from other creatures in the genus and it flows out of man’s nature, i.e. the thinking faculty/rationality. Multiple *differentiae* may appear in

diaeresis, but once we discover their ground, their unity emerges.

Aristotle identifies the form with a cause and a principle (*Metaph.* Z 17, 1041b26; 36), which presents itself as the actuality (*ἐν ἐργείᾳ*, H 2, 1043a28). There is no question as to how the form is a unity since all the prior parts that are included in the essence are “one in actuality”. Namely, the differentiae in the definition of a thing refer to actuality, i.e. the function of the elements (cf. *Metaph.* H 2, 1043a16f). The actuality is *in* the elements, and not an element *in addition to* the elements (cf. H 3, 1043b4f) or a thing made *out of* elements (1043b7–8).²⁹

If one were to take the elements in the formula – ‘two-footed’ and ‘animal’ – as the “matter of the form” (cf. Δ 24, 1023ab2), the actuality would be “something besides these” (H 3, 1043b11), i.e. the substance and “the cause of the thing’s being” (b13). However, it is better not to consider the genus and the differentia as two elements placed side by side one another (albeit they appear so in the definition), but, rather, to observe that the differentia is the actuality of the genus, the genus playing the part of matter and the differentia that of the form (cf. H 3, 1043b32).

Matter and the Division into Posterior Parts

The presence of matter allows for the existence of a thing that can be cut – a matter-form compound. Matter yields extension, for it constitutes a body, and “body is that which has extension in all directions” (*Metaph.* K 10, 1066b32), ensuring divisibility (cf. *Phys.* Γ 5, 204a11–12).

Matter ensures not just divisibility *per se*, but the divisibility into posterior parts. Since the form dictates what parts are prior to the thing whose form it is, all the parts that are posterior to the thing must be due to matter.

In *Metaph.* Δ 24, Aristotle introduces a distinction between ‘coming out of matter’

²⁹ This is not to say that the form cannot be regarded as a constituent. To get the form as a constituent, one must divide the whole into matter (i.e. material constituents *en masse*) and the form. Indeed, according to the third sense of ‘part’ in Δ 25, the form is a part along with matter. Namely, matter and form as constituents result from a different division than that which yields solely material constituents (cf. [anonymized]).

and 'coming out of the compound of matter and form'. Something comes out of matter in the sense that it is constituted by matter (cf. *Metaph.* Δ 24, 1023a26–29), and something comes out of a matter-form compound in the sense that a part is subtracted from it, i.e. arises out of the division of the compound into other compounds (cf. Δ 24, 1023a31–34).

The distinction between coming out of matter and coming out of the compound of matter and form helps to understand how matter brings about posterior parts. Certainly, matter is a prior part of the matter-form compound because the compound arises out of it. Nevertheless, matter generates posterior parts because such parts can arise only due to the fact that matter has been shaped into a matter-form compound. While matter constitutes the compound and thereby is a prior part of it, a part that is subtracted from the compound does not constitute the compound, and thus is merely a posterior part of it (cf. *Metaph.* Z 10, 1035b11–12). For example, a splinter could be broken off of the statue of Hermes, but it would be a posterior part of it because the statue first of all needs to be shaped out of, say, stone in order to undergo the loss of a splinter. The form – the shape of Hermes – does not have splinters. Such parts exist only because of matter, “and these are parts of the concrete thing, but not of the form, i.e. of that to which the formula refers” (Z 10, 1035a20–21).

Notice that matter itself can be regarded as a compound, from which other compounds are “subtracted” by being generated out of it. In that case, the thing that consists out of matter, i.e. the compound can be regarded as a subtracted part of the matter, thereby being a posterior part of it. For example, the statue of Hermes is “subtracted” from a stone by being chiselled out of it. Potentially, Hermes is in the stone (*Metaph.* Δ 7, 1017b7). The stone – Hermes' matter – is prior to Hermes, but Hermes is as much a posterior part of the stone as all the other potential statues that the sculptor could have made out of it.

Similarly, when an animal, e.g. a lamb is slaughtered it is divided into posterior parts, e.g. leg, shoulder, rump, and other members. Although the lamb can be cut in

any way, it does not consist of these parts. Instead, the lamb consists of its organic matter (coming from fire and earth in the *katamēnia* of the ewe) and form (coming from the *sperm* of the ram), which are prior to the lamb and its members. In a way, the carcass of the lamb is as matter for the lamb pieces.

There is an important nuance distinguishing the matter of a statue (or any artefact) and the animal body. The animal body is a body properly speaking only when it is alive, i.e. related to its form, i.e. the soul, which determines what sort of matter is the matter of the animal, whereas it is accidental to stone or bronze whether it is shaped into this or that statue.

The living body cannot exist without its organic matter. Its matter is organic, i.e. equipped with organs due to the presence of the animal form, i.e. soul (cf. *PA* I 1, 642a11–13). When the animal dies, its body is transformed into a carcass, and its organic matter decays into remote matter. As a result, the body of a dead animal is a body in a metaphorical sense. Yet it has structural similarities to the living body with its distinct shapes and configurations. The carcass remains for a while until the flesh rots away into fire and earth. The elements that constitute the organic matter of a living animal also constitute the carcass and continue to exist after the animal's body has decomposed. The carcass is prior to its cuts but posterior to its elements. The body of a living animal, however, is prior to the carcass.

In a manner that may be perplexing, Aristotle calls the posterior parts of an animal "matter" (*Metaph.* Z 10, 1035b21; 1035b11–12). This so-called remnant matter is not identical to the matter that, together with the form, constitutes the compound.

Rather, it is that into which the compound passes away (Z 10, 1035a17–21).³⁰ Such "matter" does not enter the definition (1035a21, cf. 1034b24–25), as only constitutive matter does (cf. Z 10, 1034b25–26).

Constitutive matter enables the divisibility into posterior parts by the fact that it

³⁰ In simple cases, the remains may coincide with the constitutive matter. For example, in the case of BA, A and B are not only remains but also elements.

constitutes a matter-form compound, from which these parts can be subtracted. Now, if genus is as matter, and matter grounds posterior parthood, are species posterior parts of the genus *because* the genus is as matter? And what sort of matter? Is genus divisible into species because it is like an animal body?³¹

Genus as the Animal Body

In his commentary on Aristotle's *Metaphysics* Δ 25, Alexander explains the difference between quantitative division and division apart from quantity:

“For ‘animal’ can be divided as a quantity, when it is divided into parts [such as] head, chest, and its other [bodily] parts, [but then] we would not be dividing it as a genus. [But] ‘animal’ can also be divided, not as a body or quantity, but as a genus, and this division, made in virtue of the differentiae, divides it into its species.” (Alex. *In Metaph.* 424.17–21, trans. Dooley)

Quantitative division yields bodily parts or pieces (μέροια) – things “into which a whole can be divided and which are actually present in it” (*Phys.* A 4, 187b15–16), for instance, “Nose, Eye, Face, and other so-called members” (*PA* I 5, 645b35–646a1). In contrast, the division apart from quantity yields kinds. It is qualitative since it is achieved by differentiae, and differentia is a quality in the substance (*Metaph.* Δ 14, 1020b1).

In *Parts of Animals*, Aristotle talks about the classification of animals based on their body parts, insinuating parallelism between animal body parts and animal species. It is a little short of treating the genus ‘animal’ on par with the body of an animal.

In what sense, then, is the genus like the body? We must keep in mind that ‘body’ is ambiguous between the dead and the living body and that each of them is both a

³¹ Muniz and Rudebusch's (2018) propose that the division of kinds in Plato's late dialogues should be understood along the lines of the division of an animal body, a *hierion* (*Plt.* 287c3). The question of whether Aristotle could have acquired such a method of division from Plato is worth a separate study. We will take it as a hypothesis that Aristotle's kinds are also divided similarly to the body, and see what follows from it. The hypothesis is justifiable given that Aristotle develops his own theory, based on Plato's views on division and definition (cf. Deslauriers 2007: 15, 18–19, 26; Balme 1987: 69), and compares kinds to matter-form compounds.

matter-form compound and matter for something else.

- (1) The living body is a matter-form compound. The form is the soul, and the body is alive only when it is ensouled. The living body is indistinguishable from the living animal *in fact*, albeit they differ *in essence*, i.e. what it is to be a living animal is not identical to what it is to be the body of the living animal.
- (2) The living body in the sense of organic flesh is the matter of each member and organ. The body has members and organs because it has the soul with its powers that necessitate and impose a certain structure to ensure a certain function. Thus, the members and organs of the body are the matter for the powers of the soul, and the living body as an organic whole is the matter for the soul.
- (3) The dead body is a matter-form compound before it has disintegrated into elements and turned into remote matter. In this case, the form is not the soul, for otherwise, the body would be alive. The “form” is the sensible shape and structure, which has lost its function. The same is true for cut-off body parts.
- (4) The dead body is the matter for its cut-off parts. The shape of a cut-off body part is the “form” of the cut-off part, and the dead flesh of the carcass is its matter. The carcass is almost like a statue, of which a fragment can be broken off, except that the outlines of the fragment are already etched in. The dead body is structured, viz. it bears witness of having been structured by the soul of the animal, as it is naturally cuttable at the joints, and now it serves as the material for the cut-off parts.

At first glance, it is not reasonable to compare a genus to the living body, for such a body is for the sake of the soul and it performs the function(s) prescribed by the soul. Then again, if nature should be cut at its joints, and the classification of kinds is natural, then genera and species appear to have a certain function (ἔργον). A man has a function, “as eye, hand, foot, and in general each of the parts evidently has a function” (EN A 7, 1097b30–32). If the fact that the whole has a function is inferred

from the fact that its parts have a function, and, if the species, being parts, have a function, the genus must have a function too. Indeed, man's function is to think, and animal's function is to perceive (1098a2–3). If function determines structure, then the structure of a genus is determined by the functions of its species, as is the case with the structure of the animal body, which is determined by the functions of its organs. Surely, the species 'man' or the genus 'animal' does not literally think or perceive; it is their members who do so. Nevertheless, assigning a function or role to a natural kind contributes to the coherence of the classification as a whole. It is not arbitrary but rather is based on the inherent anatomical structure and biological function (niche) of its members.

Considered apart from the function of its members, a genus is more similar to a dead body, which has structure but no function. In that case, the genus can be thought of as the flesh of a carcass, as it can be cut into distinct species according to the structure imposed on it by the peculiar functions of each species. Just as the body can be dissected to understand the anatomy and physiology of an animal, so too the genus 'animal' can be analysed to reveal its branching and proper place in the taxonomy.

The similarity between the body and the genus breaks down concerning their persistence conditions. The genus needs nothing to continue to be what it is, whereas the body requires nutrition to maintain its being (*De An.* B 4, 416b13–15). Moreover, upon the division into posterior parts, the body passes away into its "matter", i.e. posterior parts. Eventually, they dissolve into elements – the so-called remote matter, which is impossible to destroy. In contrast, the genus persists and survives its division into species.

The dismemberment of a body is a quantitative division according to the first sense of 'part' outlined at Δ 25, whilst the *diaeresis* of a genus is a qualitative division according to the second sense of 'part'. In a quantitative cutting of a body, the resulting parts are members (limbs, organs etc.). In a qualitative cutting of a genus,

the resulting parts are subordinate species. However, both divisions have a common factor: the *dividendum* is a structured whole, a matter-form compound. The division in the first sense of 'part' and the division in the second sense are possible since the *dividendum* is also divisible in the third or the fourth sense respectively. Namely, what is divisible quantitatively into body parts (posterior parts) is divisible into matter and form (prior parts), and what is divisible qualitatively into species (posterior parts) is divisible into genus and differentia (prior parts). Accordingly, the genus and the differentia are analogous to matter and form, hence the third sense of 'part' is analogous to the fourth, and, since the species resemble body parts, the first sense of 'part' is analogous to the second.

Conclusions

We have focused on Aristotle's remark in *Metaph.* Δ 25, 1023b24–25 that genus is a part of its species and, in a different sense, the species is a part of its genus. We have attempted to establish the following points:

1. It is the same genus and the same species – the very same things – that are part of each other in different ways or senses. The ambiguity lies in 'part', not in 'genus' or 'species'.
2. 'To be a part in a certain sense' means 'to arise as a certain sort of part due to a certain sort of division'. The method of division is key to the result. In particular, a whole can be divided into merely divisive, i.e. posterior parts and into parts that are also constitutive of the whole, i.e. prior parts. Prior parts are independent from the whole, while the whole is dependent on them, whereas posterior parts are dependent on the whole, while the whole is independent from them. The independence/dependence is not unqualified. At least in the case of kinds, it should be understood as independence/dependence in essence.
3. The distinction between prior vs. posterior parts explains the mutual parthood of genus and species. The genus is a prior part of the species because the species cannot be what it is without its genus, whereas the species is a posterior part of

the genus because the genus can be what it is without its species.

4. The genus is as matter for its species, and the differentia is as the form of the species, separating the species out of the genus. Accordingly, the species is like a matter-form compound.
5. The assimilation of genus to matter and differentia to form grounds the different parthood relations between the genus and the species. If matter and form make up the compound and hence are prior parts of it then, by analogy, genus and differentia make up the species and hence are prior parts of it. Conversely, if the matter-form compound is a posterior part of the matter, out of which it is made through the form, then, by analogy, the species is a posterior part of the genus, out of which it is made through the differentia.
6. The form as the essence and object of definition indicates the prior parts of the compound, telling us which constituents are essential to the compound. In contrast, matter, by combining with the form, yields posterior parts, which the form cannot yield in isolation from the matter.
7. Conceiving the relations between genus and species in terms of matter and form suggests that the division of a genus is analogous to the partition of an animal body. In both cases, the *dividendum* is a matter-form compound that can be divided into prior parts (matter and form or genus and differentia) or posterior parts (matter-form compounds or species).

Our conclusions are sketchy and programmatic, awaiting further justification and discussion.

References

Alexander. *Alexandri Aphrodisiensis in Aristotelis metaphysica commentaria*.

Commentaria in Aristotelem Graeca 1. Ed. M. Hayduck. Berlin, Reimer, 1891.

Aristote. *Les parties des animaux*. Ed. P. Louis. Paris, Les Belles Lettres, 1956.

- Aristoteles. *Aristotelis categoriae et liber de interpretatione*. Ed. L. Minio-Paluello. Oxford, Clarendon Press, 1966.
- Aristoteles. *Aristotelis ethica Nicomachea*. Ed. I. Bywater. Oxford, Clarendon Press, 1962.
- Aristoteles. *Aristotelis physica*. Ed. W. D. Ross. Oxford, Clarendon Press, 1966.
- Aristoteles. *Aristotelis topica et sophistici elenchi*. Ed. W. D. Ross. Oxford, Clarendon Press, 1970.
- Aristotle. *Aristotle's Metaphysics*, 2 vols. Ed. W.D. Ross. Oxford, Clarendon Press, 1970.
- Aristotle. *De anima*. Ed. W. D. Ross. Oxford, Clarendon Press, 1967.
- Aristotle. *The Complete Works of Aristotle: the Revised Oxford Translation*, 2 vols. Ed. by J. Barnes. Princeton, Princeton University Press, 1984.
- Arliig, A. (2019). 'Medieval Mereology'. *The Stanford Encyclopedia of Philosophy* (Fall 2019 Edition). In Zalta, E.
<https://plato.stanford.edu/archives/fall2019/entries/mereology-medieval/>
- Balme, D. (1962). 'Τένος and Εἶδος in Aristotle's Biology'. *The Classical Quarterly*, 12(1): 81–98. <http://www.jstor.org/stable/638031>
- Balme, D. (1987). 'Aristotle's use of division and differentiae'. In Gotthelf, A.; Lennox, J. *Philosophical Issues in Aristotle's Biology*. Cambridge University Press, Cambridge: 69–89. doi:10.1017/CBO9780511552564.008
- Barbay, P. *Commentarius in Aristotelis Logicam*. 3rd ed. Parisiis, G. Josse, 1680.
- Boethius. *Anicii Manlii Severini Boethii De divisione liber*. Critical Edition, Translation, Prolegomena, and Commentary by J. Magee. Leiden, Brill, 1998.
- Boethius. *Anicii Manlii Severini Boethii In Categorias Aristotelis Commentaria, Patrologia Latina* 64. Parisiis, apud Garnier fratres et J.-P. Migne successores, 1879.

- Boethius. *De Topicis Differentiis*. Translated, with notes and essays on the text, by E. Stump. Ithaca, London, Cornell University Press, 1978.
- Carnap, R. *Meaning and Necessity: A Study in Semantics and Modal Logic*. Chicago, University of Chicago Press, 1947.
- Cohen, S. M. (1973). 'Plato's Method of Division' in Moravcsik, J. M. E. *Patterns in Plato's Thought*. Springer, Dordrecht: 181–91.
- Cotnoir, A. J.; Varzi, A. C. *Mereology*. Oxford; online edn, Oxford Academic, 23 Sept. 2021, <https://doi.org/10.1093/oso/9780198749004.003.0002>
- Deslauriers, M. *Aristotle on Definition*. Leiden, Brill, 2007.
<https://doi.org/10.1163/ej.9789004156692.i-230>
- Fine, K. (1999). 'Things and Their Parts'. *Midwest Studies in Philosophy*, 23: 61–74.
- Graham, D. W. *Aristotle's Two Systems*. New York, Oxford University Press, 1987.
- Grene, M. (1974). 'Is Genus to Species as Matter to Form? Aristotle and Taxonomy'. *Synthese*, 28(1): 51–69. <http://www.jstor.org/stable/20114952>
- Koslicki, K. (2007). 'Towards a Neo-Aristotelian Mereology'. *Dialectica*, 61(1): 127–59.
- Koslicki, K. *Form, Matter, Substance*. New York, Oxford University Press, 2018.
- Koslicki, K. *The Structure of Objects*. Oxford, Oxford University Press, 2008.
- Lloyd, A. C. (1962). 'Genus, Species and Ordered Series in Aristotle'. *Phronesis*, 7(1): 67–90. <http://www.jstor.org/stable/4181700>
- Moravcsik, J. M. E. (1973). 'Plato's Method of Division' in Moravcsik, J. M. E. *Patterns in Plato's Thought*. Springer, Dordrecht: 158–180.
- Muniz, F.; Rudebusch, G. (2018). 'Dividing Plato's Kinds'. *Phronesis*, 63(4): 392–407. <https://www.jstor.org/stable/26566223>
- Peirce, Ch. S. (1868). 'Upon logical Comprehension and Extension'. *Proceedings of the American Academy of Arts and Sciences*, 7: 416–432.

Porphyrius. *Porphyrii isagoge et in Aristotelis categorias commentarium.*

Commentaria in Aristotelem Graeca 4, 1. Ed. A. Busse. Berlin, Reimer, 1887.

Porphyry. *Porphyry's Introduction.* Translated with a Commentary by J. Barnes.

Oxford, Clarendon Press, 2003.

Thomas Aquinas. *Sancti Thomae de Aquino Sententia libri Metaphysicae.* Textum

Taurini 1950 editum ac automato translatum a Roberto Busa SJ in taenias magneticas

denuo recognovit Enrique Alarcón atque instruxit. URL =

<<http://www.corpusthomisticum.org/cmp05.html>>