

ARISTOTLE'S DIVISION OF THEORETICAL SCIENCES¹

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ABSTRACT. *The purpose of this paper is to reconstruct the division of theoretical sciences made by Aristotle in several parts of the Corpus. Although there are several possible ways to interpret this division, we have opted for a possible unified one. The ultimate concern of this survey is to question the nature, existence, and possibility of the immovable substance.*

KEYWORDS: *Science, metaphysics, physics, mathematics, astronomy, theology, first philosophy*

If there is no substance other than those which are formed by nature, natural science will be the first science; but if there is an immovable substance, the science of this must be prior and must be first philosophy, and universal in this way, because it is first (Met. E 1, 1026a27-32 = K 7, 1064b9-14)³.

Now to investigate whether what exists is one and motionless is not a contribution to the science of nature (Phys. A 2, 184b25).

In *Metaphysics*, the aim of physics is defined as a natural science that “confines itself to one class of beings, i.e. to that sort of substance which has the principle of its movement and rest present in itself” (E 1, 1025b18-21). Consequently, beings lacking this characteristic do not fall within physics’ area of study, so things which cause movement without being moved themselves “are no longer inside the province of natural science, for they cause motion not by possessing motion or a source of motion in themselves, but being themselves incapable of motion” (Phys. B 7, 198a27-29). What is required is to distinguish between the different types of possible studies, depending on the type of substance each kind of study deals with: “Hence there are three branches of study, one of things which are incapable of motion, the second of things in motion, but indestructible, the third of destructible things” (Ib., 198a30-31). Thus, there are three different *pragmateíai* (τρεῖς πραγματεῖαι) corresponding to the three kinds of *ousíai* in Met. Λ 1. We will return to this): The first one is *proté*

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³ Regarding the quotation of Aristotle’s works, the text we follow is from the two volumes of the Revised Oxford Translation *The Complete Works of Aristotle* (Ed. by Jonathan Barnes), Princeton University Press, 1984.

philosophía (or *theology*¹), which deals with the timeless and motionless and studies the first *ousíai* and the unmoved movers, the non-material realities and the supreme of these (God). The second *pragmateíai* is *astronomy*². It deals with the imperishable but mobile and studies the indestructible bodies subject to movement. The third *pragmateíai* is *physics*. Dealing with what is perishable and mobile, it studies mobile destructible substances. These three characteristic *pragmateíai*, which are nothing but the three divisions of the theoretical sciences, require a retrospective analysis in order to justify how they are established from Aristotle's general division of the sciences. In the following, what I do is a slight restructuring of the above-mentioned classification, however, given the nature of this paper. I will record just some specific of the several relevant philosophical implications involved in this matter. The division of theoretical sciences in these three precise domains, which corresponds exactly to the three types of substances that are hierarchically ordered, becomes clear in Met. E 1 just after Aristotle defines the general division of sciences³. However, before their unambiguous definition in E, these divisions, distinctions, and classifications were previously prefigured.

Attempt at reconstruction

The unambiguous position exposed in E 1 is reached by means of different paths. However, there is a crucial one: the search, definition and justification of the first causes and principles of things or, better yet, of the science that deals with them, which is the aim of Met. A 1-2. A 1 tends to establish that “wisdom” (*sophía*), latterly named “first philosophy” (*proté philosophía*), is the highest form of human knowledge, concerning the study of the first causes and principles: “All men suppose

¹ Called as such, directly, in, cf., Met. E 1, 1026a18ff. and its replica in K 7, 1064b1-3. At this point, we can assume with Kahn that “«Wisdom» in Book A and «Theology» in E 1 refer to the same investigation” (Kahn, 1985, p. 312).

² Within the canonical division of theoretical sciences made in Met. E 1, and its correlate or reiteration from K 7, along with the suggestion of Phys. B 2, astronomy doesn't appear situated between *proté philosophía* and physics, but mathematics appeared there. The mention of astronomy as one of the theoretical sciences occurs only here (Phys. B 7) and, more or less suggested, in Met. A 1. In the first volume of his monumental *Le système du monde*, Duhem deals with physics and its relations with mathematics and metaphysics (cf. 1913, pp. 134–150). In “The subdivisions of Theoretical Philosophy”, one of the sections of his pioneering book, Merlan offers a survey on the impact of the Aristotelian division on the ancient and medieval thinking (both Arab and Christian. Cf. 1953, pp. 59–87). I highly recommend the reading of Merlan's work, which exceeds the introductory tone of this paper.

³ We must notice that the classical tension between *metaphysica specialis* and *metaphysica generalis* always remains as a background of the general division of sciences. Notwithstanding, this tension does not imply a contradiction. As Michael Frede notices, this contradiction is only apparent (Frede, 1987, pp. 84 ff.). Far beyond, we agree with the general conclusion Frede arrives regarding the systematic place of first philosophy: “A proper understanding of Aristotle's conception of metaphysics, and in particular his remark that first philosophy is universal because it is first, will restore metaphysics to its proper place, that of the first of the demonstrative sciences” (Frede, 1987, pp. 95).

what is called wisdom to deal with the first causes and the principles of things [περὶ τὰ πρῶτα αἴτια καὶ τὰς ἀρχὰς]” (981b28-29). In fact, *Physics* inquiry begins with the first causes and principles, set there in B 3 (and then reiterated in B 7). In *Metaphysics* A 3, they are referred again: “We have studied these causes sufficiently in our work on nature [ἐν τοῖς περὶ φύσεως]” (983a33-b1). Once established, *supra*, that “wisdom is knowledge about certain causes and principles” (982a1), A 2 is concerned with the examination of what causes and principles “wisdom” is science. It begins analyzing the common views regarding the wise (*sóphos*), and then, it connects them with the precise definition of “wisdom” as science. Before, in *supra*, in A 1, Aristotle had already used the same reasoning, but referring not to the common opinion but to the common *use*, in Greek language, of *sóphos*, and its analogy with *sophía* regarding to the gradually and qualitatively ascendant quality of knowledge, in its diverse forms and levels: i.) sensation, ii.) memory, iii.) experience, iv.) art, and, v.) science. Being at level “v,” you are closer to wisdom, likewise you are wiser, than being at level “i”, or at “ii”, or “iii”, or “iv.” At level “iv” you are closer to wisdom/wiser than at level “i”, “ii” or “iii”, and so forth.

Aristotle says it: “Wisdom depends in all cases rather on <the level of> knowledge” (981a27). At the end of A 1 we find a slight hint of the division of sciences proposed in E 1. In A 1, while analyzing the various ways of being and not being in wisdom, and picking up the distinction established in cf. 981a24ff., Aristotle says: “The man of experience is thought to be wiser than the possessors of any perception whatever, the artist wiser than the men of experience, the master-worker than the mechanic, and the theoretical kinds of knowledge to be more of the nature of wisdom than the productive” (981b29-982a1.) So if we combine the practical sciences with the theoretical and productive sciences, the result is the basic division of sciences made in the first part of E 1, as a whole. Again, in A 2, the common view regarding the wise man is that he is the one whose knowledge: i.) is more universal, ii.) reaches the hardest things to learn, the universals, the things that are at the furthest point from the senses, iii.) is the most accurate regarding the causes (and first principles) and the most capable of teaching them¹. At this point it appears the consideration of “wisdom”. Thus, iv) the wise man had to possess the science sought because of itself and not of its practical effects: “Of the sciences, also, that which is desirable on its own account and for the sake of knowing it is more of the nature of wisdom than that which is desirable on account of its results, and the superior science is more of the nature of wisdom than the ancillary” (982a15-17). Wisdom is the

¹ Remember that before Aristotle said, setting in advance the difference, as a better and more valuable way of accessing knowledge, that amongst experience, art and science, the first one (*empeiría*) cannot be communicated nor taught to others because it is a particular event, an individual one not a universal one as the genuine *epistémē* demands: “in general it is a sign of the man who knows, that he can teach [τὸ δύνασθαι διδάσκειν ἔστιν], and therefore we think art is more truly knowledge than experience is; for artists can teach, and men of mere experience cannot” (981b7-10).

dominant and higher science to which other kinds of knowledge are subordinated: the science of first causes and principles.

From the above-mentioned and as a summary, it follows that wisdom is a science that: i.) deals with the utmost universal, and ii.) deals with the first causes and principles, with which is knowable in high degree, and, iii.) given its particular category, concerns to the divinity. Not being a productive science, it is the only free science whose objective is -and occurs in- itself. Being the highest and most worthy of esteem, it is the most divine in a twofold sense: “For the most divine science is also most honorable; and this science alone is, in two ways, most divine. For the science which it would be most meet for God to have is a divine science, and so is any science that deals with divine objects; and this science alone has both these qualities; for God is thought to be among the causes of all things and to be a first principle, and such a science either God alone can have, or God above all others. All the sciences, indeed, are more necessary than this, but none is better” (983a5-11). If God is commonly considered first cause and principle, then the science that deals with such kinds of causes and principles must deal with God. In this determination of the divine character of “wisdom”, as the science of first causes and principles, it is anticipated the subsequent division of theoretical sciences from E 1. It is done once the general division of sciences has been established, as well as its equivalence in Λ 1, where the different kind of beings this science should study are determined and where, specially, in Λ 6-7 and 9, the first being, the divinity, finds the most appropriate and extensive treatment in the whole *Metaphysics*.

In the following, we will try to straighten out the jumble made above. A 1-2 deals with the characterization of “wisdom” or *proté philosophía* as the highest and governing science whose knowledge is about the utmost universal, about the first causes and principles and, ultimately, about the divinity, being the science of the most divine –as well as the most divine itself. This science rounds the fields of theoretical sciences and has nothing to do with productive or utilitarian sciences, because it is free and independent. Throughout these chapters Aristotle prefigures the division of sciences and the further internal subdivision established in E 1, as well as the scope of the theoretical science *par excellence* that theology is, which in Λ will reach its complete configuration. Knowing what he says and guesses in A 1-2, and before reaching E 1, Aristotle, in Γ 1, consecrates to demonstrate the existence of a science of being *qua* being ($\tau\acute{o} \delta\acute{\nu} \tilde{\eta} \delta\acute{\nu}$). Aristotle defines its essential properties and attributes, distinguishing it from the particular sciences that deal with only parts of the being, while this science covers it in its entirety, dealing with the being as being in a universal way. Again, we have a privileged universal science and specific subsidiaries. This science, nothing but the “wisdom” or *proté philosophía*, has to deal with the study of the causes and first principles of being *qua* being, if what we seek are the supreme principles and causes, and if such principles are just the causes and first principles of being *qua* being. The science that is sought is the “wisdom”, the *proté philosophía*, as the science of the first causes and principles of being *qua* being.

Now, we are ready to go onto E 1. However, before doing it, it is necessary to indicate another place where Aristotle develops some matters that will be crucial in Λ and that, for a better comprehension of the book, are also illustrative. α 1 ventures into the realm of the Truth¹, establishing that, as a privileged theoretical science, “It is right also that philosophy should be called knowledge of the truth [ἐπιστήμην τῆς ἀληθείας]” (993b20). Here Aristotle puts the search for the truth on a level with the search for causes: “We do not know a truth without its cause” (993b23-24). At the end of the chapter, Aristotle re-introduces the gradation according to the nobility, or lack of nobility, of the objects we considered before. Supreme truth belongs to the causes and the highest principles, being the principles of eternal beings the truest principles as they eternally are: “So that that which causes derivative truths to be true is most true. Therefore the principles of eternal things must be always most true” (993b27-29). Naturally, since causes are truer than effects, eternal things must be truer than all else because they came first, and the most sublime cause is that which is due to divinity, the uncaused cause and *unmoved mover*. Once we were immersed in Λ we will talk about it. Initially, E 1 is an extension and reaffirmation of what Aristotle affirms in Γ 1 for it establishes *proté philosophía* as the science of being *qua* being, its first causes and principles, and different from the particular sciences. E 1 begins with this certainty already founded, assuming it as well known in advance, and confronting the *proté philosophía* with the particular sciences based on three characteristic features.

First, as it is announced in, cf., Γ 1, 1003a22-26, these sciences deal only with parts of the being, deal with “some genus, and inquire into this, but not into being simply nor *qua* being, nor do they offer any discussion of the essence of the things of which they treat” (1025b8-9). Furthermore, second, they give no reason for *what-it-is* (τὸ τί ἐστίν), for the essence, but assume it empirically or according to postulates, while the *proté philosophía* reaches a precise determination of it. And third, they just take for granted their existence: “similarly the <particular> sciences omit the question whether the genus with which they deal exists or does not exist” (1025b16-17).

All of this occurs in the first instance of the reasoning. Then, a little later, Aristotle suggests a distinction inherent in any discursive science (i.e., a science based on reason: ἐπιστήμη διάνοητική) or involved to some extent in discursive thinking (or reasoning). He says: “Therefore, if all thought [any operation of the intellect] is either practical or productive or theoretical” (ὥστε εἰ πάντα δianoia² ἢ πρακτικὴ ἢ ποιητικὴ ἢ θεωρητικὴ: 1025b25). Here, Aristotle further defines the

¹ In Eth. Nic. VI 3 Aristotle develops a *sui generis* division of the various ways of accessing the truth, ways that we can correlate with the canonical classification of the sciences from E 1, and that also privilege, according to the nobility of the objects to which it applies, its degree of truth. This is the division: i.) science (*epistēmē*), ii.) art (*téchnē*), iii.) prudence (*phrónesis*), iv.) wisdom (*sophía*), and, v.) intellect (*noûs*). We only wanted to highlight it, maybe another time we can go more in depth.

² Here Aristotle uses a word (δianoia) that, in this context, could be exchanged without altering its meaning, either for ἐπιστήμη or for φιλοσοφία.

precise domain of physical science that already before, cf. *supra*, 1025b19, has begun to circumscribe distinguishing it from other sciences either practical or productive. From that hint, we can conjecture that sciences are divided either in “practical” or “poetical (productive)” or “theoretical”. The emphasis of this chapter on physical science allows the introduction of the basic division of sciences. Moreover, it obeys to the indictment of its claim, backed up by the common opinion, of becoming “first science”, demonstrating that it may not be such¹. At the beginning of this chapter, Aristotle sets out the different options that would make it possible for physical science to occupy that privileged place but later refutes and contrasts them to put this science in its rightful place. It is then when the division of theoretical sciences is introduced, and where the physical science takes up a seat: “And since natural science, like other sciences, confines itself to one class of beings, i.e. to that sort of substance which has the principle of its movement and rest present in itself (...) natural science must be theoretical, but it will theorize about such being as admits of being moved, and only about that kind of substance which in respect of its formula [κατὰ τὸν λόγον] is for the most part not separable from matter” (1025b19-21; 26-28), “for to natural science one would assign the study of things not *qua* being, but rather *qua* sharing in movement” (K 3, 1061b6): “[i.] natural science deals with things which are inseparable from matter but not immovable, and [ii.] some parts of mathematics² deal with things which are immovable, but probably not separable, but embodied in matter; while [iii.] the first science deals with things which are both separable and immovable” (E 1, 1026a13-16).

Even if, later, Aristotle points out the certain and indubitable point of arrival that “there must, then, be three theoretical philosophies, mathematics, natural science, and theology” (1026a18-19), there is no contradiction with the division of theoretical sciences he offers in Phys. B 7, 198a30-32, which is only a slight variation from the canonical division³ but not so different at all from it. In the quoted before Phys. B 7,

¹ Earlier, in Γ 3 Aristotle had cancelled effectively this innocuous claim: “no one who is conducting a special inquiry [within the limits of a particular science] tries to say anything about their truth or falsehood, – neither the geometer nor the arithmetician. Some natural philosophers indeed have done so, and their procedure was intelligible enough; for they thought that they alone were inquiring about the whole of nature and of being. But since there is one kind of thinker who is even above the natural philosopher (for nature is only one particular genus of being), the discussion of these truths also will belong to him whose inquiry is universal and deals with primary substance. Natural science is also a kind of wisdom, but it is not the first kind” (1005a29-35).

² Cattanei (1995) provides a very accurate account of what Aristotle meant by mathematical entity in *Metaphysics*, as well as the definition of its nature, carrying his study to Aristotle’s criticism of Plato in Met. M. With regard to Aristotle and mathematics, apart of Lear’s appeal for a unified philosophy of mathematics in Aristotle (1982), we recommend the reading of Cleary’s seminal book (1995) and his complementary essay (2001), as well as the classic monographs from Heath (1949) and Apostle (1952). Specific problems on this topic are treated with high scholar level by Annas (1987: on the objects of mathematics in Aristotle), Mignucci (1987: on Aristotle’s arithmetic) and Hussey (1991: on Aristotle’s mathematical physics).

³ Here, and in the following, with the expression “canonical division” we are trying to set up a reference point. Moreover, we consider that the division of sciences made by Aristotle in

the one which interests us here, instead of mathematics, astronomy is named as one of the three theoretical sciences; even better, it is taken for granted in the suggestion of its object, the stars and planets that revolve and are eternal¹. We are going to say it again: “[there is another branch of study] of things in motion, but indestructible” (198a31). Already in other works, Aristotle has suggested alternative variations to the canonical division, e.g. in *Topica* I 14 where he divides propositions and problems in ethical, physical and logical (cf. 105b20-25).

Therefore, the variations on the canonical division should not surprise us, even less if the research is addressed from, and addresses, specific *topoi*. We agree with Guthrie’s point of view when he states: “We must not in any case expect Aristotle always to stick to the same divisions in different contexts. For instance at Phys. B 7, 198a29-30 he again posits three classes of systematized knowledge (πραγματεῖαι), one concerned with the Unmoved, a second with what moves but is indestructible, and the third with perishable things. Here the second study is astronomy, for the circling stars and planets were in Aristotle’s view everlasting, and mathematics is omitted. There is no confusion”². Way beyond, we can also say that such variation from Phys. B 7 doesn’t quarrel with the canonical one but that is completely faithful to it. Thus, we see as in Phys. B 2 when just beginning to determine the difference between objects with which physical science and mathematics dealt, Aristotle remarks that a branch of the latter, specifically the astronomy, could be considered analogous to the first (cf. 193b23 y ss.). Later, this distinction becomes more evident, as Aristotle places the applied sciences among the range of mathematics, specifically those “more natural of the branches of mathematics, such as optics, harmonics, and astronomy” (194a7-12)³. Thus, being part of applied mathematics, astronomy has a place within the classification of theoretical sciences and, in certain cases, it is in the place of mathematics depending on the point from which the classification is addressed. Ultimately, this science is a species of the genus mathematics⁴.

Therefore, deep down, in the variant of the canonical division there is not an inconsistency but, rather, a special reaffirmation of it. Being this established, now we can bring here its equivalence in *Metaphysics*, specifically in Λ 1. There, Aristotle admits the existence of three substances, two of them physical (the sensible corruptible, based in the sublunary world, and the sensible eternal, stars and celestial bodies from the superlunary world), and the other one unmoved (the supersensible

Metaphysics could be considered as a canonical one, because it is in that place where the philosopher made the most comprehensive statement about what first philosophy is.

¹ Regarding the eternity of the stars and celestial bodies in general, components of the superlunary world, not subject to generation and corruption (as in the sublunary world), mobile but corruptible entities, cf. the first two books from *De Cælo*.

² Guthrie, 1981, 131, n. 1.

³ For an account of the distinction between physics and mathematics, and between physics and applied mathematics in Aristotle, cf. Mansion, 1946, 143-186 and 186-195.

⁴ There is a little nuance that still persists, and it is that even if astronomy can be said to fall under the heading of mathematics, the tension remains that objects of astronomy are not separable in the sense of Met. E. Thanks to Professor Christof Rapp for making me notice it.

entity, the highest and most fundamental of the first *unmoved mover*). I quote: “There are three kinds of substance – one that is sensible (of which one subdivision is eternal and another is perishable) (...) and another [supersensible] that is immovable [and eternal]” (1069a30-33)¹. The three above-mentioned theoretical sciences are concerned with the study of each of these three types of referred substances: the sensible “is the subject of natural science (for they imply movement); but the third kind [the supersensible, immovable and eternal] belongs to another science” (Ib., 1069a33-1069b2). Later, *supra*, in Λ 6-7, Aristotle will dedicate himself to determining this last “another science” and the entity it studies. On the other hand, another passage allows us to introduce astronomy within the theoretical sciences and to justify its placement. If in Phys. A 2, 194a7-12 (cf.) astronomy is considered as part of those applied mathematics closest to physics, in Λ 8 it is given another attribute. Astronomy is considered the mathematical science most closely related to philosophy, as it happens with physics, and the more prominent within the other applied mathematics. I quote: “In the number of movements we reach a problem which must be treated from the standpoint of that one of the mathematical sciences which is most akin to philosophy, that is to say, astronomy; for this science speculates about substance which is perceptible but eternal, but the other mathematical sciences, i.e. arithmetic and geometry, treat of no substance” (1073b3-8). With this statement, we believe that the matter is sufficiently settled.

Finally, we are going to point out two places where the special relevance of the substances within the astronomy field of study is mentioned. First, in, *supra*, Phys. B 4 where it is said about the heavenly bodies: “the divinest of visible things” (τὰ θεϊότατα τῶν φανερῶν: 196a33-34). And, second, in Eth. Nic. VI 7: “for there are other things much more divine in their nature even than man, e.g., most conspicuously, the bodies of which the heavens are framed” [ἐξ ὧν ὁ κόσμος συνέστηκεν]” (1141b1-3).

As a little digression and remembering, we, *supra*, talked about alternative variations to the canonical division of theoretical sciences, we will bring here a prominent and twofold one, not accounted for already: “There must, then, be three theoretical philosophies, mathematics, natural science, and theology [ὥστε τρεῖς ἂν εἶεν φιλοσοφίαι θεωρητικάι, μαθηματική, φυσική, θεολογική], since it is obvious that if the divine is present anywhere, it is present in things of this sort [both separable and immovable]. And the highest science must deal with the highest genus, so that the theoretical sciences are superior to the other sciences, and this [theology] to the other theoretical sciences” (E 1, 1026a18-23) = K 7, 1064b1-3: “evidently, then, there

¹ Regarding the order of priority among these three types of entities, it is interesting what is said by Berti. He suggests that this order is based on the view in which it is addressed. From an ontological point of view, the motionless entity would be first to the other two which, in turn, depend on this. From a logical point of view, it seems that mobile entities are first, as it is from them that we come to know the immobile entity. The above-mentioned would constitute a different order from the one proposed in *Categories*, where both logical and ontological priorities are the same (cf., *in extenso*, Berti, 1975).

are three kinds of theoretical sciences – natural science, mathematics, theology” (δῆλον τοίνυν ὅτι τρία γένη τῶν θεωρητικῶν ἐπιστημῶν ἔστι, φυσική, μαθηματική, θεολογική).

In order to conclude, we can incorporate one last thing, even if to leave it open, because solving it will exceed the limits of this paper. It is about the conclusion of E 1, a continuity of the already, *supra*, foreshadowed from A 1-2 and Γ 1: the founding of the first and supreme science (cf. 1026a27-32 = K 7, 1064b9-14)¹. In *Physics*, Aristotle is already aware of this matter, and just starting his inquiry he pointed it out (cf. A 2, 184b25). As we all know, Aristotle will demonstrate the existence and condition of the eternal, separable and immovable substance in Λ 6-7, nonetheless he invoked it in several places. For instance, in E 2, while Aristotle is devoted to demonstrate that there is not any science of accident, it is stated “but while what is for the most part exists, can nothing be said to be always, or are there eternal things? This must be considered later” (1027a19). Moreover, in K 7, which is nothing but a rudimentary replica of E 1, Aristotle affirms: “Therefore about that which can exist apart and is unmovable there is a science different from both of these, if there *is* a substance of this nature (I mean separable and unmovable), **as we shall try to prove there is**” (1064a33-36. The **stress** is ours). Here, Aristotle points directly to Λ 6-7 and continues with the record of the well-known division of theoretical sciences. As showed, Λ 1 reiterates the need and relevance of that “another science” that has to deal with the study of the supersensible, eternal and immovable substance (cf., again, 1069a33; 1069b1). Before beginning the study of such a special entity, in Λ 6, Aristotle recalls again this division: “Since there were three kinds of substance, two of them natural and one unmovable, regarding the latter we must assert that it is necessary that there should be an eternal unmovable substance” (1071b3-5).

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¹ A survey on the traditional ontotheological reading of Met. Λ, along with a new interpretative proposal on it, can be found in Gabriel (2009).

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