

## Aristotle's Rules of Division in the *Topics*: The Relationship between Genus and Differentia in a Division

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In *Topics* vi the discussion of definition is connected with the method of division. At least in this respect Aristotle is a good disciple of Plato: in fact, to define using a method of dividing is part of the Platonic tradition. In the *Phaedrus* Plato ascribes to Phaedrus a method of defining things by a double movement of division and collection. The first part of the method, i.e., the division, is further developed in the *Statesman* and the *Sophist*. In the following pages I shall focus neither on the Platonic division nor on the very debated question of the relationship between this method of division and Aristotelian division. Rather, I shall discuss *Topics* vi 6.144b12-30, where Aristotle deals with the problem of how the *same* differentia can be true of two non-subaltern genera,<sup>1</sup> and in particular of how the differentia 'two-footed' can be true of walking animals and flying animals. By considering the possibility that the same differentia is true of these two genera, Aristotle develops a couple of rules to effect a division. One of these will appear to be an *ad hoc* rule to solve the particular problem under discussion. This passage is also clear evidence for the claim that every differentia entails its genus or rather that it is logically dependent on its genus. A full understanding of this claim could shed light upon the relation between genus and differentia, and more particularly upon which sort of logical dependence Aristotle is considering.

### § 1. Rule R (*Topics* vi 6.144b12-20)

The issue of the relationship between genus and differentia comes up in *Topics* vi 6 at least twice. In the first of these passages, 144a28-33, Aristotle is content to make explicit that whatever this relationship may be, it cannot be interpreted as predicative in nature, namely, as a subject-predicate relationship. In other words, if G is a genus and Δ one of its differentiae, the relationship cannot be illustrated by saying either 'Δ is G' or 'G is Δ'. Unfortunately, the mere prohibition of predication does not greatly assist positive understanding of this relationship: in fact, it does not tell us what it is, but only what it is not. The second passage, 144b12-30, seems to be more promising. The question at issue here is whether the *same* differentia may be differentia of two genera that are non-subaltern. Two genera are non-subaltern when neither of them contains the other: G<sub>1</sub> and G<sub>2</sub>, for example, are non-subaltern genera when neither G<sub>1</sub> contains G<sub>2</sub> nor G<sub>2</sub> contains G<sub>1</sub>.

<sup>1</sup> I borrow 'non-subaltern' to translate the Greek μη περιεχόντων ἄλληλα in 144b14 from Pickard-Cambridge 1928

At least at first sight it does not seem, Aristotle says, that the *same* differentia is true of two genera that are non-subaltern (144b13). Nevertheless, let us suppose it is possible (144b14). The consequence is that the same species will be in two non-subaltern genera (συμβήσεται καὶ εἶδος τὸ αὐτὸ ἐν δύο γένεσιν εἶναι μὴ περιεχόντων ἀλλήλα, 144b15-16).

Aristotle's argument relies on the rule spelled out in 144b16-17, according to which every differentia *introduces* its own genus: ἐπιφέρει γὰρ ἐκάστη τῶν διαφορῶν τὸ οἰκεῖον γένος. Aristotle gives two examples, the differentiae 'two-footed' and 'walking', by which the genus 'animal' is introduced. The idea is that by saying 'two-footed' one also gives the genus implied, namely, 'animal', or better by saying that  $x$  is two-footed one also says that  $x$  is animal. If  $\Delta$  is a differentia and  $G$  its own genus, Aristotle's claim seems to be the following: if  $x$  is  $\Delta$  and  $\Delta$  is differentia of  $G$ , then  $x$  is  $G$ .

Suppose now that the differentia  $\Delta$  marks off the species  $S$  and that  $\Delta$  is a differentia that introduces both genus  $G_1$  and genus  $G_2$ . We have to assume, of course, that they are non-subaltern, i.e., neither  $G_1$  contains  $G_2$  nor *vice versa*. Given the rule Aristotle offers in 144b16-17, the consequence is that each of the genera is true of that of which the differentia is true (ὥστε καθ' οὐ ἡ διαφορά, καὶ τῶν γενῶν ἐκάτερον, 144b18-19). In other words, if  $\Delta$  is true of  $S$ , then both  $G_1$  is true of  $S$  and  $G_2$  is true of  $S$ . But this is not possible: two non-subaltern genera cannot be true of the same species.

It is important to make Aristotle's argument clear. In the case that the same differentia  $\Delta$  introduces two non-subaltern genera, e.g.,  $G_1$  and  $G_2$ , Aristotle claims that the same species *will be* in  $G_1$  and  $G_2$  (144b15-16). What he wants to say here is that one will not be able to establish whether the species  $S$  is a species of  $G_1$  or  $G_2$ . This is because  $\Delta$  introduces the genera it differentiates, and whichever species has  $\Delta$  as its differentia will belong to the genus that  $\Delta$  differentiates. From 144b16-17 come the following two premisses: (i) if  $S$  is  $\Delta$  and  $\Delta$  is a differentia of  $G_1$ , then  $S$  is  $G_1$ ; and (ii) if  $S$  is  $\Delta$  and  $\Delta$  is a differentia of  $G_2$ , then  $S$  is  $G_2$ . From (i) and (ii) one can draw the following conclusion:  $S$  is  $G_1$  and  $G_2$ . But it is also clear that Aristotle does not really wish to say that in the case in which the same differentia  $\Delta$  introduces  $G_1$  and  $G_2$ , the same species  $S$  falls under  $G_1$  and  $G_2$ . There is no reason to think that the species  $S_1$ , which results from the division of  $G_1$  by  $\Delta$ , is the same as the species  $S_2$ , which results from the division of  $G_2$  by  $\Delta$ . Apart from any other consideration, it is in fact clear that  $S_1 = G_1\Delta$  and  $S_2 = G_2\Delta$ .

Thus, in 144b12-20 Aristotle is denying the possibility that the same differentia  $\Delta$  is differentia of two non-subaltern genera. The rule on which he is relying is that spelt out in 144b16-17: *every differentia introduces its own genus* (rule R). In other words, Aristotle is denying the situation described in diagram I:

DIAGRAM I

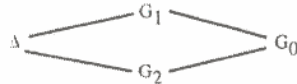


This is not new. In *Categories* 3.1b16-17 and *Topics* i 15.107b19-20 Aristotle gives the same principle: the differentiae of genera that are different and non-subaltern are themselves different in species. In the *Categories* Aristotle explains this principle by the following example: if 'knowledge' is a genus it cannot be divided by the differentia 'two-footed'. In fact, as 'knowledge' is not a proper genus of the differentia 'two-footed', none of the species of knowledge differs from another by being two-footed.

§ 2. Rule R\* (*Topics* vi 6.144b20-30)

In 144b20-30 Aristotle goes on to correct himself.<sup>2</sup> Perhaps it is not impossible, he says, that the same differentia is differentia of two non-subaltern genera. A further condition has to be added: *they must be non-subaltern and fall under the same genus*. (οὐκ ἀδύνατον τὴν αὐτὴν διαφορὰν δύο γενῶν εἶναι μὴ περιεχόντων ἀλλήλα, ἀλλὰ προσθετέον μηδ' ἄμφω ὑπὸ ταῦτόν ὄντων, 144b20-22). The case he seems to be thinking of is the following:

DIAGRAM II



Aristotle gives as an example of Diagram II the case of the differentia 'two-footed', which may be differentia both of walking animals and flying animals. Nevertheless, this case does not cause difficulty. Although these two genera are non-subaltern, they are subordinated to a higher one: both walking and flying animals are in fact animals. From this example Aristotle comes to the conclusion that rule R has to be modified. It is in fact unnecessary that a differentia introduces every appropriate genus (δῆλον δὲ καὶ ὅτι οὐκ ἀνάγκη τὴν διαφορὰν πᾶν τὸ οἰκεῖον ἐπιφέρειν γένος, 144b25-26). Diagram II shows that a differentia can be used of two non-subaltern genera: *it is only necessary for a differentia to introduce one of the two non-subaltern genera with the genera that are higher than this* (rule R\*: τὸ ἕτερον μόνον ἀνάγκη συνεπιφέρειν καὶ τὰ ἐπάνω τοῦτου πάντα, 144b28-30).

Why is case II accepted by Aristotle while case I is not? Presumably he thinks that in II, to the question 'what does Δ introduce?', we can always answer giving the higher genus G<sub>0</sub>. In other words, even if we cannot decide whether the 'two-footed' differentia introduces a walking or a flying animal, we can answer that it introduces an animal. This is not possible in case I. In I there is no higher genus to bypass G<sub>1</sub> and G<sub>2</sub>, as in II, so we cannot answer the question 'what does Δ introduce?' without denying the division into G<sub>1</sub> and G<sub>2</sub>.

<sup>2</sup> In *Topics* vi Aristotle applies the same strategy many times: first offering a provisional and tentative solution and then correcting himself by presenting the final solution. See, e.g., 140b4-5 and b31-32.

§ 3. *Phaedo* 105a1-5

Before going on in the discussion of rules R and R\*, I would like to turn to the *Phaedo*. The relatively unusual verb ἐπιφέρειν, that occurs in rule R (*every differentia introduces [ἐπιφέρει] its own genus*), also plays an important role in the final argument of the *Phaedo* (102a10-107d10), where Socrates advances his final proof of the immortality of the soul. The argument is intricate, but without tracing the intricacies it is perhaps possible to highlight what is relevant for the present discussion. In 105a1-5 Socrates enunciates two general principles as the basis for the argument.

Well, see whether you would define thus: it is not only the opposite that does not admit its opposite, but also that which introduces an opposite into whatever it enters itself; and that thing, the very thing that introduces it, never admits the quality opposed to the one that it has introduced

ἀλλ' ὅρα δὴ εἰ οὕτως ὀρίξει, μὴ μόνον τὸ ἐναντίον μὴ δέχεσθαι, ἀλλὰ καὶ ἐκεῖνο, ὃ ἂν ἐπιφέρει τι ἐναντίον ἐκείνου. ἐφ' ὅτι ἂν αὐτὸ ἴη, αὐτὸ τὸ ἐπιφέρον τὴν τοῦ ἐπιφερομένου ἐναντιότητα μηδέποτε δέξασθαι.<sup>3</sup>

Let us call the two principles P1 and P2: Socrates presents P2 as an extension of P1

P1: *the opposite does not admit its opposite*

P2: *what introduces an opposite never admits the opposite to the one that it introduces*

The numerical example that Socrates introduces before enunciating P2 may help with understanding this principle. *Odd* and *Even* are opposite and numbers, while numbers themselves are not opposite, they must always be characterised by one member of the pair and must exclude the other. In 104d5-7 Socrates says that necessarily whatever the Form *Three* occupies is not only three but also odd (οἴσθα γὰρ δήπου ὅτι ἂν ἢ τῶν τριῶν ἰδέα κατάσχη, ἀνάγκη αὐτοῖς οὐ μόνον τρισὶν εἶναι ἀλλὰ καὶ περιττοῖς)

Socrates' idea seems to be the following

If F and G are opposite and H *introduces* (ἐπιφέρει) F, necessarily whatever x possesses H will not admit G

F, G, and H stand for Forms. *Odd* and *Even* are opposite Forms, namely, F and G. The *Three* (H) introduces one of the two opposites, the *Odd* (F), and excludes the other, the *Even* (G). Necessarily whatever is three (H) is also odd (F), and hence not-even (not-G). Clearly Plato has in mind a transitive and non-symmetrical relation, but he has no technical term for it and he is content to use a metaphor. In

<sup>3</sup> The Greek is not easy. I follow the editors who take ἐκεῖνο as subject of δέχεσθαι and antecedent of ὃ ἂν ἐπιφέρει. According to this interpretation αὐτὸ τὸ ἐπιφέρον is either emphatic or it is a gloss upon ἐκεῖνο. Nonetheless there is also the possibility of taking ἐκεῖνο as object of δέχεσθαι. The subject will be ὃ ἂν ἐπιφέρει and τὴν τὸ ἐπιφερομένου ἐναντιότητα repeats ἐκεῖνο. This is Burnet's translation (1911)

fact ἐπιφέρειν is one of the military metaphors (ἐπιφέρειν πόλεμον, ὅπλα ἐπιφέρειν) that Plato uses in his final argument (cf. Vlastos 1969; Hackforth 1955, 155-156; Burnet 1911, 121)

Can this passage of the *Phaedo* help to shed light upon the background of the verb ἐπιφέρειν, and upon the background of rule R, *every differentia introduces its own genus*? It would be tempting to answer yes. There appear to be some interesting similarities between the relations marked by this verb as used by Aristotle and Plato. Nevertheless, the *Phaedo* passage has no explicitly stated connection with division, and consequently with the notions of genus and differentia. In the *Topics* ἐπιφέρειν marks a relation between differentiae such as 'two-footed' and genera such as 'walking animal' and 'flying animal', while in the *Phaedo* ἐπιφέρειν marks a relation that is explicitly said to hold between *Three* and *Odd*. On the most natural reading of *Phaedo* 103b10-105b10, ἐπιφέρειν marks also a relation between fever and disease, fire and hot, and soul and life. In light of this, it is wiser to be content to point out the similarities between these relations and to keep as speculation a dependence of *Topics* 144b12-30 on *Phaedo* 105a1-5.<sup>4</sup> More particularly, 'Δ introduces G' in rule R initially appeared to be the following: if  $x$  is Δ and Δ is a differentia of G, then  $x$  is G. Nevertheless, from the *Phaedo*, and from the example of the forms *Three* and *Odd*, we should now be inclined to think that the meaning of 'Δ introduces G' is much stronger. When Aristotle claims that Δ introduces G he is suggesting

(i) *necessarily* if  $x$  is Δ and Δ is a differentia of G, then  $x$  is G.

(ii) G is the genus of  $x$

Condition (ii), in particular, points out the fact that genus cannot be just any predicate; genus in fact is a special kind of predicate that is given by answering the question 'what is  $x$ ' (102a31-35)

#### § 4. The Relationship between Genus and Differentia

(the Verbs ἐπιφέρειν and συνεπιφέρειν)

It is clear that rule R\* is weaker than rule R, or that R implies R\* but R\* does not imply R. Nevertheless, there are two ways of understanding the relationship between R and R\*: (a) R\* replaces R and every division has to be carried out applying only R\*; (b) R\* is only an additional rule to manage particular cases and some divisions have to be carried out applying R\* instead of R. I am inclined to think that (a) is what Aristotle is really suggesting. A division has to be carried out relying on rule R\*: *it is only necessary for a differentia to introduce one higher genus together with the genera that are higher than this*

Whatever Aristotle *may* have thought about the relation between R and R\*, one might raise the question whether the logical relation between differentia and

<sup>4</sup> As I have already said, Aristotle is looking for a relationship that is not a subject-predicate relationship. In the *Phaedo* he could have found a satisfactory scheme of relations to describe the relationship that holds between genus and differentia. From this point of view the use of the verb ἐπιφέρειν is reminiscent of the *Phaedo*



genus has to be revised once R\* has been accepted. Perhaps the question becomes clearer with the help of a diagram. In diagram III, according to 144b28-30, R\* suggests two possibilities: either  $\Delta$  introduces  $G_1$  and  $G_0$  or it introduces  $G_2$  and  $G_0$ :

DIAGRAM III



Does the case described in III force Aristotle to revise the relation between genus and differentia? Is Aristotle giving up his claim about the nature of this relation in admitting R\*?

It is easy to see that Aristotle is not forced to rethink the relation between genus and differentia by softening his initial position. In fact, rule R, *every differentia introduces its own genus*, can be rendered as something like this:

- (i) if  $x$  is  $\Delta$  and  $\Delta$  is a differentia of  $G$ , then  $\Delta$  ἐπιφέρει the genus  $G$  of  $x$ ,

where ' $\Delta$  ἐπιφέρει the genus  $G$  of  $x$ ' means '*necessarily* if  $x$  is  $\Delta$  and  $\Delta$  is differentia of  $G$ , then  $x$  is  $G$  and  $G$  is the genus of  $x$ '.

Meanwhile, rule R\* can be rendered thus:

- (ii) if  $x$  is  $\Delta$  and  $\Delta$  is a differentia of  $G_1$  and  $G_2$ , and  $G_0$  is a higher genus of  $x$ , then  $\Delta$  συνεπιφέρει  $G_0$ ,

where the verb συνεπιφέρειν describes the fact that  $\Delta$  introduces *either*  $G_1$  *or*  $G_2$  with the higher genus  $G_0$ . In particular, when in 144b28-29 Aristotle says that it is only necessary for a differentia to introduce one genus together with the genera that are higher, the Greek τὸ ἕτερον μόνον must be taken generously: 'either...or' has to be interpreted as an *exclusive disjunction* composed of opposing disjuncts.  $\Delta$  does not introduce  $G_1$  and  $G_2$  at the same time, but if it does not introduce  $G_1$  it must introduce  $G_2$ , and if it does not introduce  $G_2$  it must introduce  $G_1$ .

It might be objected that it is too strong to claim that the Greek τὸ ἕτερον μόνον has to be taken as introducing an exclusive disjunction. In fact, we tend to give the exclusive disjunction more importance than it actually has in everyday language. There is a nice remark on this point in Quine 1952, 4. Often what appears to be an exclusive disjunction is only a nonexclusive disjunction in disguise. In the statement 'every number is either even or odd' '...either...or...' should not be taken in the exclusive sense. The clauses ' $x$  is odd' and ' $x$  is even' in fact exclude each other by themselves. Since they are mutually exclusive, '...either...or...' does not have to be understood to repeat the exclusion. In other words, '...either...or...' is to be interpreted as nonexclusive because the content that fills the gaps is by its nature incompatible. Something like this may happen also in the passage I am dealing with: the Greek τὸ ἕτερον μόνον may be taken as

introducing a nonexclusive disjunction whose content is by itself exclusive.

At any rate, however the Greek τὸ ἕτερον μόνον may be interpreted, R\* becomes:

- (iii) if  $x$  is  $\Delta$  and  $\Delta$  is a differentia of  $G_1$  and  $G_2$ , and  $G_0$  is a higher genus of  $x$ , then  $\Delta$  ἐπιφέρει  $G_1$  and  $G_0$  or  $\Delta$  ἐπιφέρει  $G_2$  and  $G_0$ ,

where  $\Delta$  ἐπιφέρει  $G_1$  and  $G_0$  means 'necessarily if  $x$  is  $\Delta$  and  $\Delta$  is differentia of  $G_1$ , then  $x$  is  $G_1$  and  $x$  is  $G_0$  and  $G_1$  and  $G_0$  are genera of  $x$ ';  $\Delta$  ἐπιφέρει  $G_2$  and  $G_0$  means 'necessarily if  $x$  is  $\Delta$  and  $\Delta$  is differentia of  $G_2$ , then  $x$  is  $G_2$  and  $x$  is  $G_0$  and  $G_2$  and  $G_0$  are genera of  $x$ '.

#### § 5. An alternative version of R\*?

Some of the MSS suggest another interpretation of R\*, that though less convincing is still of some interest. Ross' text in 144b28-30 is the following:

- (a) τὸ ἕτερον μόνον ἀνάγκη συνεπιφέρειν καὶ τὰ ἐπάνω τούτου πάντα, καθάπερ τὸ δίπουν τὸ πτηνὸν ἢ τὸ πεζὸν συνεπιφέρει ζῶον.

And I translate this in the following way:

- (a) it is only necessary to introduce one of the two together with the genera that are higher than this, as two-footed introduces either flying or walking Animal.

In this translation τὸ ἕτερον refers to one of the two non-subaltern genera, namely, either τὸ πτηνὸν or τὸ πεζόν. According to diagram III, R\* in (a) (which I will refer to as R\*(a)) suggests two possibilities: either  $\Delta$  introduces  $G_1$  and  $G_0$  or it introduces  $G_2$  and  $G_0$ .

Ross's text is not the only possible one, however. I suggest the following that is based on manuscript B, Marcianus 201, and perhaps C, Parisinus Coislinianus 330:

- (b) τὸ ἕτερον μόνον ἀνάγκη συνεπιφέρειν καὶ τὰ ἐπάνω τούτου πάντα, καθάπερ τὸ δίπουν, τὸ πτηνὸν ἢ τὸ πεζόν, συνεπιφέρει τὸ ζῶον.

This is a tentative translation:

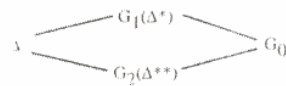
- (b) it is only necessary to introduce the other together with the genera that are higher than this, as two-footed, either flying or walking Animal, introduces Animal.

According to this translation τὸ ἕτερον is taken in a more general sense without referring to the two non-subaltern genera, namely, τὸ πτηνὸν and τὸ πεζόν. By inserting τὸ before ζῶον in line 144b30, τὸ ἕτερον does not refer necessarily to τὸ πτηνὸν and τὸ πεζόν, but it could refer to τὸ ζῶον. According to (b), in diagram III, R\* suggests that  $\Delta$  introduces  $G_0$  jumping over both  $G_1$  and  $G_2$ .

According to (b) Aristotle gives the following version of R\*: *it is only necessary for a differentia to introduce a higher genus together with the genera that are higher than this.* Text (b), and consequently the new version of R\* (which I will refer to as R\*(b)), is interesting because it does not force Aristotle to revise

the nature of the relation between genus and differentia. In the particular case of two-footed animals the differentia 'two-footed' still introduces the genus 'animal' (or according to my above interpretation: *necessarily* if  $x$  is two-footed, then  $x$  is animal). From this point of view  $R^*(b)$  is only a *weaker version* of  $R^*(a)$ : in other words  $R^*(a)$  implies  $R^*(b)$  but  $R^*(b)$  does not imply  $R^*(a)$ . Nevertheless, the solution suggested by  $R^*(b)$  does not seem to be as good as the previous one. The difficulties that still remain are the best proof that this new solution does not manage to solve all the problems. From diagram IV it is clear that  $G_1$  and  $G_2$  are marked off respectively by differentiae  $\Delta^*$  and  $\Delta^{**}$ . By jumping over  $G_1$  and  $G_2$   $R^*(b)$  loses the information contained in  $G_1$  and  $G_2$ , and in particular the fact that they are marked off by  $\Delta^*$  and  $\Delta^{**}$ .  $R^*(a)$  has, therefore, to be preferred to  $R^*(b)$  primarily because it is more informative than  $R^*(b)$  about the way one comes to  $G_0$ .

DIAGRAM IV



§ 6. R and R\*: Rules for Testing or Constructing a Division?

Until now I have been dealing with rules R and R\* without committing myself to answering the following question: what are rules R and R\* for?

If Aristotle's dialectic is what the *Topics* is about, it is not difficult to offer a first, tentative answer to this question. Rules R and R\* are rules for *testing* a division in a dialectical discussion. In other words, if A claims that  $\Delta$  is a differentia and  $G_1$  is a proper genus of  $\Delta$ , Aristotle offers two rules to the opponent of A (let him or her be B). These rules help B to establish whether A is right. In fact, if  $\Delta$  is differentia both of  $G_1$  and of  $G_2$ , and  $G_1$  and  $G_2$  are non-subaltern genera (i.e., neither  $G_1$  contains genus  $G_2$  nor  $G_2$  contains  $G_1$ ), A is probably wrong. According to rule R it is not possible that the same differentia introduces two proper genera that are non-subaltern to each other. Nevertheless, if  $G_1$  and  $G_2$  are subaltern to another genus  $G_0$ , that is higher than  $G_1$  and  $G_2$ , then A may persist in claiming that  $G_1$  is a proper genus of  $\Delta$ . According to rule R\* it is possible that both  $G_1$  and  $G_2$  are proper genera of  $\Delta$  because  $G_0$ , bypassing  $G_1$  and  $G_2$ , is the element of unity that in this case is required.

However, R and R\* are not only rules for testing a division, namely, rules for the control of the relation between genus and differentia in a division. R and R\* can also be taken as rules for the *construction* of a division. Rule R, in particular, introduces a restrictive condition that holds in the construction of a divisional tree. According to rule R the case illustrated in the following diagram simply cannot happen:

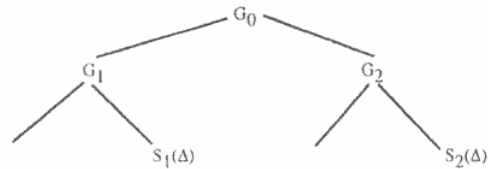
DIAGRAM V





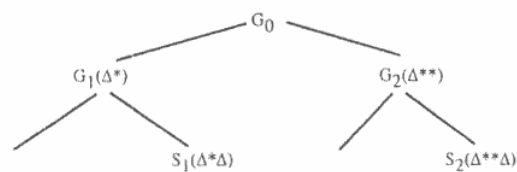
As I have already said, rule R is not the final answer to the question Aristotle is dealing with in *Topics* vi 6.144b12-30, namely, whether the same differentia may be differentia of two non-subaltern genera. Aristotle cannot deny that the same differentia appears more than once in the same divisional tree. Two-footed animals are his favourite example. 'Two-footed' is a differentia both of walking and flying animals and walking and flying animals are non-subaltern genera. Since Aristotle thinks that the number of legs is an essential feature in the morphological description of animals, rule R causes difficulties. Both a species of walking animals, namely, man, and a large group of flying animals, namely, birds, are marked off as two-footed animals. Two options present themselves in this case: either give up rule R as a rule of division or give up 'two-footed' as an adequate differentia. Aristotle chooses the first option, which is theoretically less expensive. He weakens R, modifying it into R\*: the same differentia may introduce two non-subaltern genera if there is at least another genus that is higher than these. Rule R\* make the case illustrated in diagram VI acceptable:

DIAGRAM VI



By considering rules R and R\* as rules for testing a division, the distance between R\*(a) and R\*(b) I dealt with in § 5 may appear even more clearly. This time the difficulties involved in the solution offered by R\*(b) are difficulties in defining. R\*(b) is highly unsatisfactory if one bears in mind *how* definitions are reached by division. From diagram VII it is clear that  $S_1$  is to be defined by giving the genus  $G_0$  plus the differentiae  $\Delta^*$  and  $\Delta$  and  $S_2$  by giving the genus  $G_0$  plus the differentiae  $\Delta^{**}$  and  $\Delta$ . The definition of  $S_1$  is therefore  $G_0\Delta^*\Delta$ , while that of  $S_2$  is  $G_0\Delta^{**}\Delta$ . Both definitions consist therefore of three elements, i.e., the genus  $G_0$  and the differentiae that have been applied to  $G_0$  in order to reach respectively  $S_1$  and  $S_2$ .

DIAGRAM VII



According to R\*(b) one has to jump over  $G_1$  and  $G_2$ . But in doing so one denies the division of the genus  $G_0$  by the differentiae  $\Delta^*$  and  $\Delta^{**}$ , and hence the fact that  $S_1$  and  $S_2$  are two *different* species. Even though both walking and fly-

ing animals are two-footed, they remain different species of animals. In fact, in jumping from the differentia 'two-footed' to the higher genus 'animal', one denies that there are two species of two-footed animals, that, while having this differentia in common, have other peculiar differentiae by which they are distinguished from one another.

#### § 7. Appendix

In *Topics* vi 6.144b12-30 Aristotle raises the question of whether it is possible that the same differentia is a differentia of two genera that are non-subaltern. His answer is yes, provided that there is a third genus that is higher than the given genera and that contains them. The fact that men and birds are two-footed does not make difficulties because both fall under a higher genus: both men and birds are animals. Nevertheless, there is another case that Aristotle does not take into account in his discussion of the relation between genus and differentia but of which he is aware elsewhere. Let us suppose that after dividing animals into two-footed and four-footed animals one also divides artifacts by way of the differentia 'four-footed'. By carrying out a division in this way one has two species of four-footed things: on the one hand the genus of four-footed animals (e.g., dogs, cats, and elephants) and on the other hand the genus of four-footed artifacts (e.g., tables and chairs). Can this division be taken as a case where the same differentia 'four-footed' is a differentia of two genera that are non-subaltern? Aristotle does not think so. He rather takes such a division as a case of *ambiguity*. In such a case 'four-footed' is only a *homonymous* term.<sup>5</sup> In the case of division of animals and artifacts by way of the differentia 'four-footed', one does not have *the same differentia* that introduces different and non-subaltern genera, but rather *different kinds of differentia* that share the *same term* (107b21-23)

Cases of homonymy in a division are only cases of ambiguity, namely, cases in which the definition is not clear enough. Aristotle deals with clarity in definition in *Topics* vi 2, where homonymy and metaphor appear as the main two sources of obscurity. Aristotle returns to the problem of homonymy in the last section of *Posterior Analytics* ii 13, where he gives a rule for the control of homonymy in a division. Here he says again that there must be clarity in definition, and he claims that one can avoid ambiguity by giving separate definitions (τὸ ἐν ἑκάστῳ γένει ὀρίζεσθαι χωρὶς, 97b33-34). A parallel usage of χωρὶς in *Parts of Animals* i 4.644a24-b9 can be of some help in understanding the meaning of ὀρίζεσθαι χωρὶς. In this passage Aristotle is considering the advantages and disadvantages of studying separately the particulars and indivisibles in species (περὶ τῶν καθ' ἕκαστον καὶ ἀτόμων τῷ εἶδει θεωρεῖν χωρὶς, 644a30-31). For example in the case of birds one may hesitate to say whether it is better to study the different species of birds separately, e.g., ostriches and cranes, and to give separate

<sup>5</sup> *Top.* i 15.107b16-26: ἐπεὶ δὲ τῶν ἐτέρων γενῶν καὶ μὴ ὑπ' ἄλληλα ἕτεροι τῷ εἶδει καὶ αἱ διαφοραὶ, οἷον ζῴου καὶ ἐπιστήμης (ἕτεροι γὰρ τούτων αἱ διαφοραὶ), σκοπεῖν εἰ τὰ ὑπὸ τὸ αὐτὸ ὄνομα ἐτέρων γενῶν καὶ μὴ ὑπ' ἄλληλα διαφοραὶ εἰσιν, οἷον τὸ ὄξύ φωνῆς καὶ ὄγκου. ὥστε ὁμώνυμον τὸ ὄξύ· ἐτέρων γὰρ γενῶν καὶ οὐχ ὑπ' ἄλληλα διαφοραὶ εἰσιν.

descriptions of each species (τὸ περὶ ἐκάστου λέγειν χωρὶς, 644b1). As they happen to have the same attribute *qua* birds, one has to repeat the same things many times. For this reason in the case of birds, and in the other similar cases as well, where the species are not far removed from one another, it is better to describe the common attributes of the genus all together (τὰ μὲν γένη κοινῇ λέγειν, 644b2). From the parallel expressions θεωρεῖν χωρὶς and λέγειν χωρὶς in *Parts of Animals* i 4, what Aristotle means by ὀρίζεσθαι χωρὶς becomes clearer. One must carry out two divisions separately, the one for artifacts and the other for animals. By doing so the fact that there is the same term 'four-footed' for different kinds of differentia does not cause any difficulty. According to Aristotle if one first divides animal into two-footed and four-footed animals and then artifacts by way of the differentia 'four-footed', and does not fuse the two cases, then one will be able to give two unambiguous definitions.<sup>6</sup>

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