On Diairesis, Parallel Division, and Chiasmus: Plato's and Aristotle's Methods of Division[1]

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ABSTRACT

In this paper, I articulate three kinds of division that Plato and Aristotle acknowledge to be proper, valid methods of division, namely, diairesis (vertical division), parallel division, and chiasmus (cross-division). I attempt to explain the relationship among the three kinds of division, namely, how they transform from one to another. Starting with Plato's division of constitution in the *Statesman*, I illuminate that from ostensible diairesis emerges a parallel division, and the parallel division causes a cross-division to occur. Thus, the sixfold division of constitution is not a diairesis (as it appears to be) but rather is a 3 x 2 cross-division. Inheriting the three kinds of division from Plato, Aristotle advances the form by providing a theoretical explanation to the transformation of the three kinds of division.

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In *Topics* Z6, Aristotle prescribes two conditions under which a parallel division can originate from or construct ostensible diairesis and how the parallel division further causes a cross-division to occur.

Keywords: Plato, Aristotle, diairesis/vertical division, parallel division, chiasmus/cross-division.

INTRODUCTION

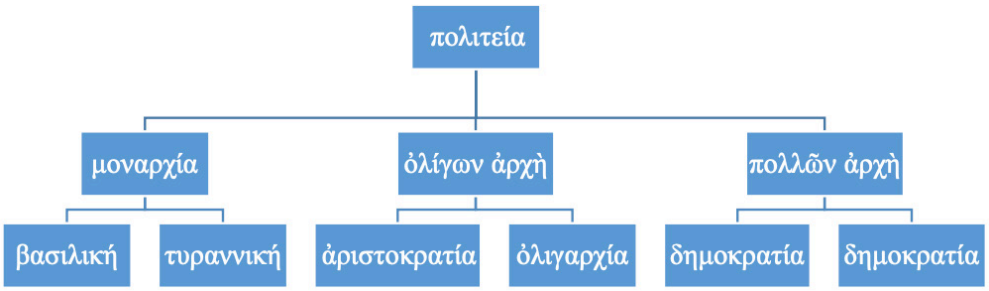
This paper attempts to articulate the three kinds of division that Plato and Aristotle acknowledge to be proper, valid methods of division, namely, diairesis (vertical division), parallel division, and chiasmus (cross-division). Starting with Plato's division of constitution in the *Statesman*, I show that the sixfold division of constitution is not a diairesis (as it appears to be) but rather is a 3 x 2 cross-division. The cross-division emerges from a parallel division, and the parallel division originates from ostensible diairesis (section 1). Then, I turn to Aristotle's explication of how a parallel division can originate from or constitute ostensible diairesis by introducing the two conditions prescribed in *Topics* Z6 (section 2). Further, to prove the propriety and validity of the two conditions, I invoke the division of contrary in *Categories* 10 as an example. On this basis, I establish general schemes, thereby theoretically exploring how a parallel division emerges from ostensible diairesis, and how the parallel division causes a cross- division to occur (section 3). Moreover, I delve into the biological domain, explaining the phenomenon that in classifying animals, Plato and Aristotle seem to make diairesis but actually conduct chiasmus (section 4). Finally, I conclude that there are three kinds of division, namely, diairesis, parallel division, and chiasmus – propriety and validity of which are admitted by both Plato and Aristotle. With particular emphasis on the relationship between the three kinds of division, I summarize how they are associated with each other, transforming from one to another (section 5). In closing, I add an appendix to answer the question of why chiasmus is familiar to philosophers and used by Plato, Aristotle, and Kant while being unknown to scholars for such a long time (Appendix).

1. PLATO'S DIVISION OF CONSTITUTION IN THE *STATESMAN*

At the end of the *Statesman*, Plato intends to distinguish the statesman from other citizens in general and from his imitators in particular. While the imitators rule by law or against law, the statesman rules by wisdom. Ruling by wisdom, the statesman not only aims at establishing the common good but also considers the specific situation. Ruling by law, the good imitators care about the common advantages prescribed in written or unwritten laws while omitting the diversity and complexity of concrete cases. Ruling against law, the bad imitators are only concerned about the interests of the ruling class. In discussing different kinds of imitators, Plato spells out different types of constitutions because a certain type of constitution mirrors a certain kind of imitator by sharing the same characteristics with him.[2]

To distinguish among different types of constitutions, Plato seems to make a diairetical division by dividing the genus into the differentiae and dividing the differentiae into the sub-differentiae until the final differentia is arrived at. First, in terms of the number of rulers, Plato divides constitution into three types in which one, few, or many rulers rule (*Plt*. 302c4-6).[3] In terms of the quality of rule, then, Plato subdivides the three types – that is, constitutions with one, few, and many rulers – into legal and illegal (*Plt*. 302e5-8). In this way, the constitution with one ruler (namely, monarchy) is subdivided into kingdom and tyranny, the constitution with few rulers is subdivided into aristocracy and oligarchy, and the constitution with many rulers is subdivided into two types that share the same name democracy (*Plt*. 302d1-e2).[4] Based on what Plato

Diagram 1



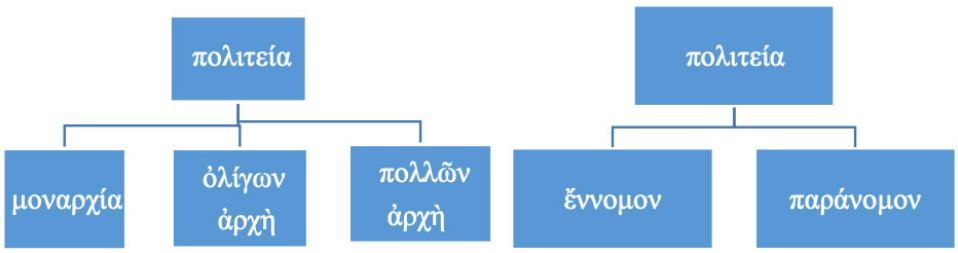
literally states in words, a sixfold division is conducted, illustrated through Diagram 1.

Initially, the division of constitution appears to be a diairesis, that is, a single division tree. This tree has three levels. The top level contains one genus, namely, *politeia*. The second level is a trichotomous division of the top level into three species, and the third level contains three dichotomous divisions of the second level into six subspecies. Thus, the division of constitution resembles a single division tree with three levels. Since it proceeds from the top down, the division of constitution seemingly has a vertical structure.

Despite appearing to be a diairesis, the division of constitution cannot be a proper, valid diairesis, at least from Aristotle's point of view, because it does not comply with the fundamental principle of diairesis. Aristotle states the fundamental principle of diairesis clearly in words such that at each level of diairesis, the one conducting the division must select the sub-differentia that is the appropriate differentia derived from the superordinate type – that is, *the sub-differentia of the differentia*.[5] The division in Diagram 1 is not a diairesis because 'legal-illegal' are not the appropriate sub-differentiae of the superordinate type 'one-few-many'. From Aristotle's perspective, in dividing one, few, and many rulers into legal and illegal, Plato could have made a categorical mistake, dividing something quantitative (number of rulers) into something qualitative (quality of rule).

Although 'legal-illegal' cannot be used to divide the superordinate differentiae 'one-few-many', they can be applied to divide the genus 'constitution' because a constitution can be either legal (insomuch as one rules by law) or illegal (insomuch as one rules against law) independent of how many rulers govern. Because 'legal-illegal' are not applied to divide the superordinate differentiae 'one-few-many' but used to differentiate the genus 'constitution', 'legal-illegal' cannot be subordinate to but should remain alongside 'one-few-many'. In this case, a parallel double structure replaces the single vertical structure of the diairesis in Diagram 1. In fact, Plato is fully aware of the parallel structure of the division of constitution in noting that "Do we suppose that any of these constitutions is correct, when it is classified and defined by the following criteria – one-few-many on the one hand, and wealth-poverty, force-consent or accompanied with written laws or without laws on the other hand?" (*Plt.* 292a5-9). Therefore, in the division of constitution, the two pairs of differentiae – that is, 'one-

Diagram 2



few-many' and 'legal-illegal' – are not vertically arranged but remain in parallel alongside each other, illustrated through Diagram 2.

The division of constitution is not a single division tree but contains two division trees. The two division trees remain in parallel alongside each other. Each of the two division trees contains two levels such that the same genus, '*politeia*', is divided into 'one-few-many' and into 'legal-illegal'. The two 2-level division trees have the same genus at the top level, but they do not need to have the same number of species (as well as differentiae) at the second level.

In dividing constitution, Plato does not conduct diairesis but performs another type of division – that is, parallel division, in which two 2-level division trees remain in parallel alongside each other. Instead of dividing constitution diairetically, Plato makes a division in two parallel lines, dividing constitution into one-few-many with respect to the number of rulers in one line (*Plt*. 291d1-9; 302c4-6) and into legal-illegal with respect to the quality of rule in the other line (*Plt*. 302e5-8). One pair of differentiae produces a trichotomy, and another pair of differentiae establishes a dichotomy. The two pairs of differentiae cross each other, which causes a 3 x 2 cross-division to occur. From the 3 x 2 cross-division, a sixfold division arises, illustrated as follows:

	μοναρχία	ὀλίγων ἀρχὴ	πολλῶν ἀρχὴ
ἔννομον	βασιλική	ἀριστοκρατία	δημοκρατία
παράνομον	τυραννική	ὀλιγαρχία	δημοκρατία

By means of a 3 x 2 cross division, constitutions are classified into six types: (1) the constitution in which one rules by law is called kingdom; (2) the constitution in which one rules against law is called tyranny; (3) the constitution in which a few rulers rule by law is named aristocracy; (4) the constitution in which a few rulers rule against law is named oligarchy; and the last two constitutions, (5) and (6), in which many rulers rule, regardless of whether they rule by law or against law, are named democracy.[6]

In summary, first, it is worth mentioning that there is a fundamental pattern for conducting division, that is, a single division tree with two levels (a single 2-level division tree). In the single 2-level division tree, the top level contains a genus, and the second level is a division of the genus into differentia. A dichotomy emerges from dividing the genus into two differentiae, similar to how a dichotomy is made dividing animal into footed and footless; a trichotomy arises from dividing the genus into three differentiae; for example, a trichotomy is conducted by dividing the genus

animal into walking, flying, and swimming.[7] In general, an *m*-chotomy originates from dividing the genus into *m* numbers of differentiae; therefore, the expression '*m*-chotomy' refers to *m* numbers of differentiae in a single 2-level division tree. A single 2-level division tree is the fundamental pattern for conducting divisions, regardless of whether it is a dichotomy, trichotomy, or polytomy.

Based on the fundamental pattern (namely, a single 2-level division tree), then, *diairesis* can be regarded as a single division tree with more levels (namely, a single *x*-level division tree) by which a genus is divided into the differentiae and the differentiae are divided into the sub-differentiae up to an indivisible final differentia. For example, the genus animal is successively and continuously divided into footed, two-footed, and split-two-footed (*PA* A2, 642b7-9). Proceeding from the top down, diairesis is regarded as a *vertical division*. *Parallel division* is the type of division in which two or more 2-level division trees are arranged in parallel and stay alongside each other.[8] As diagram 2 shows, in the two division trees, the same genus, 'constitution', is divided in parallel into one-few-many and into legal-illegal. Remaining in parallel alongside each other, the two 2-level division trees constitute a parallel division. Despite having the same genus at the top level, the two 2-level divisions do not need to have the same number of differentiae at the second level, as clearly seen in the fact that constitution is divided into one-few-many trichotomously on the one side and divided into legal-illegal dichotomously on the other side. Furthermore, parallel division can cause a *cross-division* (which Porphyrius calls '*chiasmus*') to occur. In the parallel division, there are two 2-level division trees: one containing an *m*-chotomous (*m*-fold) differentiae and the other containing an *n*-chotomous (*n*-fold) differentiae. When the *m*-fold and the *n*-fold differentiae cross each other, an *m* x *n* cross-division is conducted. As illuminated, the 3 x 2 cross-division of constitution occurs, when the threefold differentiae 'one-few-many' and the twofold differentiae 'legal-illegal' cross each other.

Plato, in the *Statesman*, describes that a 3 x 2 cross-division emerges from a parallel division and the parallel division originates from ostensible diairesis. In *Topics* Z6, Aristotle advances the form further by explaining the conditions under which a parallel division can originate from or constitute ostensible diairesis.[9]

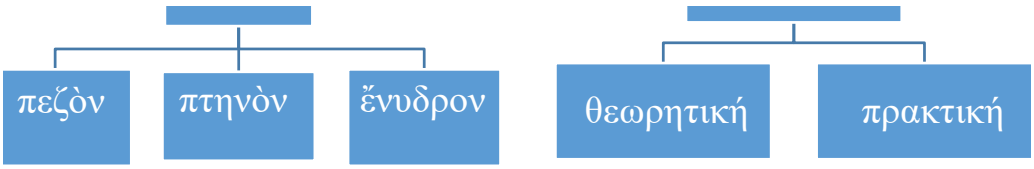
2. ARISTOTLE'S EXPLICATION OF THE RELATIONSHIP BETWEEN DIAIRESIS AND PARALLEL DIVISION

To explain the relationship between diairesis and parallel division, Aristotle begins by analyzing parallel division, distinguishing valid parallel division from invalid division. The valid parallel division can constitute ostensible diairesis, while the invalid division cannot construct diairesis.

Aristotle first invokes an invalid parallel division as an example: it appears to be a parallel division composed of two 2-level division trees that remain in parallel alongside each other.[10] In one division tree, the genus animal is divided into walking, flying, and swimming with respect to the way of activity,[11] and in another division tree, the genus knowledge is divided into theoretical and practical with respect to their different aim (see Diagram 3).[12]

To clarify the issue clearly and precisely, Aristotle characterizes the two genera – animal and knowledge – with the technical term 'two

Diagram 3



non-subaltern genera'.[13] By 'two non-subaltern genera', Aristotle means two genera such that one does not contain the other (Σκοπεῖν δὲ καὶ εἰ ἑτέρου γένους ἡ ῥηθεῖσα διαφορὰ μὴ περιεχομένου μηδὲ περιέχοντος, *Top*. Z6, 144b12-13); that is, the two genera are neither superordinate nor subordinate to but remain in parallel alongside each other. As illuminated, the two non-subaltern genera are divided into their appropriate differentiae. A genus has its appropriate differentiae, so the differentiae of the two non-subaltern genera differ in kind.[14]

Furthermore, the division is not a valid parallel division but rather two independent 2-level division trees that stay alongside, unrelated to each other. A parallel division must consist of at least two 2-level division trees, but not all of the divisions composed of two 2-level division trees can be regarded as a parallel division. Two 2-level division trees remain in parallel alongside each other – this is merely the necessary condition for being a parallel division. The necessary and sufficient conditions are that the two 2-level division trees that remain in parallel alongside each other must be associated with each other. The two division trees are associated with each other such that the two pairs of differentiae that arise from the two division trees cross each other. Nevertheless, the two pairs of differentiae, namely, walking-flying-swimming and theoretical-practical, cannot cross each other; therefore, the division is not a valid parallel division but rather two independent 2-level division trees. Moreover, the invalid parallel division cannot constitute a diairesis because the two non-subaltern genera cannot be contained by or subordinate to a higher genus. Animal and knowledge belong to two of the ten highest genera, namely, substance and relation, so there is no higher genus to embrace them.[15]

As noted, the differentiae of animal (walking-flying-swimming) and those of knowledge (theoretical-practical) differ in kind, not only because the two non-subaltern genera – animal and knowledge – are differentiated into their appropriate differentiae but also because they cannot be subordinate to a higher genus. In general, the differentiae of the two non-subaltern genera differ in kind when the two non-subaltern genera are not subordinate to the same superordinate genus.[16] When the two non-subaltern genera are subordinate to the same superordinate genus, the differentiae of the two non-subaltern genera can be the same (*Top*. Z6, 144b20-2). For example, the two non-subaltern genera, namely, 'walking-animal' and 'flying-animal', can be divided by the same differentia, 'two-footed', because the

Diagram 4

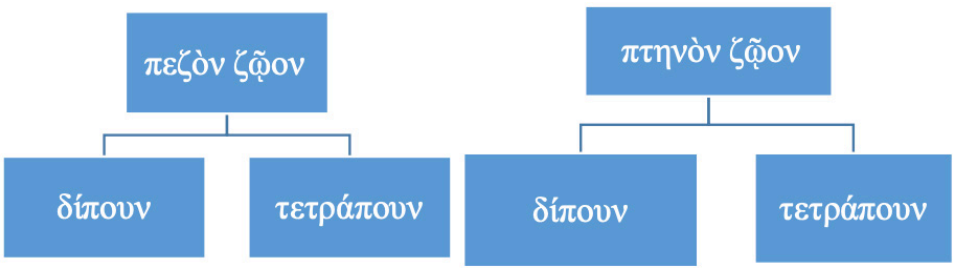
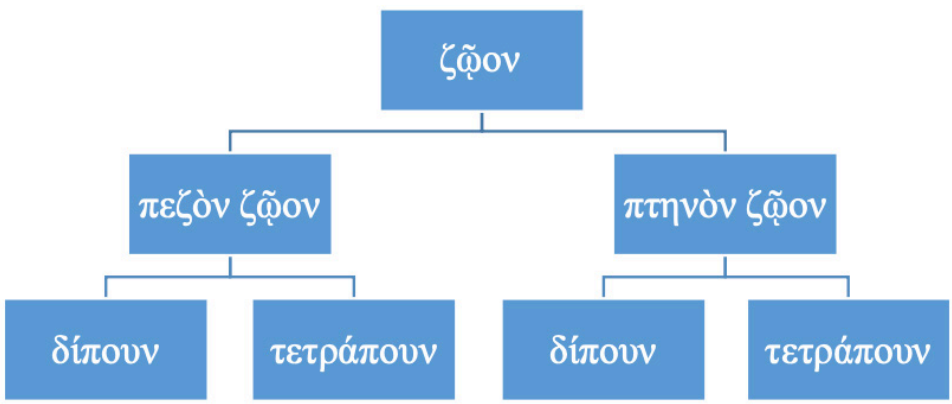


Diagram 5



two non-subaltern genera are embraced by and subordinate to the same superordinate genus, 'animal' (*Top*. Z6, 144b22-5). Initially, the division appears in the form shown in Diagram 4.

Since the two non-subaltern genera, namely, walking-animal and flying-animal, are subordinate to the same genus, animal, the initial division can constitute a diairesis, illustrated through Diagram 5.

There are two possibilities to interpret this division depending on how to understand and translate πεζὸν and πτηνὸν. In one interpretation, someone regards πεζὸν and πτηνὸν as organs of locomotion, translating them as footed and winged. In this interpretation, the division is a diairesis in which animals are divided into footed animals and winged animals, and footed and winged animals are subdivided into two-footed and four-footed. Although it is theoretically possible to interpret the division in this way, I reject this interpretation. Despite properly dividing animals into footed animals and subdividing footed animals into two-footed, one cannot subdivide winged animals into two-footed. Because all of the winged animals – that is, all of the birds – are two-footed, the two-footed that coexists within birds cannot be used as a sub-differentia to

divide birds into subgenera. Moreover, if the division were merely a diairesis, there is no reason why Aristotle in *Top*. Z6 spells out a normal diairesis in such an abnormal way.

I offer another interpretation. Instead of treating πεζὸν and πτηνὸν as organs of locomotion, I view them as ways of activity for the following reasons. First, in many contexts, Aristotle divides animals into πεζὸν, πτηνὸν, and ἔνυδρον trichotomously.[17] In the trichotomy, one cannot regard the triple differentiae as organs of locomotion because, although πεζὸν qua footed and πτηνὸν qua winged can refer to the organ of locomotion, ἔνυδρον cannot reference the organ of locomotion. Also, one cannot treat the triple differentiae as places of habitation/activity because, although πεζὸν qua terrestrial and ἔνυδρον qua aquatic can designate the place of habitation, πτηνὸν cannot signify the place of habitation/activity. Thus, there is only one way to explain the trichotomy consistently: πεζὸν, πτηνὸν, and ἔνυδρον must be regarded as ways of activity (πράξεις) and translated as walking, flying, and swimming (*HA* A1, 487b33-488a2). Πεζὸν, πτηνὸν, and ἔνυδρον, as ways of activity, in turn, indicate both the organ of locomotion and the place of activity because every kind of activity requires a necessary, corresponding organ and must occur in a certain place. Second, Aristotle particularly emphasizes that one cannot divide substance by accidents; therefore, one cannot divide animals by their accidental habitation or activity places (*Top*. Z6, 144b31-6). If one could divide animals using πεζὸν-ἔνυδρον, then properly, πεζὸν-ἔνυδρον cannot refer to the place of habitation but must signify the way of an animal's activity. Third, Aristotle's usage of terminology provides further evidence supporting my interpretation. Aristotle applies ὑπόπουν in the dichotomy of ὑπόπουν-ἄπουν (*PA* A2, 642b7-8) or ὑπόπουν-πτηνὸν (*Metaph*. Z12, 1038a9-15) to designate the organ of locomotion, 'footed', while he uses πεζὸν in the trichotomy of πεζὸν-πτηνὸν-ἔνυδρον (*Cat*. 3, 1b18-19; 13, 14b34-15a3; *Top*. Z6, 143a36-b2) and in the dichotomy of πεζὸν-ἔνυδρον (*Top*. Z6, 144b31-6) to reference the way of activity, 'walking'. In the context of *Topics* (*Top*. Z6, 144b12-30), therefore, I am inclined to interpret πεζὸν-πτηνὸν as ways of activity and translate them as walking-flying.

According to my interpretation, then, Aristotle seems to conduct a diairesis by dividing animals into walking and flying and subdividing both kinds of animals into two-footed and four-footed. Nevertheless, this division cannot be a proper, valid diairesis because the division does not comply with the fundamental principle of diairesis, namely, 'the sub-differentia of the differentia'. 'Two-footed – four-footed' that designate the organ of locomotion in terms of the number of feet cannot be used as sub-differentiae to divide the differentiae 'walking-flying' that reference the way of activity. Fully aware of this problem, Aristotle supplements with a further explanation as follows:

> δῆλον δὲ καὶ ὅτι οὐκ ἀνάγκη τὴν διαφορὰν πᾶν οἰκεῖον ἐπιφέρειν γένος, ἐπειδὴ ἐνδέχεται τὴν αὐτὴν δύο γενῶν εἶναι μὴ περιεχόντων ἄλληλα, ἀλλὰ τὸ ἕτερον μόνον ἀνάγκη συνεπιφέρειν καὶ τὰ ἐπάνω τούτου πάντα, καθάπερ τὸ δίπουν τὸ πτηνὸν **καὶ** τὸ πεζὸν συνεπιφέρει **τὸ ζῷον**. (*Top*. Z6, 144b26-30)[18]
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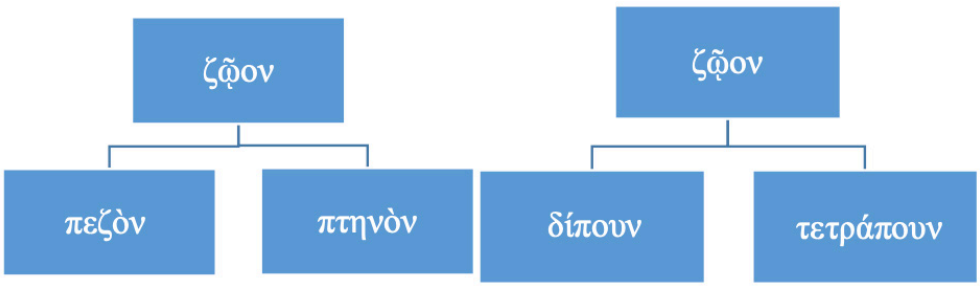
> Obviously, it is not of necessity for the differentia to accompany its own genus because it is possible for the same differentia to be the differentia of two non-subaltern genera, but this differentia must accompany all that are superordinate to

Diagram 6



it, just as the two-footed accompanies the flying and the walking together with accompanying the animal.

To explain the text, I should clarify some technical terms. First, the non-subaltern genera correspond to the coordinate differentiae, that is, a pair of differentiae applied to divide a genus, simultaneously. For example, corresponding to the non-subaltern genera 'flying-animal – walking-animal', 'flying-walking' are coordinate differentiae that designate the way of activity and are applied to divide the genus animal in this aspect, simultaneously. Second, a differentia *accompanies* (ἐπιφέρειν) its appropriate genus – that is, a differentia must be applied to *divide* its appropriate genus, or an appropriate differentia must be selected and used to divide the genus. The differentia and the genus must match each other.

As the text notes, the same differentiae, 'two-footed – four-footed', can be used to divide the coordinate differentiae 'walking-flying', when these coordinate differentiae are subordinate to the same superordinate genus 'animal'. Aristotle demonstrates that in this case, 'two-footed – four-footed' should be used to divide all that are superordinate to them; that is, they should be used to divide not only the differentiae 'walking-flying' but also the genus 'animal'. Nevertheless, 'two-footed – four-footed' qua number of feet cannot be used to subdivide the differentiae 'walking-flying' qua way of activity (inconsistent with the fundamental principle of diairesis); therefore, they can be applied only to divide the genus 'animal'. In fact, 'two-footed – four-footed' jump from being used to subdivide the differentiae 'walking-flying' to being used to divide the superordinate genus 'animal'. Thus, 'two-footed – four-footed' are not the appropriate sub-differentiae (ὑποδιαίρεσις) that should be subordinate to the differentiae 'walking-flying' but turn out to be the parallel-differentiae (ἐπιδιαίρεσις) that remain in parallel alongside the differentiae 'walking-flying' (διαίρεσις).[19] As a result, the genus 'animal' is divided in parallel into the differentiae 'walking-flying' (with respect to the way of activity) and into the parallel-differentiae 'two-footed – four-footed' (with respect to the number of feet), seen in Diagram 6.

This is a valid parallel division in which two 2-level division trees remain in parallel alongside each other, and the two pairs of differentiae that emerge from the two 2-level division trees can cross each other. As analyzed, Aristotle in *Top.* Z6 reveals the

conditions under which a valid parallel division can constitute ostensible diairesis. There are two conditions: (a) the same differentiae, 'two-footed – four-footed', are applied to divide the coordinate differentiae 'walking-flying' on both sides; and (b) the coordinate differentiae 'walking-flying' are used to divide the same superordinate genus 'animal'.

Apparently, Aristotle in *Top*. Z6 conducts a 'diairetical' division of animal from the bottom up, while Plato in the *Statesman* establishes a 'diairetical' division of constitution from the top down. Actually, the two divisions are not diaireses but rather parallel divisions. From the top down, Plato shows how a parallel division (constitution → one-few-many; constitution → legal-illegal) emerges from ostensible diairesis (constitution → one-few-many → legal-illegal); from the bottom up, Aristotle illuminates how a parallel division (two-footed – four-footed → animal; walking-flying → animal) constructs ostensible diairesis (two-footed – four-footed → walking-flying → animal). Although the one constitutes ostensible diairesis and the other originates from ostensible diairesis, essentially, the two parallel divisions are of the same kind. Insofar as a parallel division originates from ostensible diairesis, it can constitute diairesis; conversely, insofar as a parallel division constitutes ostensible diairesis, it can originate from diairesis.

3. DIAIRESIS, PARALLEL DIVISION, AND CHIASMUS

One might argue that the interpretation of *Top*. Z6 that I offer is based on the specific understanding of πεζὸν-πτηνὸν: I reconstruct a valid parallel division by treating πεζὸν-πτηνὸν as ways of activity and translating them as walking-flying. Were πεζὸν-πτηνὸν regarded as organs of locomotion and interpreted as footed-winged, the division cited from *Top*. Z6 would be a normal diairesis. To prove the universal validity of my interpretation, I cite another example from *Cat.* 10, where Aristotle unambiguously notes that under the two conditions prescribed in *Top*. Z6, a parallel division emerges from ostensible diairesis, and the parallel division further causes a cross-division to occur.

Diagram 7

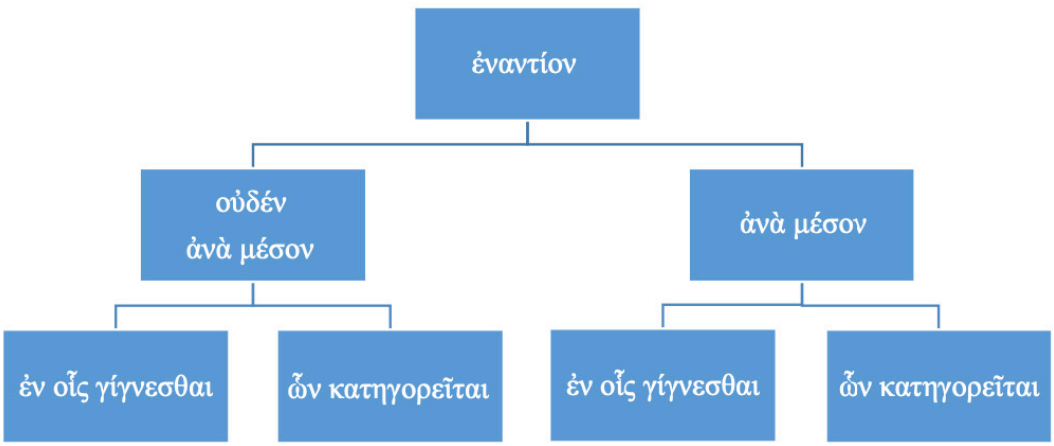
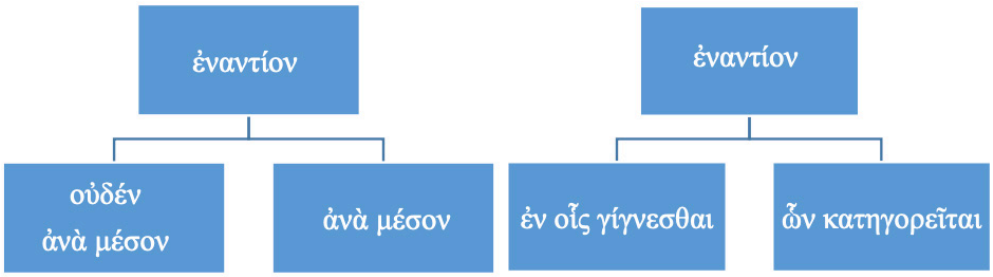


Diagram 8



In dividing contraries into four kinds (*Cat*. 10, 11b32-12a17), initially, Aristotle seems to conduct a 'diairesis' by dividing contraries into exclusive and inclusive contraries[20] and subdividing exclusive and inclusive contraries into the same differentiae, 'occurrence in a substrate – predication of a subject', respectively, illustrated through Diagram 7.

According to what Aristotle demonstrates in *Top*. Z6, the same differentiae, 'occurrence in a substrate – predication of a subject', can be applied to divide the coordinate differentiae 'exclusive-inclusive' because these coordinate differentiae are subordinate to the same superordinate genus, 'contrary'. In this case, the differentiae 'occurrence in a substrate – predication of a subject' shift from being applied to subdivide the differentiae 'exclusive-inclusive' to being applied to divide the genus 'contrary'. Thus, they are not the sub-differentiae of the differentiae 'exclusive-inclusive' (ὑποδιαίρεσις) but turn out to be the parallel-differentiae of the genus 'contrary' (ἐπιδιαίρεσις). In structure, correspondingly, 'occurrence in a substrate – predication of a subject' qua parallel-differentiae are not subordinate to but remain in parallel alongside the differentiae 'exclusive-inclusive', shown in Diagram 8.

From ostensible diairesis emerges a parallel division in which the same genus 'contrary' is divided in parallel into the differentiae 'exclusive-inclusive' and into the parallel-differentiae 'occurrence in a substrate – predication of a subject'. The differentiae and parallel-differentiae cross each other – this operation causes a cross-division to occur.

	οὐδέν ἀνὰ μέσον	ἀνὰ μέσον
ἐν οἷς γίγνεσθαι	νόσον-ὑγίειαν	μέλαν-λευκὸν
ὧν κατηγορεῖται	περιττὸν-ἄρτιον	φαῦλον-σπουδαῖον

By means of a 2 x 2 cross-division, contraries are classified into four kinds: (1) the contrary is exclusive and occurs in an animal body, such as healthy-ill; (2) the contrary is exclusive and predicated of a natural number, such as odd-even; (3) the contrary is inclusive and occurs on an object surface, such as white-black; and (4) the contrary is inclusive and predicated of a human behavior, such as good-bad.

In Aristotle's division of contrary, a parallel division emerges from ostensible diairesis because the same differentiae, 'occurrence in a substrate – predication of a subject', are used to divide the coordinate differentiae 'exclusive-inclusive', and these twofold coordinate differentiae are subordinate to the same superordinate genus, 'contrary'. This is exactly

the same case as Plato's division of constitution. From ostensible diairesis originates the parallel division because the same differentiae, 'legal-illegal', are applied to divide the coordinate differentiae 'one-few-many', and these threefold coordinate differentiae are subordinate to the same superordinate genus, 'constitution'. In this case, 'legal-illegal' shifts from being used to subdivide the differentiae 'one-few-many' to being applied to divide the genus 'constitution', so 'legal-illegal' are not sub-differentiae of the differentiae 'one-few-many' but rather parallel-differentiae of the genus 'constitution'. Therefore, the same genus, 'constitution', is divided in parallel into the differentiae 'one-few-many' and into the parallel-differentiae 'legal-illegal'. The two pairs of differentiae cross each other; therefore, a 3 x 2 cross-division is conduced, and constitutions are classified into six types.

Plato's division of constitution as well as Aristotle's division of contrary obviously illuminate how a cross-division arises from a parallel division and the parallel division emerges from ostensible diairesis. The emergence process of the parallel division from ostensible diairesis, which Plato in the *Statesman* and Aristotle in *Categories* portray, provides sufficient evidence confirming the propriety and validity of the two conditions prescribed in *Top*. Z6. The parallel division originates from ostensible diairesis under the conditions that (a) the same differentiae are used to divide the coordinate differentiae, regardless of whether the coordinate differentiae are twofold or threefold, and (b) the coordinate differentiae are used to divide the same superordinate genus. The general scheme of constructing ostensible diairesis can be illustrated through Diagram 9.

Diagram 9

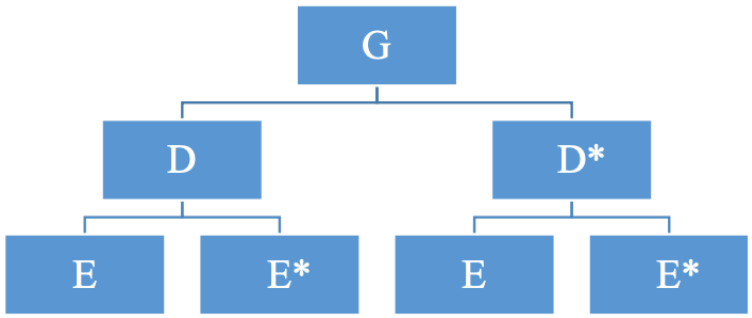
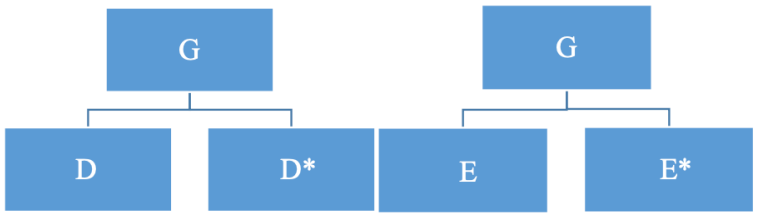


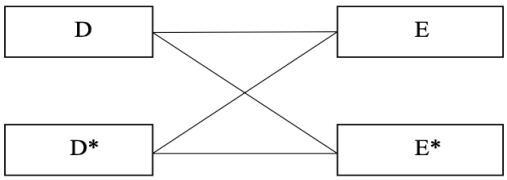
Diagram 10



Under both conditions mentioned above, ostensible sub-differentiae E - E* shift from being used to subdivide the differentiae D - D* to being used to divide the genus G, so E - E* are not the sub-differentiae of the differentiae D - D* but rather the parallel-differentiae of the genus G. In structure, correspondingly, the parallel-differentiae E - E* are not subordinate to but remain in parallel alongside the differentiae D - D*. Thus, a parallel division replaces ostensible diairesis, seen in Diagram 10.

From dividing the same genus G, the differentiae D - D* and the parallel-differentiae E - E* emerge. The two pairs of differentiae cross each other – this operation causes a cross-division to occur, illustrated through Diagram 11 as follows:

Diagram 11



Based on the general schemes, the conditions under which a cross-division emerges from a parallel division and parallel division originates from ostensible diairesis can be summarized as follows. A parallel division originates from ostensible diairesis when ostensible sub-differentiae become the parallel-differentiae (ὑποδιαίρεσις → ἐπιδιαίρεσις) that are applied not to subdivide the differentiae but to divide the genus. Two (or more) pairs of differentiae, namely, the differentiae (διαίρεσις) and the parallel-differentiae (ἐπιδιαίρεσις), are applied to divide the same genus in parallel – this constitutes a parallel division. The differentiae and parallel-differentiae cross each other – this operation causes a cross-division to occur.

4. FROM DIAIRESIS TO CHIASMUS

As noted, through the transition of parallel division, a *chiasmus* originates from ostensible *diairesis*. It is no coincidence that in classifying animals, Plato and Aristotle perform those divisions that appear to be diaireses but actually are chiasmata. The reason is that in the biological context, there is only one target for division, namely, the genus animal. It appears that Plato and Aristotle could have conducted a diairesis by dividing the genus animal into the differentiae and further dividing the differentiae into the sub-differentiae. Actually, after dividing the genus animal into the differentiae, Plato and Aristotle do not divide the differentiae into the sub-differentiae but rather divide the same genus into the parallel-differentiae. Thus, they divide the same genus animal into two pairs of differentiae that remain in parallel alongside each other (G → D - D*; G → E - E*). The differentiae (D - D*) and the parallel-differentiae (E - E*) cross each other; therefore, a chiasmus occurs, as clearly seen in the following examples cited from Plato's and Aristotle's texts.

In the opening division of the *Statesman* (258b7-268d4), after dividing animate being into gregarious-solitary, Plato introduces another pair of differentiae, 'tame-wild', that is not used to subdivide the differentia 'gregarious' but rather is used to divide the genus 'animate being' (263e9-264a7). Thus, Plato divides the same genus, 'animate being', in parallel into the differentiae 'gregarious-solitary' (with respect to the manner of life) and into the parallel-differentiae 'tame-wild' (with respect to the disposition). The twofold differentiae and the twofold parallel-differentiae cross each other; therefore, a 2 x 2 cross-division is conducted.[21]

There is a similar 2 x 2 cross-division conducted by Aristotle in *History of Animals*:

> Καὶ τὰ μὲν ἐπιδημητικὰ καὶ τῶν ἀγελαίων καὶ τῶν μοναδικῶν τὰ δ' ἐκτοπιστικά. – *HA* A1, 488a13-14

Initially, Aristotle seems to make a diairesis by dividing the genus animal into the differentiae gregarious-solitary and subdividing these differentiae into migratory-nonmigratory. As analyzed, instead, Aristotle divides the same genus animal in parallel into the differentiae gregarious-solitary (with respect to the manner of life) and into the parallel-differentiae migratory-nonmigratory (depending on whether this kind of animal migrates). A 2 x 2 cross-division takes place in such a way that the twofold differentiae and the twofold parallel-differentiae cross each other. Using a 2 x 2 chiasmus, animals are classified into four types: the first type is gregarious and migratory; the second type is gregarious and not migratory; the third type is solitary and migratory; and the fourth type is solitary and not migratory.

Not only is the genus animal divided in parallel into gregarious-solitary and migratory-nonmigratory, but it is also divisible in parallel into gregarious-solitary and social-dispersed, illuminated as follows:

> Καὶ τῶν ἀγελαίων **καὶ τῶν μοναδικῶν** τὰ μὲν πολιτικὰ τὰ δὲ σποραδικά ἐστιν. – *HA* A1, 488a2-3

Again, it appears to be a diairesis, in which the genus animal is divided into the differentiae 'gregarious-solitary' and both of these differentiae seem to be subdivided into 'social-dispersed'. In fact, Aristotle does not subdivide the differentiae 'gregarious-solitary' into 'social-dispersed' but rather divides the same genus animal in parallel into the differentiae 'gregarious-solitary' (with respect to the way of life) and into the parallel-differentiae 'social-dispersed' (with respect to the manner of activity). The twofold differentiae and the twofold parallel-differentiae cross each other; therefore, a 2 x 2 cross-division occurs. From the 2 x 2 cross-division, four pairs of combinations are generated, namely, gregarious-social, gregarious-dispersed, solitary-dispersed, and solitary-social. Each pair composed of two diverse and compatible attributes can characterize and define a certain kind of animal. The animal that lives in herds and behaves socially is a pigeon; the animal that lives in herds and behaves dispersedly is a queen bee; the animal that lives singly and behaves dispersedly is a whale; and the animal that lives singly and behaves socially is a single, unmarried man or woman.

In the chiasmus mentioned above, it is possible to find some animals characterized by the two diverse and compatible attributes, namely, solitary and social, such as some single, unmarried men or women who live alone and are active in a community. In some chiasmata, however, it is completely impossible to find a type of thing characterized by two diverse and compatible attributes. Taking Porphyrius's paradigm, for example, living beings are divided in parallel into the differentiae 'rational-irrational' (λογικόν-ἄλογον) and into the parallel-differentiae 'mortal-immortal' (θνητόν-ἀθάνατον). The two pairs of differentiae cross each other; therefore, a cross-division occurs. From the 2 x 2 cross-division, four pairs of combinations are generated, and each pair is composed of two diverse, compatible attributes, namely, rational-mortal, rational-immortal, irrational-mortal, and irrational-immortal. Nevertheless, the four pairs of combinations can only characterize

and determine three kinds of living beings, that is, mankind is rational and mortal, God is rational and immortal, and animal is irrational and mortal. The fourth kind cannot come into being because there is no such kind of living being that is irrational and immortal.[22]

A 2 x 2 chiasmus qua fourfold division always produces four pairs of combinations, each of which is composed of two diverse and compatible attributes, regardless of whether the thing characterized by the two diverse and compatible attributes exists. In one case, there is no such kind of living being characterized as irrational and immortal, while in another case, it is possible to find some kind of animal characterized as solitary and social. Even though we could not find a certain kind of animal that is both solitary and social, this does not prevent the two attributes from combining with each other. Some editors have supposed that it is completely impossible to combine solitary with social, thereby deleting τῶν μοναδικῶν.[23] Because previous scholars have not borne the chiasmus in mind, they have not realized that due to its structure, the 2 x 2 chiasmus inevitably establishes four pairs of combinations. Thus, it is improper to delete τῶν μοναδικῶν based on the assumption that two diverse and compatible attributes cannot combine with each other. Aristotle classifies animals into four groups using a 2 x 2 chiasmus. To conduct a chiasmus, therefore, we must keep τῶν μοναδικῶν here.

In addition to a 2 x 2 chiasmus, Aristotle also conducts a 3 x 2 chiasmus, similar to the 3 x 2 chiasmus that Plato performs in the *Statesman*.

> **Τὰ μὲν** γὰρ αὐτῶν ἐστιν ἀγελαῖα τὰ δὲ μοναδικά, καὶ πεζὰ καὶ πτηνὰ καὶ πλωτά, τὰ δ' ἐπαμφοτερίζει. – *HA* A1, 487b34-488a2

Aristotle discusses two cases. In one case (τὰ μὲν), it seems that Aristotle divides animals into the differentiae 'walking-flying-swimming' and subdivides these threefold differentiae into 'gregarious-solitary'. In another case (τὰ δ'), Aristotle claims that some animals are equipped with two characteristics by nature (ἐπαμφοτερίζει), being gregarious and solitary. The latter case refers to a natural phenomenon in which some animals have dual characteristics regardless of how they perform their activities, namely, walking, flying, or swimming. Since the latter case is irrelevant for the division, I set it aside and focus only on the former case.

In the former case, Aristotle seemingly makes a diairesis by dividing animals into the differentiae 'walking-flying-swimming' and subdividing these threefold differentiae into 'gregarious-solitary', just as Plato apparently divides constitutions into the differentiae 'one-few-many' and subdivides these threefold differentiae into 'legal-illegal'. In fact, what Plato conducts is not a vertical but a parallel division in which the same genus, constitution, is divided in parallel into the differentiae 'one-few-many' (with respect to the number of rulers) and into the parallel-differentiae 'legal-illegal' (with respect to the quality of rule). Similarly, Aristotle performs a parallel division by dividing the same genus, animal, into the differentiae 'walking-flying-swimming' (with respect to the animal's way of activity) and into the parallel-differentiae 'gregarious-solitary' (with respect to the animal's manner of life). Similar the sixfold division of constitution, conducted by a cross-division such that the threefold differentiae 'one-few-many' and the twofold parallel-differentiae 'legal-illegal' cross each other, a 3 x 2 cross-division of animal occurs in such a way that the threefold differentiae 'walking-flying-swimming' and the twofold parallel-differentiae 'gregarious-

solitary' cross each other. By means of a 3 x 2 cross-division, animals are classified into six types, and each type is characterized and determined by two diverse and compatible attributes. The first type walks on land and is gregarious; the second type flies in the sky and is gregarious; the third type swims in the water and is gregarious; the fourth type walks on land and is solitary; the fifth type flies in the air and is solitary; and the sixth type swims in the water and is solitary.

In the biological context, Plato and Aristotle conduct chiasmata that appear to be diaireses. Because there is only one target for division, it seems that the only target, namely, the genus animal, is divided into the differentiae, and the differentiae are further divided into the sub-differentiae. In fact, the same genus, animal, is divided in parallel into the *m*-fold differentiae and the *n*-fold parallel-differentiae. The *m*-fold differentiae and the *n*-fold parallel-differentiae cross each other, so an *m* x *n* chiasmus occurs.

5. CONCLUSION

There are three types of division that Plato and Aristotle acknowledge to be proper and valid: vertical division, parallel division, and cross-division. *Vertical division* refers to a single *x*-level division tree in which a genus is divided into the differentiae, and the differentiae are divided into the sub-differentiae, until an indivisible final differentia is arrived at. *Parallel division* refers to two (or more) 2-level division trees that remain in parallel alongside each other. Among the two 2-level division trees, it is possible that either the same genus is divided in parallel into differentiae and parallel-differentiae or two non-subaltern genera are divided into their appropriate differentiae. Correspondingly, there are two kinds of parallel division. The first kind of parallel division refers to the two 2-level division trees in which *the same genus* is divided in parallel into differentiae and parallel-differentiae ($G \rightarrow D - D^*$; $G \rightarrow E - E^*$) – all of the parallel divisions mentioned above belong to this type. The second kind of parallel division refers to the two 2-level division trees in which two non-subaltern genera are divided into their appropriate differentiae ($G^1 \rightarrow D^1 - D^{1*}$; $G^2 \rightarrow D^2 - D^{2*}$). Either dividing the same genus into differentiae and parallel-differentiae or dividing two non-subaltern genera into their appropriate differentiae can result in the emergence of two pairs of differentiae. When the two pairs of differentiae, whether they are two pairs of differentiae of the same genus ($D - D^*$; $E - E^*$) or those of two non-subaltern genera ($D^1 - D^{1*}$; $D^2 - D^{2*}$), cross each other, a cross-division occurs. A 2 x 2 cross-division establishes four pairs of combinations, and each pair composed of two diverse and compatible attributes (DE, DE*, D*E, D*E* or D^1D^2, D^1D^{2*}, $D^{1*}D^2$, $D^{1*}D^{2*}$) can characterize and define an *infima* species.

The distinction between two kinds of parallel division sheds light on explaining the relationship between diairesis, parallel division, and chiasmus. As analyzed, the first kind of parallel division can constitute or originate from ostensible diairesis and cause a chiasmus to occur. The first kind of parallel division originates from ostensible diairesis, when the same genus is divided in parallel into differentiae and parallel-differentiae instead of being divided into differentiae and sub-differentiae up to the final differentia, diairetically. As illuminated, instead of dividing the genus into the differentiae and dividing the differentiae into sub-differentiae, Plato in the *Statesman* conducts a parallel division by dividing constitutions in parallel into the differentiae 'one-few-many' and into the parallel-differentiae

'legal-illegal'. Similarly, instead of dividing animals into 'walking-flying-swimming' and subdividing these threefold differentiae into 'gregarious-solitary', Aristotle in *History of Animals* conducts a parallel division by dividing animals in parallel into the differentiae 'walking-flying-swimming' and into the parallel-differentiae 'gregarious-solitary'. Furthermore, the first kind of parallel division causes a cross-division to occur. Both in Aristotle's division of animal and Plato's division of constitution, the threefold differentiae and the twofold parallel-differentiae cross each other; therefore, a 3 x 2 chiasmus takes place. Using a 3 x 2 chiasmus, constitutions and animals are classified into six groups.

Whereas the first kind of parallel division originates from ostensible diairesis, the second kind of parallel division cannot originate from or constitute ostensible diairesis because the two non-subaltern genera cannot be subordinate to a higher genus. Whereas cross-division can be regarded as a result of parallel division of the first kind (insomuch as the first kind of parallel division causes cross-division to occur), cross-division is not the result of parallel division of the second kind but rather the criterion for judging whether a division (which is composed of two parallel 2-level division trees) is a valid parallel division of the second kind. As presented in the section 2, despite remaining in parallel alongside each other, the division of animal and that of knowledge cannot constitute a parallel division because they are not associated with each other. The two division trees are not associated with each other because the differentiae of animal 'walking-flying-swimming' and those of knowledge 'theoretical-practical' cannot cross each other. In contrast, when the differentiae of the two non-subaltern genera can cross each other, the two division trees constitute a valid parallel division of the second kind. For example, Aristotle in *Cat*. 2 conducts a valid parallel division of the second kind by dividing one genus, 'being', into its appropriate differentiae, 'substance-accident' and dividing another genus, 'mode of being', into its appropriate differentiae, 'general-individual'. This division is a valid parallel division of the second kind because the two pairs of differentiae that emerge from dividing two non-subaltern genera can cross each other. As a result, things are classified into four types: (1) the general substance that is not inherent in a substrate but said of a subject, such as man or dog; (2) the general accident that is inherent in a substrate and said of a subject, such as white or grammar-knowledge; (3) the individual substance that is neither in a substrate nor said of a subject, such as an individual man or an individual dog; and (4) the individual accident that is inherent in a substrate but not said of a subject, such as an individual white or an individual grammar-knowledge.[24] Comparing the valid parallel division (being → substance-accident; mode of being → general-individual) with the invalid (animal → walking-flying-swimming; knowledge → theoretical-practical), a conclusion can be drawn: if and only if two parallel 2-level division trees (whereby two non-subaltern genera are divided into their appropriate differentiae) cause a cross-division to occur can they constitute a valid parallel division of the second kind. In this case, cross-division is used as a criterion for judging whether a division is a valid parallel division of the second kind or not.

The first kind of parallel division originates from ostensible diairesis and causes a cross-division to occur (ostensible diairesis → parallel division of the first kind → chiasmus). Although the second kind of parallel division cannot originate from or constitute ostensible

diairesis, it must cause a cross-division to occur (parallel division of the second kind → chiasmus). In both cases, parallel division has transitional characteristics, so it can be seen as a transition (from diairesis) to a chiasmus. Due to its transitional characteristics, there is no specific terminology for referencing and naming parallel division. In comparison with the nonnamed parallel division, vertical division is called 'diairesis' (διαίρεσις) by Plato and Aristotle, and cross-division is terminologically named 'chiasmus' (χιαστή) by Porphyrius.[25] The terms that are closest to the meaning of 'chiasmus' are 'overlapping' (ἐπάλλαξις, *GA* B2, 732b15) and 'combining' (σύζευξις, *De Gen. et Corr*. B3, 330a30-330b1; *Pol*. Δ4, 1290b23-39), which are applied by Aristotle.[26] The term 'weaving' (ὑφαντική, *Plt*. 310e5-311c10) applied by Plato refers to the meaning of 'chiasmus' in the sense of interweaving such that the statesman combines diverse and compatible virtues with each other, interweaving bravery with temperance within and between citizens.

With particular emphasis on definition, Aristotle first draws attention to diairesis. To properly define a natural kind, for example, bird, one must divide animals in one single line throughout up to the final differentia (animal → footed → two-footed). In this way, bird can be characterized by the one defining feature 'two-footedness' and defined as the two-footed animal. Faced with the reality of the natural world, however, Aristotle is fully aware that it is impossible to properly characterize bird with only one feature (footedness) because it is equipped with other necessary, defining features. Considering this reality, Aristotle admits that to characterize a natural kind fully by virtue of all the diverse features it has by nature, one can not only divide animals in one single line but must differentiate them along many parallel lines.[27] To characterize bird as completely as possible, thus, one cannot be content with dividing animals in one single line into footed and two-footed merely with respect to the organ of locomotion. Rather, one should divide animals in parallel into flying-walking-swimming (with respect to the way of activity), into polypod-biped (with respect to the organ of locomotion in terms of the number of feet), into blooded-bloodless (with respect to the organ of producing and keeping heat), and into with beak and without beak (with respect to the organ of nutrition and defense). Moreover, in the natural world, nothing prevents diverse and compatible attributes from overlapping each other, just as bird is an animal that can fly and is blooded, biped, and equipped with a beak (ὄρνις ἐστὶ ζῷον πτερωτὸν ἔναιμον δίπουν ῥυγχωτόν, Michael of Ephesus *In Libros De partibus animalium Commentaria*, 15.20-21).[28] It is likewise with fish and other natural kinds. What a chiasmus demonstrates is nothing but the natural phenomenon that diverse and compatible properties can overlap in a certain kind of animal. To portray such natural kinds as bird, fish, or mankind as closely as possible to their own natures, therefore, one cannot use diairesis that divides animals in one single line but must apply parallel division as well as a chiasmus differentiating animals along many parallel lines. In this way, each natural kind can be defined, as well as characterized, with its multiple necessary, crucial features.

Diairesis characterizes one feature of the species as precisely as possible, while parallel division and chiasmus characterize a species as completely as possible. Diairesis is prior *to us* since we first recognize and use it to define *infima* species while being posterior *by nature* because diairesis can merely portray *infima* species to a limited extent by characterizing it with only one feature. Parallel division and chiasmus are prior *by nature*: they character-

ize a species as completely as possible, so the result of parallel division and chiasmus seems not only more natural but also closer to reality than the result of diairesis. Parallel division and chiasmus are posterior *to us*: despite admitting the propriety and validity of parallel division,[29] previous scholars have not realized the inherent relationship of parallel division to diairesis as well as to chiasmus while dismissing chiasmus as improper[30] or completely ignoring it. In the appendix, then, I propose an explanation of why chiasmus has not been known to scholars for such a long time.

6. APPENDIX

Chiasmus is unknown to scholars while being familiar to philosophers. As shown, Plato classifies constitutions using a 3 x 2 chiasmus while dividing animate beings using a 2 x 2 chiasmus, and Aristotle divides animals applying a 2 x 2 or 3 x 2 chiasmus. After Plato and Aristotle established the chiastic method of division, chiasmus played a continuous, crucial role in the history of philosophy. In the *Prolegomena to Any Future Metaphysics*, for example, Kant makes the famous fourfold division – this is a 2 x 2 chiasmus:[31]

	a priori	*a posteriori*
analytic	analytic *a priori* judgments	analytic *a posteriori* judgments
synthetic	synthetic *a priori* judgments	synthetic *a posteriori* judgments

The 2 x 2 chiasmus occurs in such a way that the two pairs of differentiae, namely, 'analytic-synthetic' and '*a priori-a posteriori*', cross each other. The two pairs of differentiae emerge from dividing two non-subaltern genera, so the chiasmus that Kant conducts arises from parallel division of the second kind. Using a 2 x 2 chiasmus, Kant classifies judgments into four types: analytic *a priori*, analytic *a posteriori*, synthetic *a priori*, and synthetic *a posteriori*. Such expressions as 'analytic *a priori*' and 'synthetic *a posteriori*' seem to be tautologies, while 'analytic *a posteriori*' and 'synthetic *a priori*' appear to be contradictions. These tautological and contradictory expressions can come to light due to the chiastic method of division. Without any methodological reflection, Kant directly applies the chiastic method of division to lay the foundation for his critical philosophy, inquiring how synthetic *a priori* judgments are possible. This provides clear evidence proving the power and profound influence of the chiastic method of division. Nothing stops philosophers from applying chiasmus, but what prevents scholars from recognizing it? Why have previous scholars been unwilling to acknowledge chiasmus to be a proper, valid method of division?

Balme has penetratingly observed the cross-divisions applied by Plato in the *Statesman* and Aristotle in *Parts of Animals*.[32] Despite noticing the application of cross-division, Balme has rejected cross-division as a proper, valid division because it 'splits natural kinds'.[33] In Balme's view, if we divide animals into [biped and] polypod, we cannot subdivide both into walking and swimming animals because polypod would appear under both walking and swimming, and we could not show whether a polypod animal walks or swims. According to Balme, then, we should recognize from the outset that polypod animals either walk or swim while avoiding cross-division, theoretically.[34]

Although Balme has properly pointed out that the cross-division that Aristotle conducts in *PA* A2 is associated with the discussion in

Top. Z6, he has drawn an improper conclusion that 'the cases are not parallel' (1992, 107). Just the opposite; the two cases are parallel: the cross-division cited from *PA* A2 occurs by complying with the two conditions prescribed in *Top*. Z6.[35] It appears that Aristotle could have conducted a diairesis by dividing animals into [biped and] polypod animals and subdividing polypod animals into walking and swimming (τῶν πολυπόδων γάρ ἐστι τὰ μὲν ἐν τοῖς πεζοῖς τὰ δ' ἐν τοῖς ἐνύδροις – *PA* A2, 642b19-20). According to what Aristotle demonstrates in *Top*. Z6, when the same differentiae, 'walking-swimming', are used to divide the differentiae 'biped-polypod' on both sides and these differentiae are subordinate to the same superordinate genus, 'animal', 'walking-swimming' shift from being used to subdivide the differentiae 'biped-polypod' to being applied to divide the genus 'animal'. In this case, the same genus, animal, is divided in parallel into the differentiae biped-polypod (with respect to the number of feet) and into the parallel-differentiae walking-swimming (with respect to the way of activity). The two pairs of differentiae cross each other, so a 2 x 2 cross-division occurs. From the 2 x 2 chiasmus, four pairs of combinations are generated, and each pair is composed of two diverse and compatible attributes, namely, biped-walking, biped-swimming, polypod-walking, and polypod-swimming. Chiasmus mirrors the natural phenomenon that both a biped and a polypod animal can either walk on land or swim in the water, and conversely, an animal can either walk on land or swim in the water regardless of how many feet it has by nature. Thus, what chiasmus reveals is not the split of natural kinds (as Balme has asserted) but rather the overlapping of diverse and compatible attributes (Συμβαίνει δὲ πολλὴ ἐπάλλαξις τοῖς γένεσιν, *GA* B1, 732b15). Since the chiasmus corresponds to and reflects on the natural phenomenon that diverse and compatible attributes overlap in a certain kind of animal, the theoretical investigation of the natural world must acknowledge its propriety and validity.

Invoking an example of Aristotle, Balme has intended to explain what a proper cross-division looks like. In Balme's view, Aristotle divides virtues in parallel into 'moral-intellectual' and into 'of-the-mean – not-of-the-mean'. A cross-division is conducted such that the two pairs of differentiae cross each other. Balme has acknowledged the division of virtue to be a proper chiasmus while insisting on the view that the chiastic division of animal in *PA* A2 is improper (1992, 104). In my estimation, however, both are proper, valid cross-divisions, and they differ in emerging from different kinds of parallel division. In *PA* A2, Aristotle performs the first kind of parallel division by dividing *the same genus*, 'animal', into the differentiae 'biped-polypod' and into the parallel-differentiae 'walking-swimming'. In classifying virtues, Aristotle conducts the second kind of parallel division by dividing *two non-subaltern genera* into their appropriate differentiae; it is likewise with the cross-division that Kant conducts. Contrary to Balme, therefore, I believe that the division of animal and the division of virtue are proper, valid cross-divisions.

Furthermore, despite realizing Plato's and Aristotle's application of chiasmus, Balme has been unwilling to admit its propriety and validity – the reason is deeply rooted in Aristotle. Aristotle criticizes the cross-division presented in *PA* A2 because in this context, he regards the division made by two differentiations (namely, the division made along two parallel lines) as pointless (ἡ εἰς δύο διαίρεσις μάταιος ἂν εἴη, *PA* A2, 642b17-18).[36] Not only does Aristotle criticize cross-division explicitly, but he also critiques parallel division implicitly. Aristo-

tle's criticism of parallel division is implicit because it mixes with his criticism of division by accidents.

In two parallel discussions of diairesis (*PA* A3, 643b9-23; *Metaph*. Z12, 1038a9-15), Aristotle aims to show how to conduct diairesis properly, thereby addressing the fundamental principle of diairesis, namely, the sub-differentia of the differentia. If someone fails to adhere to the sub-differentia of the differentia (even if he properly divides animal into wingless-winged), it is improper to subdivide winged into white-black in one case and into tame-wild in another case (*PA* A3, 643b17-23). These are examples signifying two types of division: they differ in such a way that white-black are accidental sub-differentiae of winged, while tame-wild are not sub-differentiae of winged but parallel-differentiae of animal. Because tame-wild are neither accidents or characteristics of wingedness nor associated in any way with the organ of locomotion but designate the disposition of animal, they cannot be used to subdivide winged but can only be applied to divide animal. In this case, one conducts a parallel division by dividing animals in parallel into wingless-winged with respect to the organ of locomotion and into tame-wild with respect to the disposition of animal (ζῴον → ἄπτερον καὶ πτερωτὸν; ζῴον → ἥμερον καὶ ἄγριον). In another case, one conducts a diairesis by dividing animals into wingless-winged and subdividing winged into white-black (ζῴον → πτερωτὸν → λευκὸν καὶ μέλαν). Thus, Aristotle distinguishes between two types of division: after dividing genus into differentiae, someone improperly subdivides differentiae into accidents in one single line or divides a genus in two parallel lines – the former refers to diairesis and the latter refers to parallel division. Based on this distinction, Aristotle criticizes the two types of division for different reasons. Aristotle critiques the first type of division for *not being a proper diairesis* because it is improper to divide differentiae into accidents, while he criticizes the second type of division – that is a type of parallel division – because it is *not a diairesis*. Using diairesis as a criterion, Aristotle in *PA* A2-3 and *Metaph*. Z12 criticizes parallel division and counts it as improper. The question is why does Aristotle select and use diairesis as a criterion to criticize parallel division as well as chiasmus? To answer this question, I should explain the relationship between division and definition by turning to the metaphysical background of Aristotle's criticism.

In *Metaph.* Z12 and H6, Aristotle endeavors to solve the problem of the unity of definition: how a definition composed of at least two elements (final differentia and genus) can be one and not many. To ensure the unity of definition, one should conduct the unity of multiple differentiae when the division is made using multiple differentiae. Against this metaphysical background, Aristotle in *PA* A3 first addresses *the unity of multiple differentiae* by emphasizing the fundamental principle of diairesis. Consistent with this principle, multiple differentiae can be unified by dividing a genus into the differentiae and further dividing the differentiae into the sub-differentiae up to an indivisible final differentia that embraces all of the predecessors. The diairetical division in one single line leads to one final differentia that ensures the unity of the multiple differentiae by embracing all of its predecessors. After the multiple differentiae are unified in one final differentia by means of diairesis, then Aristotle, in *Metaph*. Z12 and H6, articulates the solution of *the unity of definition* by establishing an analogy between the definition of a species and the production of a specimen: final differentia and genus (as intelligible matter) build up an

intelligible unity by defining a species, just as form and matter (as sensible matter) build up a sensible unity by producing a specimen.[37]

To ensure the unity of the definition, one should first establish the unity of multiple differentiae. Diairesis produces *a single final differentia* by dividing a genus in one single line, and the single final differentia unifies the multiple differentiae by embracing all of its predecessors. Parallel division and chiasmus, in contrast, produce *multiple final differentiae* by differentiating a genus along many parallel lines, and the multiple final differentiae cannot be unified. In *PA* A2-3 and *Metaph*. Z12, therefore, Aristotle criticizes parallel division and chiasmus due to his metaphysical concerns – that is, they cannot fulfil the function of diairesis to guarantee the unity of multiple differentiae and further ensure the unity of definition. Without considering the unity of multiple differentiae or the unity of definition, Aristotle not only justifies the propriety and validity of parallel division and chiasmus but also makes widespread use of them. Inheriting diairesis, parallel division, and chiasmus from Plato, Aristotle advances them by explaining the relationship between them. On the other hand, Aristotle's criticism prevents scholars from acknowledging parallel division and chiasmus to be proper, valid methods of division.

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Notes

[1] This paper, originally titled with '*On Diairesis and Chiasmus: Plato's Methods of Division in the Statesman*', was presented in the section on Plato's Late Dialogues: Methodologies (30 June 2020, on Zoom), organized by Edward Halper on behalf of the *International Plato Society* (IPS) in the *American Philosophical Association* (APA) Pacific Division Meeting 2020. Thanks to Edward Halper for excellent organization and successful efforts to let the meeting be held on Zoom. Many thanks to William Altman for helpful comments and meaningful questions. To respond to his question, namely, why chiasmus has been forgotten by previous scholars, I add an appendix. Particular thanks is given to George Rudebusch for reading and commenting on earlier and final drafts. Accepting his suggestion, I eventually decided to use the term 'parallel division' to reference a division composed of two parallel 2-level division trees, instead of 'horizontal division' (which I have previously used). I would like to thank the chair, Jan Szaif, the other participants, Gabriele Cornelli and George Rudebusch, and the audiences for attending the meeting. Many thanks to the editor of the *Plato Journal*, Gabriele Cornelli, for an invitation to submit to the journal, and thanks also to the guest editor Richard Parry for his editing work. The present article is published in the framework of the research project: 'Research on Division and Method of Division in Ancient Greek Philosophy', supported by National Social Science Foundation of China, General Program [Grant Number: 21BZX088].

[2] *Plt*. 291c9-292b5, 301a6-303b7.

[3] See also *Plt*. 291d1-9.

[4] See also *Plt*. 291e1-292a3; Klein 1977, 193; Lane 1988, 159; Ricken 2008, 181-2, 251.

[5] *Top*. Z6, 145a5-7; *PA* A3, 643b9-10, 17-19; *Metaph*. Z12, 1038a9-15, 1038a25-6. See Alexander *In Metaphysica Commentaria*, 521.15-29; Asclepius *In Metaphysicorum Libros A-Z Commentaria*, 426.20-9; Michael of Ephesus *In Libros De partibus animalium Commentaria*, 17.11-17; Cherniss 1944, 50-1, 52-3n42; G. E. R. Lloyd 1961, 67, 71; Balme 1987, 73; 1992, 102, 117; Pellegrin 1986, 30-1; Lennox 2001, 165-6; Falcon 1997, 134-5; 2000, 408n18, 413-4; Kullmann 2007, 324, 338; Henry 2011, 249.

[6] *Plt*. 291e1-292a3; 302d1-e2.

[7] *Phlb*. 23c4-5: Πάντα τὰ νῦν ὄντα ἐν τῷ παντὶ διχῇ διαλάβωμεν, μᾶλλον δ', εἰ βούλει, τριχῇ; *Plt*. 261b4-c5, 262e3-6, 265e10-11; *Soph*. 226c10-11, 264d12-e1; *Phdr*. 245e4-6, 265a9-c3; *PA* A2, 642b5-6. See also Meyer 1855, 76-7; Cherniss 1944, 54-5n43; Pellegrin 1986, 22, 172n11; Balme 1987, 69-71.

[8] Admitting the propriety and validity of the two kinds of division, Falcon called diairesis 'division by single tree' while naming parallel division 'division by several, simultaneous trees'; see Falcon 1997, 138. Responding to Balme's influence (Balme 1987, 69, 73, 76-7), Falcon and other scholars (Lennox 1987, 351; Furth 1988, 99) have suggested that division made in many trees occurs *simultaneously*. *Simultaneously*, however, does not sufficiently express the precise relationship among multiple division trees because we cannot divide 'animal' in many trees at the same time – division must be carried out step by step. Thus, what *simultaneously* designates is not something that happens at the same time but rather a case in which multiple division trees remain in parallel alongside each other. To articulate multiple division trees accurately, therefore, I prefer 'parallel'/'in parallel' to 'simultaneous'/'simultaneously'. Despite using the imprecise expression 'simultaneously' most of the time, Balme also expressed the truth of the matter in two other places; see 1987, 70-1, 86.

[9] By 'ostensible diairesis', I mean merely apparent diairesis as opposed to a genuine diairesis, which complies with the fundamental principle of diairesis.

[10] *Cat*. 3, 1b16-20; *Top*. A15, 107b19-21.

[11] In this context, Aristotle not only divides animals into walking, flying, and swimming but also divides animals into biped (ζῴου μὲν γὰρ διαφοραὶ τό τε πεζὸν καὶ τὸ πτηνὸν καὶ τὸ ἔνυδρον καὶ τὸ δίπουν, *Cat*. 3, 1b18-19). I temporarily set τὸ δίπουν aside, thereby regarding this division as the division of animal into. In due course, I explain the relationship of biped to walking-flying-swimming.

[12] Following Plato's dichotomous division of knowledge (*Plt*. 258e4-5), Aristotle divides knowledge into theoretical and practical, dichotomously. Theoretical knowledge aims at grasping the truth, while practical knowledge strives for doing something gut (*Metaph*. α1, 993b20-1). More commonly, Aristotle divides knowledge into theoretical, practical, and poietical, trichotomously, according to their different objects; see *Top*. Z6, 145a15-18; Θ1, 157a8-13; *Metaph*. E1, 1025b18-28; K7, 1064a10-19; *EN* Z2, 1139a27-9; Zeller 2013, 177-8n5; Liu 2019, 15n15, 18-22. Regardless of whether knowledge is divided dichotomously or trichotomously, the differentiae of knowledge differ from those of animal.

[13] *Cat*. 3, 1b16: τῶν ἑτερογενῶν καὶ μὴ ὑπ' ἄλληλα τεταγμένων […]; *Top*. A15, 107b19: […] τῶν ἑτέρων γενῶν καὶ μὴ ὑπ' ἄλληλα […]; *Top*. Z6, 144b19-20: […] δύο γένεσιν οὐ περιέχουσιν ἄλληλα.

[14] In addition, Aristotle in *Top*. A15, 107b21-6 mentions an exceptional case in which the differentiae of the two non-subaltern genera can be the same. For example, the same differentia, 'sharp', is used to divide the two non-subaltern genera 'sound' and 'body'. The two non-subaltern genera 'sound' and 'body' can have the same differentia, 'sharp', because the term 'sharp' is applied equivocally. Therefore, when the term that signifies the differentia is used equivocally, the two non-subaltern genera can have the same differentia. See also Falcon 1996, 386-7.

[15] According to Aristotle's doctrine of category, animal is allocated to the category of substance (see *Cat*. 5, 2a14-19), and knowledge is allocated to the category of relation (see *Top*. Z6, 145a14-18).

[16] Alexander *In Topicorum Libros Octo Commentaria* 453.23-5: ἢ ἐν Κατηγορίαις ἕτερα γένη τὰ πρῶτα λέγει, ἐπεὶ 'τῶν ἑτερογενῶν καὶ μὴ ὑπ' ἄλληλα τεταγμένων' μηδ' ἄμφω ὑπὸ ταὐτὸν ὄντων γένος 'ἕτεραι τῷ εἴδει αἱ διαφοραί'.

[17] *Cat*. 3, 1b18-19; 13, 14b34-15a3; *Top*. Z6, 143a36-b2; *HA* A1, 487b33-488a2.

[18] All of the translations are my own. I do not accept Ross's reading of καθάπερ τὸ δίπουν τὸ πτηνὸν **ἢ** τὸ πεζὸν συνεπιφέρει **ζῷον** at 144b29-30, but I am inclined to read the text as καθάπερ τὸ δίπουν τὸ πτηνὸν **καὶ** τὸ πεζὸν συνεπιφέρει **τὸ ζῷον**, following Alexander *In Topicorum Libros Octo Commentaria* 454.7-10. Falcon also intends to accept the reading of τὸ ζῷον at 144b30; see Falcon 1996, 383.

[19] Aristotle distinguishes between three kinds of differentiae and the Neoplatonic commentators characterize them with technical terms. In classifying philosophy, Ammonius introduces three terms, namely, διαίρεσις, ἐπιδιαίρεσις, and ὑποδιαίρεσις to signify three kinds of differentiae. Διαίρεσις refers to the differentia of the genus, ἐπιδιαίρεσις refers to the parallel-differentia of the genus (which remains alongside the differentia of the genus), and ὑποδιαίρεσις refers to the sub-differentia of the differentia; see Ammonius *In Porphyrii Isagogen sive quinque voces*, 9.25-10.10. In commenting on Aristotle's division of quantity in the *Categories* 6, Olympiodorus uses the same terms, making a similar distinction between διαίρεσις, ἐπιδιαίρεσις and ὑποδιαίρεσις; see Olympiodorus *In Categorias Commentarium*, 84.33-85.7. It is worth noting that Ammonius and Olympiodorus do not use the term διαίρεσις in the ordinary way as Plato and Aristotle have done, pointing to the division or the method of division. In distinguishing between three kinds of differentiae, the Neoplatonic commentators apply διαίρεσις in the sense of διαφορά, referring to the differentia of the genus. I explain Aristotle's distinction of the three kinds of differentiae and Ammonius's as well as Olympiodorus's explanation fully on another occasion.

[20] *Cat*. 10, 11b38-12a17; 12b26-35; Pellegrin 1987, 320, 332.

[21] It is definitely a cross-division because after this cut, what Plato further divides is not animate being in herds alone but animate being that lives in herds and is tame. See also Balme 1987, 70.

[22] Porphyrius *Isagoge*, 9.24-10.21; Liu 2019, 15-17.

[23] Peck edited the text at 488a2-3 as follows: καὶ τῶν ἀγελαίων [καὶ τῶν μοναδικῶν] τὰ μὲν πολιτικὰ τὰ δὲ σποραδικά ἐστιν. Having deleted καὶ τῶν μοναδικῶν, Peck translated the sentence such that 'some of the gregarious animals are social, whereas others are more dispersed' (Peck 1965, 14-15). It is likewise with Thompson's translation as 'and of the gregarious, some are social, others independent' (Thompson 1991, 5) – this translation is based on the Greek text edited by Dittmeyer (Leipzig: Teubner, 1907); see Thompson 1991, 2n2. Instead of Peck's and Dittmeyer's editions, I adhere to the Bekker edition in which the text was properly edited as καὶ τῶν ἀγελαίων καὶ τῶν μοναδικῶν τὰ μὲν πολιτικὰ τὰ δὲ σποραδικά ἐστιν.

[24] *Cat*. 2, 1a20-b6; Porphyrius *In Categorias Commentarium*, 78.34-79.11; Ammonius *In Categorias Commentarius*, 25.5-12; Simplicius *In Categorias Commentarium*, 44.11-25; Philoponus *In Categorias Commentarium*, 28.9-23; Olympiodorus *In Categorias Commentarium*, 43.3-11; Elias *In Categorias Commentaria*, 147.7-11; Pacius 1966, 28; Liu 2019, 81n92.

[25] Porphyrius *In Categorias Commentarium*, 78.34-79.11; Liu 2019, 15-18, 16n16, 16-17n17, 17n18.

[26] Liu 2019, 253-6.

[27] *PA* A3, 643b12-13: Τούτων δ' ἕκαστον πολλαῖς ὥρισται διαφοραῖς, οὐ κατὰ τὴν διχοτομίαν; 643b23-4: Διὸ πολλαῖς τὸ ἓν εὐθέως διαιρετέον, ὥσπερ λέγομεν.

[28] *PA* A3, 643b10-13; Michael of Ephesus *In Libros De partibus animalium Commentaria*, 15.13-25; Falcon 1997, 136-9. Aristotle portrays more natural features of bird in greater detail in *HA* B12, 503b29-504b12; see also Bayer 1998, 495-6, 501-2.

[29] Balme 1992, 101-5; Falcon 1997, 138-9; Bayer 1998, 494-6; Lennox 2001, 166; Kullmann 2007, 338-9.

[30] Balme 1987, 74-5; 1992, 107-8; Bayer 1998, 493-4.

[31] Kant 2001, 16-36; Liu 2019, 16n16.

[32] Balme 1987, 70-1; 1992, 104, 107-8. See also Bayer 1998, 493.

[33] Balme 1987, 74-5; 1992, 107-8.

[34] Balme 1987, 74-5; 1992, 107.

[35] Balme has argued that the cross-division presented in *PA* A2 and the discussion in *Top*. Z6 are not parallel because in two cases, the targets of division are different. According to Balme, Aristotle in *Top*. Z6 divides living beings while in *PA* A2, he divides animals (1992, 107-8). Indeed, Aristotle uses the same word, ζῷον, to signify both animal and living being. All animals are living beings, but not all living beings are animals. Living beings embraces animals and plants in the narrow sense while containing animals, plants, and God in the broader sense. Using the differentiae, 'mortality-immortality', Aristotle divides ζῷον into mortal animal and immortal God – in this case, ζῷον refers to living being (*APr*. A31, 46b3-19; *APo*. B5, 91b38-92a1; *Top*. Δ2, 122b12-14). In using such differentiae as 'biped-polypod' and 'walking-swimming', Aristotle can only divide animals (ζῷον) into subgenera. What Aristotle in *PA* A2 and *Top*. Z6 divides, therefore, is not living being but animal. Having the same target of division, the two discussions are parallel.

[36] *PA* A2, 642b16-20: Εἴπερ οὖν μηδὲν τῶν ὁμογενῶν διασπαστέον, ἡ εἰς δύο διαίρεσις μάταιος ἂν εἴη· οὕτως γὰρ διαιροῦντας ἀναγκαῖον χωρίζειν καὶ διασπᾶν· τῶν πολυπόδων γάρ ἐστι τὰ μὲν ἐν τοῖς πεζοῖς τὰ δ' ἐν τοῖς ἐνύδροις.

[37] Stenzel 1924, 133-144; Cherniss 1944, 38-43; Gill 2010, 104-113; Liu 2019, 233-7, 234-6n319.