



Università degli Studi di Parma

Dipartimento di Antichistica, Lingue, Educazione, Filosofia – A.L.E.F.

Corso di Laurea Magistrale in Filosofia

PHILOSOPHY OF BIOLOGY AND METAPHYSICS
Reconsidering the Aristotelian Approach

Relatore:

Chiar.mo Prof. FABRIZIO AMERINI

Correlatore:

Chiar.mo Prof. ANDREA BIANCHI

Laureanda:

FEDERICA BOCCHI

N. Mat. 255132

Contents

INTRODUCTION.....	p. 5
I. ESTABLISHING A FRAMEWORK: Rough Outline of Philosophy of Biology and Metaphysics.....	p. 9
§1. <i>Some General Aristotelian Remarks</i>	p. 9
§2. <i>Is it the Same Old (Aristotelian) History?</i>	p. 10
§2.1. <i>Biology Meets the Metaphysical Analysis</i>	p. 12
§3. <i>Theoretical Framework. Issues Blossom like Flowers</i>	p. 19
§4. <i>Better too much than too little Clarity: Justifying the Answer to the ‘What is it’-Question</i>	p. 22
§5. <i>What Makes Something What it is: Metaphysical Essentialism</i>	p. 25
§5.1. <i>Why Essentialism is Banished from Contemporary Biological Inquiry</i>	p. 26
§5.2. <i>What Properly Essentialism Aims at (First Clues)</i>	p. 28
§5.3. <i>Essentialism: General Description</i>	p. 30
II. ARISTOTLE’S METAPHYSICS: From The What To The Why.....	p. 35
§1. <i>Overall Plan</i>	p. 35
§1.1. <i>The Priority of the Categories</i>	p. 39
§2. <i>An Interpretative Digression</i>	p. 41
§3. <i>The ‘What is it’-Question: Interdependence and Explanation</i>	p. 44
§3.1. <i>The What: Primary and Secondary Substances as Foundational Commitments</i>	p. 45
§3.2. <i>Individuals as Primary Substances: Achieving the “It”</i>	p. 48
§3.3. <i>Species as Essential Way of Being: Achieving the ‘What is it’</i>	p. 50
§4. <i>Definitions Between the What and the Why</i>	p. 53
§4.1. <i>A Preliminary Epistemic Reflexion</i>	p. 55
§4.2. <i>The Roles of Definitions</i>	p. 57

§4.2.1. <i>First Role (I): Fulfillment of the ‘What is it’-Question</i>	p. 60
§4.2.2. <i>First Role (II): Practical Fulfillment of the ‘What’ by Means of Genus-Differentia Predicates</i>	p. 61
§4.2.3. <i>Second Role (I): Explanation by Means of Per Se Predication</i>	p. 65
§4.2.4. <i>Second Role (II): Explanation through Demonstration</i>	p. 69
§5. <i>The ‘Why it is’-Question: Essences as Principles/Causes</i>	p. 70
§5.1. <i>Switching Subject: from the Individual-Substance to the Substance-of</i> ...	p. 75
§5.2. <i>Forms, Essences, Principles</i>	p. 79
§5.3. <i>Two Forms of Aristotelian Essentialism</i>	p. 91
§5.3.1. <i>Early Aristotelian Essentialism and the Problem of Subject-hood</i> ...	p. 91
§5.3.2. <i>Later Aristotelian Essentialism and the Problem of Cause-hood</i>	p. 92
III. <i>ARISTOTLE’S BIOLOGY AND HIS CRITICS</i>	p. 93
§1. <i>The Science of the Living World and its Metaphysical Commitments</i>	p. 93
§1.1. <i>The Uniqueness of the Aristotelian Bio-Metaphysics</i>	p. 96
§2. <i>Aristotle and Typological Thinking</i>	p. 102
§3. <i>Species are Eternal</i>	p. 110
§4. <i>Extrinsic Finality</i>	p. 120
CONCLUSION.....	p. 127
BIBLIOGRAPHY.....	p. 131

NOTES ON THE ABBREVIATIONS AND TRANSLATIONS OF ARISTOTLE'S
WORKS

All quotations refer to the following editions.

Categories (Categoriae) *Cat.*
Translated by Edghill, E.M., 1928, "Categoriae and De Interpretatione" in Ross, W.D.,
Smith, J.A., *The Works of Aristotle*, Clarendon University Press: Oxford.

Generation of Animals (de Generatione Animalium) *Gen. an.*
Translated by Platt, A., 2015, *On the Generation of Animals*, University of Adelaide
Press.

History of Animals (Historia Animalium) *Hist. an.*
Translated by Thompson, D'A., 2005 ed, *The History of Animals by Aristotle*,
University of Adelaide.

Metaphysics (Metaphysica) *Met.*
Books Z-H translated by Bostock, S., 2003, *Metaphysics Books Z and H*, Clarendon
Press.
Books A-B-Γ-Δ-E translated by Ross, W.D., 2015 ed., *The Metaphysics*,
University of Adelaide.

Meteorology (Meteorologica) *Meteor.*
Translated by Webster, E.W., 1984, "Meteorology" in Barnes, J., *Aristotle, The
Complete Works*, vol.1, Princeton.

On Generation and Corruption (De Generatione et Corruptione) *Gen. et. Cor.*
Translated by Joachim, H.H., 1941, "On Generation and Corruption", in McKeon, R.,
The Basic Works of Aristotle, Random House: NY.

On the Heavens (de Caelo) *De Caelo*

Translated by Stock, J.L., 1922, *De Caelo*, Clarendon University Press: Oxford.

On the interpretations (de Interpretatione)

De int.

Translated by Edghill, E.M., 1928, “*Categoriae and De Interpretatione*” in Ross, W.D., Smith, J.A., *The Works of Aristotle*, Clarendon University Press: Oxford.

On the Soul (de Anima)

De. an.

Translated by Shiffman, M., 2011, *Aristotle: de Anima*, Focus Publishing.

Parts of Animals (de Partibus Animalium)

De Par. an.

Translated by Lennox, J.G., 2004, *Aristotle on the Parts of Animals*, Clarendon University Press: Oxford

Physics (Physica)

Phys.

Translated by Ross, W.D., 1936, *Aristotle's Physics*, Clarendon Press: Oxford.

Posterior Analytics (Analytica Posteriora)

An. Post.

Translated by Barnes, B., 2002, *Aristotle's Posterior Analytics*, Clarendon Press: Oxford.

Topics (Topica)

Top.

Translated by Smith, R., 2009, *Topics Books I and VIII*, Oxford University Press.

INTRODUCTION

This dissertation deals with the Aristotelian philosophy of biology and metaphysics.

My interest in this topic stems from the following consideration. Aristotle has always been a source of philosophical respect, a bedrock for philosophers. His thought has been associated with different—and sometimes incompatible—viewpoints, and some theoretical intuitions of Aristotle continue to inspire contemporary philosophers. But especially in the scientific field we also come upon severe criticism, above all concerning Aristotle's natural philosophy. Since the Aristotelian thought concerning biological individuals and natural phenomena goes hand in hand with his metaphysical reflection, a negative judgement about the former suggests a negative judgement about the latter.

Well, this thesis proposes to clarify *where* such criticism originates and if it is actually right. The plan of the work is the following. I will first discuss Aristotle's philosophy of biology and metaphysics, then I will reinterpret some clichés usually attributed to Aristotle in the light of my interpretation of his works. In particular, I shall focus on the Aristotelian concept of “natural species” and “essence/form”, which will be examined in the context of both Aristotle's philosophy of biology and metaphysics. Some scholars ascribe to Aristotle a Platonic-inspired idea of *species* as fixed models for the imperfect living beings, the belief in the eternity of species, or the very mysterious assumption that there is an extrinsic goal or end toward which all the natural creatures and phenomena tend. In order to assess the criticism directed to such beliefs, I will provide an examination of Aristotle's works about the science of living beings.

However, studying the biology of Aristotle is not enough if one wants to reach a full understanding of the Aristotelian philosophy of biology. One must also investigate his metaphysical doctrines. The above-mentioned criticism, indeed, does concern not only the Aristotelian biology—although it has been raised especially by biologists and philosophers of biology—but also passages in Aristotle's logical and metaphysical works. Accordingly, we cannot confine ourselves to the works about natural things, but

we must also deal with some selected topics of Aristotle's logic and metaphysics. As will be shown, a deep investigation in the Aristotelian metaphysical doctrines will shed light on the biological concepts and theories that are the targets of such a criticism.

The upshot of my work is to show that the clichés that are usually attributed to Aristotle are due to a misinterpretation of those metaphysical theories upon which the Aristotelian biology is based. Not only that, but we shall also show that if correctly understood, some biological intuitions of Aristotle can be of some utility even today.

More in particular, in Chapter I we shall briefly consider some scientific bias toward the metaphysical commitments involved in the Aristotelian biological thought. My argument will be that biological issues—like the questions as to *which* is the *status* of biological species or which definition for “species” works better in biology—need philosophical, above all metaphysical reflection. I shall construct a theoretical framework in which biology and metaphysics are tied to each other. The “trick” will be given by the answer to the question as to *why* something is *what it actually is* as a species-member, namely, *why* an individual belongs to its proper species. I shall call it the ‘Why is it’-question. Before explaining *why* a thing is what it is, one must previously answer the question as to what a thing *is*. I shall call this the ‘What is it’-question, whose answer consists in providing a specific predicate. The central issue is essentialism. Essentialism is a metaphysical thesis according to which something is a species-member in virtue of an essence, which must be understood as the sum of the necessary features that allow an individual to be a species-member. In the scientific field, essences have recently been a matter of scathing critique, because of their mysterious status and role. Anyway, I will show that Aristotelian essences must not be understood as things over and above individuals, but as metaphysical *principles* intimately bound to individuals, capable to explain why something is such-and-such.

In Chapter II, we shall turn to the Aristotelian metaphysics in its development from *Categories* to *Metaphysics*. We shall assess the theoretical pattern devised in Chapter I in the light of the Aristotelian works, thus showing that this conceptual scheme of the ‘What is it’ and the ‘Why is it’-question is based on the Aristotelian reasoning. We will show that Aristotle identifies the grounding entities of his ontology

with the biological living beings, and will give the reason why he chooses a specific predicate to answer the ‘What is it’-question. Moreover, we shall discuss the crucial role definitions play in answering the ‘What is it’-question. For Aristotle, definitions express the *per se* (i.e. structural) features of species and hence articulate its essence. Our focus will be especially on the *Categories*, but in the final part of the Chapter, we will turn to the *Metaphysics*, for in it Aristotle provides a full-fledged account of what essences are. We will make then clearer what Aristotelian essences consist in and prove that, for him, they are the principles or causes of things that are in a certain way, thus they are the proper answer to the ‘Why is it’-question.

In sum, my interpretation is that the Aristotelian essentialism originates from two different but complementary viewpoints, the ‘What’ and the ‘Why’. I will suggest that one finds two different forms of Aristotelian essentialism. The first relates to the need of identifying an organism by singling out a set of immutable features. A specific or *essential* feature is attributed to an individual through positing and answering the ‘What is it’-question. Aristotle develops this form of essentialism especially in the *Categories*. Following the scheme elaborated in the *Posterior Analytics*, after dealing with the ‘What’, Aristotle turns to the ‘Why’. He envisages an investigation into the causing feature of an individual, an investigation that leads us to a deeper level of metaphysical analysis. The essences, or forms, of individuals as well as of species consist in some intrinsic principle of things, precisely in what makes them *what they actually are*. Aristotle elaborates this second form of essentialism in the *Metaphysics*.

Chapter III is devoted to the philosophy of biology of Aristotle. We shall examine some clichés usually attributed to Aristotle by contemporary philosopher of biology: as said, the typological essentialism, the belief in the eternity of species, and the extrinsic finality that guides the development of living beings and natural phenomena. My conclusion will be that these are nothing but mere prejudices due to a misinterpretation of the Aristotelian metaphysical and biological doctrines. In particular, these false beliefs depend on a Neo-platonic way of understanding the Aristotelian species and on the identification of “form” and “species”, which both translate the Greek term “eidos”. If interpreted in the light of its proper principles and distinctions, as

a metaphysical investigation into what explains *why* things are such-and-such, the philosophy of biology of Aristotle can still said to possess philosophical as well as biological significance.

ESTABLISHING A FRAMEWORK: ROUGH OUTLINE OF PHILOSOPHY OF BIOLOGY AND METAPHYSICS

§1. Some General Aristotelian Remarks

In the following pages, I will consider two main topics: the Aristotelian philosophy of biology and his metaphysical essentialism, two themes closely tied together.

Aristotelian biological intuitions swing between empirical practice and logical-metaphysical analysis, and the hurdle to be overtaken is the sizable amount of pages devoted to both biology and the essences, sometimes explicitly tied together, but in most cases arranged over different books. In this work, I will seek to keep a balance between the two topics by means of a trick. My inquiry will be characterized by a theoretical manner of linking together biology and metaphysics: it will be a matter of delving deeper into the question as to what makes an individual *what it actually is*, what I will call the ‘Why is it’-question. How to derive essentialist claims from the biological inquiry, and vice versa, how to derive biological intuitions from metaphysics: all this will be largely clarified starting from the question at stake, what makes something a specimen of a biological species.

In what follows my purpose is to ponder the role that essence (what it means *to be* for something, which renders the Greek “*to ti ên einai*”¹) plays in the Aristotelian biological theories. I shall take special care of some clichés that assign metaphysical commitments to Aristotle, above all “typological essentialism”. I shall argue that Aristotelian essences are strictly linked to biological functions (transmitted to an

¹ The Greek phrase is usually translated as “essence”, more literary it would be “the what it was to be”, or “the what was being”. These latter expressions give us further details on what we are after: we must already know *what* something actually is, in order to proceed further to specifying *why* something is what it actually is. As Owen pointed out, “ên” is to be intended as “the being in a timeless present”, referring to the being of something non-contingently intended. Thus, we will pick out all possible predicates of a thing from a non-accidental viewpoint. See Owen 1978.

individual by parents) which explain those macroscopic features and behaviors we usually attribute to the members of a species. Essences are not *per se* immutable entities separated from individuals, but they rather consist in the metaphysical causal principle we refer to in explaining the biological categorizations of things.

I shall try to give a contribution to make Aristotle's biological concerns and his metaphysical suggestions clearer. To do so, I will develop my argument turning the attention to many Aristotelian works rather than focusing over just one of them. My choice is due to the belief that the Aristotelian works I selected share a common line of thought: a metaphysical inquiry is a search into the everyday ontology, and a biological investigation has much to learn from it.

§2. *Is it the Same Old (Aristotelian) History?*

By skimming through recent works about philosophy of biology, one will find that the biological theories preceding Darwin's *The Origins of the Species* are dismissed or simply ignored, allowed only for mere historical curiosity. According to the well-known biologist Theodosius Dobzhansky, nothing makes sense in biology except in the light of Evolution². The Theory of Evolution is the *nemesis* of fixism, an ancient religion-oriented body of theories declaring immutability and eternity of natural species. Legend has it, not without good reasons but in a blurry manner, that the works of Aristotle have been the source of years in darkness³. According to this school of

² See Dobzhansky 1973.

³ According to Phillip Sloan, this shallow way of treating Aristotle was due to Dewey, Mayr 1998 and Hull 1965. See Sloan 2014.

thought, the ground for fixism was established by Aristotle by means of typological and essentialist dogmas, so that the life science was conditioned by wrong requirements⁴.

If biologists and philosophers of biology are happy with this, they should get rid of old-fashioned biology and ancient biological theories uncommitted to (contemporary) evolutionism. Anyway, it is our task as critical thinkers not to be misguided by fashionable trends or prejudices, but to give things their proper value. Indeed, many philosophers have recently shed new light on Aristotle's biological works, by developing a new interpretative framework about the role that the metaphysical assumptions play in the natural doctrine of Aristotle. Balme, Furth, Lennox and many others have reevaluated the Aristotelian biology. They all showed Aristotle's biology to

⁴ However the role Porphyry played must not be underrated as many contemporary commentators do, like David L. Hull in "The Effect of Essentialism in Taxonomy: Two Thousand Years of Stasis" where he admits «[...] Aristotelian definition is responsible for taxonomists being unable to define species adequately» (Hull 1965, p. 317). The Porphyrian attempt to build a univocal *genos-differentia* tree exploitable for defining each species, whose definition (given by means of proximate genus plus specific difference) can be found by picking significant differences that the aforementioned tree outlines, infected the way Aristotle's use of the *diairesis* was received. Aristotle never makes the point for a univocal classification to define species, like *man, horse*, as nowadays taxonomists aim at. As Balme points out: «A *genos* [...] is a kind that collects different forms, while an *eidos* is one of the forms of a kind. The *genos* itself may be a member of a wider *genos* collecting similar genera, in which case Aristotle speaks of 'kinds under each other', *gene hup' allela*; similarly an *eidos* may be divisible into *eide*, in which case it may be regarded as a *genos* in this respect (*Ph.*, V. 227bi). [...] Intermediate *differentiae* are therefore only analytical steps towards the final determination, and the final *differentia* entails them and renders them 'redundant' as Aristotle puts it. The resulting definition consists of two terms, the genus and the final *differentia*. Since the genus too can only exist in a differentiated form as one of its own species, the naming of genus with *differentia* will denote a single thing, the unified substantial *tode ti* which for Aristotle is the object of definition» (Balme 1987, in Gotthelf-Lennox 1987, pp. 72-3). In *The Parts of Animals* Aristotle implicitly expresses the impossibility of a unique "tree of differences" proceeding from a higher to a lower level of generality, since in defining a species a series of simultaneous *differentiae* are equally to be applied. In biological works, Aristotle did not aspire to give an exhaustive systematics for living beings. Moreover, Aristotle's classifications are always due to a particular purpose, not to a general systematics of the living world.

go hand in hand with his logical and metaphysical works, hence any effort at re-elaborating his scientific thinking must take into account a substantial part of his production. Theoretic relations are to be displayed in order to come across a reasonable understanding of his biology, placed within a deserving philosophical system and not only engaged with obsolete issues. I shall move in their direction shortly.

§2.1. *Biology Meets the Metaphysical Analysis*

Should philosophers still be interested nowadays in the old, maybe outdated, biological Aristotelian practice and concepts, aside from mere historical remarks? Could Aristotelian biological works still be the source of philosophical and scientific reflection?

From the point of view of a contemporary philosopher of biology, several Aristotelian thoughts may seem old-fashioned—spontaneous generation and teleological causation, for example⁵. But what strikes scientists⁶ as surprising, I think, is the deep metaphysical outlook Aristotle applies in describing individual and generic natural items—something bizarre for the today scientific practice. A clear example comes from the taxonomical discipline: the contemporary bio-systematics is considered a mere applied science, almost detached from any theoretical reflection. But as the inventor of biology and philosophy of biology, Aristotle, however, made his natural doctrines square well with his philosophical, above all metaphysical, ones. Sometimes errors are plain to see, above all when some irrevocable metaphysical principles assumed by Aristotle are employed in explaining facts that were inexplicable at that time; then some Aristotelian outcomes seem to be non-scientific. Consequently, the analysis of Aristotle's biological works does not appear very interesting for biologists today.

I will reject this approach: I will suggest that biology, in time of Aristotle as well as today, needs metaphysical reflection. Thus, Aristotle's works are still valuable both

⁵ For a general overview, see Griffiths 2014.

⁶ I mean, scientists uncommitted to the philosophical analysis of biological themes.

when elaborating an interdisciplinary framework and when focusing on theoretical difficulties. This is my approach and with it in mind, let me articulate a little further the metaphysical commitments involved in biology.

From a very scholastic viewpoint one could hold that metaphysics delves deeper into what scientists take for granted, i.e., metaphysics searches for the *nature* of the scientific ontology⁷. Take the example of biology, whose field of exploration is the living world taken as a whole⁸. In the biological inquiry, the notion of “biological individual” is *assumed* as the basis or the primitive element from which the biological investigation starts. In general, it is customary for natural sciences to take for granted the *existence* of their proper objects of inquiry⁹. This is necessary: if biology lacked a proper object, it would be reducible to “lower-level” sciences like chemistry or physics; but since arguments for its irreducibility can be given, the existence of a biological-way-of-being must be assumed. Metaphysicians can help scientists to understand what-it-is-to-be a biological individual¹⁰, without calling for downward causation, the source of reducibility. As will be discussed at length, *what* makes an individual a biological being—i.e. the identity condition for something to be a living being—has to do with essence. Generally speaking, an essence is what makes something *what it is*. Hence, the issue as

⁷ Cf. *Top.*, I 2, 101a36-b34.

⁸ The irreducibility of biology is here taken for granted. There is no room to enter into details here, it suffices to highlight that the biology’s autonomy is due to its development through concepts and principles merely biology-specific (evolution, bio-population and so on). For arguments in favor of the irreducibility of biology see Bohr 1958, Ayala 1968, Mayr 2004, ch. 2.

⁹ In fact, not only for the natural sciences, but also for the social ones.

¹⁰ For a better account, see Boulter 2013, p. 90: «At issue is how to draw the distinction between parts of organisms, individual organisms and the groups which individual organisms may join. That is, biologists are not yet clear on what it is to be an individual per se, an issue left unaddressed by contemporary discussions». Boulter provides a list of assumptions taken for granted by contemporary evolutionary biology. Roughly, biology’s concern is the analysis of *individuals* understood as biological entities, but a basic question such as what it is to be an individual is left unaddressed within biology, it is up to the metaphysician the clarification of this concept.

to what an essence *consists in*, even if biologically disregarded, is biologically meaningful.

Many more are the complex metaphysical assumptions that biologists take actually for granted: the irreducibility of biological entities, the persistence through change, the mind-independency of natural features and principles, the universality of scientific statements versus the actual individuality of things¹¹. Just because of its prodigal usage of non-strictly-scientific-terms, like “essences”, “being *qua* being”, in the era of birth and development of biology (nineteenth century), Aristotelian metaphysics was not treated nicely¹². Nevertheless, I agree with Michael T. Ghiselin’s sharp reflection, «one can no more have science without metaphysics than a drink without a beverage»¹³. Science organizes knowledge not just as an “epistemological gadgetry”, but it is committed to real things and it seeks for an explanation of their nature¹⁴.

We shall give different examples of the biology-metaphysics interaction as soon as the *status* of species will be called into question. Although the proper objects of life science are the natural species, answering to the question as to what kind of objects species *are* is a metaphysical story, which is usually overlooked by biologists. Indeed the species are considered the bricks of the biological inquiry and their *existence* is assumed, at least for the taxonomical role that species play.

Ghiselin (who started his career as a biologist, for the record) hit the philosophical headlines by introducing a new perspective into the biological ontology: he noticed that bio-systematics worked—wrongly—with the idea that species have classes-status, i.e. scientists took species as collections of individuals. Instead,

¹¹ All these are considered by Aristotle as metaphysical issues.

¹² It is commonly hold that Positivism was the school of thought responsible for the skepticism toward metaphysics.

¹³ Ghiselin 1997, p. 19.

¹⁴ Ghiselin 2005, p. 162. But see also Varzi 2008 for the role of metaphysics. In “Solution to the Species Problem”, Ghiselin said: «The species problem has to do with biology, but it is fundamentally a philosophical problem—a matter for the “theory of universals”» (Ghiselin 1992, in Ereshefsky 1992, p. 285).

according to Ghiselin, they should be understood as individuals, and their members as parts of a whole, just like cells are parts of an organism (and not instantiations of it). Biologists and philosophers diverged about the status of species. The attribution of *individual being* to natural species forces the metaphysician to build a new theoretical framework in the debate on universals; and not only, the metaphysician has to reconsider the existence of species as real entities.

Moreover, many maintain that the status of species has important conceptual implications as to the Theory of Evolution and to the concept of normativity¹⁵: the laws of nature only apply to that which is universals, like classes; but species are individuals: then the laws of nature do not apply to species. What is, therefore, the proper object of Natural Selection¹⁶? According to Mayr, anyway, neither Natural Selection is a law of nature¹⁷, nor are species its objects. Mayr supports the idea that Natural Selection is a matter of fact in the living world, whose proper object is the individual¹⁸. This clarification may be enough, in what follows we may avoid to return to this topic.

Even if few life scientists are engaged in the above-mentioned debate about the individuality vs. “classhood” of the natural species, like *human being*, *giraffe*, *oak tree*, rarer are those pretending not to be troubled with providing a definition for the taxonomical category of “species”, understood as the tag under which the single species are collected. What really *are* species is itself a metaphysical question¹⁹. Indeed, the categorization of the living world depends on the concept of biological species: the

¹⁵ For an overall view see Ghiselin 1997. He builds a metaphysics based on the concept of “individual” in order to explain how revolutionary is his claim on the individual nature of species and its role in our way of conceiving the Evolution theory. Ghiselin treats metaphysics as «one of the natural sciences» (Ghiselin 1997, p. 12).

¹⁶ The smartest overview is to be found in Hull 1969, but also in Smart 1968 and Mayr 1970.

¹⁷ Versus Byerly 1983.

¹⁸ See Mayr 2004, ch. 8.

¹⁹ See Ereshefsky 1992, Introduction to part II. Moreover, Hull’s claims that «From the very beginning taxonomists have sought two things—a definition of “species” which would result in real species and a unifying principle which would result in a natural classification» (Hull 1965, p. 318).

classification of the living world will be different according to the different species concepts under which the living beings will be classified. Here a serious theoretical issue undermines the work of a biologist. If membership to a species rests on the definition of “species” that one assumes, and if many species-concepts have been formulated, one could then ask whether there really is a group of individuals that belong to a species, or specific classification is only a matter of conceptual economy. Let me clarify my point by providing some examples of species-concepts.

Consider closely the *definition* of the taxonomical concept of “species” that characterizes groups of individuals collected under a unique species. This is a scientific as well as a philosophical issue, as pointed out by several eminent biologists like Mayr, Ereshefsky and others. The operation of classifying the organic world into biological categories, the species, is a work for biological systematists, but the very criteria applied to distinguishing what counts as a species is also a matter for the metaphysician. It could be said, following Ernst Mayr, that to find an unanimous species-taxa concept is a philosophical pre-requisite for the biological practice: first, one has to say what counts as a species, only then one can apply this criterion by collecting all the single living beings into different species.

It would take a book-length survey to itemize and discuss such a difficult story about species-concepts. To make it short: an open quarrel held among biologists²⁰ (and between biologists and philosophers²¹) on the question as to what it means for a group of individuals to belong to the same species, what renders a group of enough-similar individuals a real natural kind. In the literature, many species concepts have been proposed, yet there is no unanimity about which one is preferable. I shall list three well-known species-concepts.

The *biological* species-concept (BSC)²² is the most widespread in zoology: it takes a species to be a group of interbreeding individuals whose offspring is fertile

²⁰ Like Mayr 1942 vs Miescher and Budd 1990.

²¹ Mayr 1942 vs Putnam 1975, for instance.

²² Introduced by Mayr 1963 and Mayr 1982, already out about since Buffon 1748, Wagner 1841, improved by Dobzhansky 1937.

without limit. It is a very useful concept, as long as only animals are involved. It accounts for a great variety of different species with interbreeding capacity, whose progeny is sterile. On the contrary, the species in botanics and the parthenogenesis-reproduction cases are badly accounted for by BSC. BSC is based on the idea of a limitless intra-specific breeding capacity among individuals of the same species, but BSC cannot account for those species—plants and parthenogenesis-reproductive individuals—which lack this mating skill. Therefore, the biological species concept can account only for a limited group of individuals—those with intra-specific mating capacities²³.

A very different species-concept is the *typological* one (TSC), which is well-accepted among philosophers and we shall discuss in detail below. This concept was also attributed to Aristotle. It was, and still is, subject to a scathing critique because of its *prima facie* too naive look. It fixes a standard species-member, i.e. the prototype, for membership into a species (the so called “holotype”). The account given by Mayr is even more radical: a typological species is a class composed of individuals sharing a set of descriptive features, whereas individual differences are just “imperfections” and deviations from the essential fixed standard, which is a sort of abstract entity like a Platonic *eidōs*²⁴. Empirical as well as theoretical issues arise from such an “unnatural”

²³ A different critique is offered by Sokal-Crovello 1992. They envisage a *petitio principii*: BSC theorists assume what they try to explain, namely, mating skills among conspecific individuals. According to BSC theorists, interbreed is the only criterion of identification for a species and also the reason why a group of individuals can be grouped under a unique tag. According to BSC, moreover, phenotypic traits are unnecessary in the identification of species. This is problematic for population that do not overlap in distribution: in these cases the species identification is a trial-and-error approach. Therefore a BSC theorists has to assume that isolated groups of individuals belong to the same species because they are supposed to have the capacity of interbreed, but this is a *petitio principii*. According to Sokal and Crovello an inter-fertile group of organism must be firstly identified by its exterior traits rather than by its mating skills.

²⁴ Mayr and many others, as will be pointed out, charged Aristotle with believing that species were similar to the Platonic ideas, showing a deep ignorance of the Aristotelian production.

entity²⁵: the standard individual is supposed to comprehend all the species' features—from childhood to maturity—to be the real basis for comparison; and the choice of which features are necessary for the species-concept seems to be an arbitrary move. Mayr noticed that TSC is useless in biology²⁶: it leaves the question as to why species are *what they are* unanswered, just appealing to arbitrary, mainly superficial, instructions to split the living world²⁷.

Lastly, let me sketch out the *ecological* species-concept (ESC)²⁸, the one in virtue of which species are individuated by their occupying a certain *ecological niche* (the sum of the habitat plus the diet and the interactions with others species, like parasitism, predator-prey role and so on). ESC theorists take as starting point the “Gause’s rule”, i.e. the principle of mutual exclusion among groups of individuals exploiting the same ecological niche; according to this principle, a species consists in the population of individuals sharing the same ecological niche. As a result, this species-concept excludes that, for instance, English and Libyan thrush are members of the same species, since their ecological niche is obviously different. Whilst BSC and TSC could also work together²⁹, ESC is inconsistent with the two. As a matter of fact, ECS splits

²⁵ Historically speaking, this concept was anything but harmless. See Spedini 1997. She depicted the typological species-concept as involved in scientific racism. Because of nationalistic commitments, during the Eighteenth Century a phantom “white European man” was taken as the typological standard for humankind.

²⁶ See also Sober 1980.

²⁷ It is held that evolutionary biology is able to explain «why the living world has the pattern it actually has, and why it is not more varied than it actually is» (Boulter 2013, p. 103). From an Aristotelian viewpoint, borne out by recent works by Devitt, the “purged-from-prejudices” TSC species-concept’s purpose is different from evolutionary biology’s one (to account for biodiversity), and it works in answering a host of explicative questions.

²⁸ Sustained by Van Valen 1976.

²⁹ It is not excluded that interbreeding skilled-individuals own a set of defining common features, neither it is inconsistent that, among species’ essential features, the mating skills occur. See Walsh 2006.

population that according to BSC belong to the same species³⁰; moreover BSC theorists charge ECS theorists with not answering the evolutionist paramount question as to *why* species exist. Conversely, TSC theorists, who mainly used the concept for grouping individuals according to the phenotypic traits, judge ECS theorists to be counterintuitive. A very empirical output issues from this controversy. As long as biologists disagree on which species concept works better, they also disagree on the taxonomy³¹ of the living world. Over the last decades many efforts have been made to give a unique—essential—criterion preparatory the empirical work, but unanimity is far from being reached.

Here, we may stop our introduction to the theoretical-metaphysical commitments of biology. It will become clear later the role of metaphysics in the Aristotelian biological concepts. Later, we shall also try to shed light on some scientific prejudices believed by philosophers and biologists, which depend on an inaccurate knowledge of Aristotle's empirical work as well as of his biological theory. Thus, our answer to the previous question "is it the same old Aristotelian history" is "yes it is": the reason is that the Aristotelian intuitions and methodology are always present in the philosophy of biology. In order to justify this answer, we have to figure out what has been misinterpreted.

§3. *Theoretical Framework. Issues Blossom like Flowers*

³⁰ For instance, according to ESC the Mexican and the Italian wolf—*Canis lupus baileyi* and *Canis lupus italicus*—are two distinct species, whereas according to BSC they belong to the same species as soon as they can generate fertile offspring. The orthodox view maintains that the Mexican and the Italian wolf belong to different *types* of the same species. However, some deny the existence of "types" or subspecies.

³¹ Taxonomy, a biological branch, aims at organizing the living world into taxa, like species, genus, order, family and so. This is not a purely epistemic work. According to Ghiselin, taxonomy has to do with ontology: «I refer to an "ontological cut" as a deliberate allusion to Plato's metaphor of cutting nature at her joints (see his dialogue *Phaedrus*). In metaphysics, as in any other natural science, the goal of classification is to arrange the materials in terms of their fundamental relationships one with another» (Ghiselin 2005, p. 166).

The topic of this section is not a biological theme, strictly speaking. I mean to turn to the theoretical background lying at the heart of the Aristotelian metaphysics. My aim will be to show that the same theoretical pattern can work in a commonsensical investigation as well as in an Aristotle-inspired analysis. Briefly, I shall provide a theoretical framework in virtue of which one can approach the ‘What is it’ and the ‘Why is it’-question.

First, I want to argue for the point that, by attributing a species-predicate to an individual, we are properly answering the ‘What is it’-question, and this is a matter of providing an identity-condition for individuals. Once this step has been made, the question as to what makes something *what it is*, i.e. the ‘Why is it’-question, can be approached. The initial step will establish a solid ground for our enquiry for developing further metaphysical questions. We shall deal with them as soon as essentialism will be introduced in §5.

As stated earlier, the trick thanks to which I shall try to keep a balance between biology and metaphysics consists in proposing an investigation into a metaphysical, as well as biological, question, which can be stated as follows: what makes Socrates a human being? I shall analyze the reasons that explain *why* an individual belongs to a natural kind, or, said otherwise, what renders an individual a member of its proper species. All these questions are committed to the idea that kind-membership is a matter of owning “something”, say a series of properties that every singular individual must have to belong to its proper natural species: this thing is a daisy, the thing flying around it is a beetle, and this thing that I am is a human being.

This issue is a particular side of a wider topic³²: the relationship holding between the species and those individuals falling under it, a question of which philosophers, as well as scientists, have had a lot to say. Many questions are related to the concept of species, especially when the resemblances among co-specific individuals are concerned. When we discuss the case of the membership of Socrates to humankind, we must first clarify what it generally means, for an individual, to belong to a species, and second, how can we legitimately talk of species as “a unity” even if it is multiply realized.

³² If you liked the metaphorical title of this section: the bud before it opens up.

With respect to these questions, in the first paragraph two different, though interconnected, metaphysical themes have already been noted. We have not only made it clear that our initial query concerns what makes an individual a member of a certain species, but also explained why it is important to account for what an individual thing *is tout court*. In the following, I shall develop the two themes from an Aristotelian perspective, adopting in particular the viewpoint of the *Posterior Analytics*. We shall see that, for Aristotle, the individuals whose way of being must be clarified are commonsensical organisms, and their essential way of being amounts to their specific way of being. For example, to be, for Socrates, is to be a human being³³. To my mind, this viewpoint keeps together metaphysics and biology since an individual is, as a matter of fact, always existing as a biological species and membership into a species gives much information (morphological, functional and behavioral) about each living being. Moreover, the biological practice primarily aims at classifying each living being in a general kind. Before vindicating further my say [attaching the being *tout court* of an individual to the being a member of a species], let me illustrate a series of interconnected questions.

1) Do we need to know certain properties of an individual before knowing its membership in a species? If so, are these properties “more revealing” of *what something is* rather than the species? To answer this question we need to distinguish between how-features and what-features, which are two different metaphysical levels of investigation, as Aristotle himself acknowledges. The former are simply accidental attributes of an individual, whereas the latter are part of a being’s constitution or essence.

2) Once an individual is identified as a species member in virtue of his possessing given properties, have we told all the story about what an individual is? To put it differently: once we know that Socrates is a man, can we ask *why* he has the property of being a man without generating any infinite regress? I guess that answering

³³ Someone could object that Socrates is, first of all, a person. Personal identity is a fascinating theme, but the real issue at stake here would be moral, far from our limited scope of investigation. For further details on these themes, see Wiggins 1980.

the *what it is* question presupposes the search for a last, epistemically satisfying property causing the individual to be *what it is*.

3) If species were just a matter of convenience and only particulars actually existed, why co-specific individuals would share interbreeding, species-transmitting capacities? Can the species' features have natural grounds, whereas the species themselves are only arbitrarily assigned?

4) Are the *diairesis*—i.e. the ancient logical technique of partitioning a general concept—and systematic taxonomy wrapped together? Is their aim the same?

5) And finally, what about change? For an evolutionary theorist it is hard to reconcile individual's changes with species' change, if one assumes that the species are individuals too, just like their specimens. Is there a difference between individuals and species that undergo accidental or essential change? In particular, if individuals end being *what they are* only by death, do species evolve or die?

These and a bunch of other questions “blossom like flowers” from the ‘What is it’-question, and suggest once again that biology needs the metaphysical reflection.

§4. Better Too Much Than Too Little Clarity: Justifying the Answer to the ‘What is it’-question

It is now time to specify our framework. The claim that for an individual “to be” can be re-worded as “to be one instance of a species”, is as old as Aristotle's metaphysics. It is an apparently intuitive claim, but the suggestion that the ‘What is is’-question, when

applied to a living organism, is answered by the reference to a species calls for justification³⁴.

We could answer the ‘What is it’-question following scientific proposals that have nothing or little to do with metaphysics³⁵. For instance, this individual thing is nothing but a cluster of cells, or something composed of carbon atoms plus other chemicals elements. This is scientifically very interesting for academics, but even if an individual’s micro-structural composition is part of its *nature*, this cannot satisfy our metaphysical concerns as we generally ask “what something *is*”. We are begging the ‘What is it’-question, and accounting instead for what something *is made of*³⁶. Indeed, even if I know that an individual living thing is composed of cells and necessarily it is built from chemical elements, this is not exhaustive of *what something is*. I daresay: once we consider the chemical or molecular composition, we already must have a clear

³⁴ I am aware that I make a hasty move: my proposal is to equate the “it” occurring in the ‘What is it’-question to a commonsensical notion of “organism”. **The resulting predicative sentence is an application of the more general “x is P” (where “x” is a generic logical variable, and “P” is a generic logical predicate). It has the form “o is S”, where “o” is an individual organism and “S” is a predicate taken from substantial predicates, to say it in an Aristotelian manner.** A considerable disapproval comes from Ghiselin and contemporary philosophers committed to the individuality of species: they say it is wrong, strictly speaking, claiming that “Socrates is human”, for it suggests that those individuals called “human” instantiate a property. But since species are individuals, «there cannot be instances of them» according to Ghiselin, therefore it is better to use the form “Socrates is a specimen of Homo Sapiens”. See Ghiselin 1992, in Ereshefsky 1992, p. 280.

³⁵ In the first chapter of *Introduction to the Philosophy of Science*, the extent of scientific explanations is clearly expressed by Salmon: «It would be a serious error to suppose that any phenomenon has only one explanation. It is a mistake, I believe, to ask for *the* explanation of any occurrence. Each of these explanations confers a kind of scientific understanding» (Salmon 1999, p. 38).

³⁶ At stake here is what can be called “vertical” (what is it) versus “horizontal” (how is it) explanation of *what something is*. For this terminology see Furth 1988. These are different questions. Through the latter, we do not reach a reasonable understanding of the thing itself. The answer does not give us enough details about the individuals, for example it does not say anything about its morphological appearance or its habits, neither if it belongs to the vegetable or the animal kingdom.

idea of *what it is*. On the other hand, we could relate the ‘What is it’-question only to metaphysical assumptions. For instance, someone could answer that question saying that a thing is an “entity” or a “substance”: however one could feel uneasy with this answer, for the notions of “entity” and “substance” are opaque and need further metaphysical investigation³⁷.

It should be manifest from what said above that I accept the biological as well as the commonsensical equation between “individual” and “organism”³⁸. The need for providing a plausible and exhaustive answer to the ‘What is it’-question has been stated from the very beginning. When I argued that the living beings are the proper object of biology, and the science of the living world is non-reducible to the mechanical and chemical disciplines³⁹, I was assuming that an organism must be understood as a complex system, whose structural and functional features are well expressed by a biological category such as species and genus. The species, in particular, “summarize” all that matters about an individual, since what an individual *is* may be straightforwardly expressed by referring to the species it belongs to. Once we know the species, we know a reasonable amount of information about a thing’s morphology and functioning of that organism. This information gives us what that organism essentially *is*. Species’ characteristics are therefore of paramount importance for showing *what*

³⁷ Not to mention that we can answer the ‘What is it’-question by “this particular individual being” (Locke 1689). This line of thought echoes the medieval idea that things have an “haecceitas”, a notion firstly introduced by the Franciscan theologian John Duns Scotus. The real “thisness” of an individual is its proper haecceity, or particular essence. This is thought to *explain* the actual individuality of a thing among co-specific things. Haecceity is opposed to individuals’ “quidditas”, or “whatness”, which is of major interest with regard to our biological concerns. This notion explains, instead, *why* an individuals belongs to the species it belongs, giving up its particular traits.

³⁸ From the very beginning my intent was firmly stated. I want to keep together biology and metaphysics. It should now be clear why I agree with Ghiselin: «In biology, ‘individual’ is usually synonymous with ‘organism’, as it is in everyday life. In metaphysics and logic it has a more general sense, namely a particular thing, including not only an organism like Fido or me, but a chair, the Milky Way, and all sort of other things» (Ghiselin 1997, p. 13).

³⁹ See Mayr 2004.

something is. This is why specific predication reveals a lot about an organism⁴⁰. According to Lowe, «[...] any individual thing, X, must be a thing of some general kind—because, at the very least, it must belong to some ontological category»⁴¹

§5. *What Makes Something What It Is: Metaphysical Essentialism*

Once granted that *to be* for an individual is to be a member of a species, it is time to turn to our main question as to what makes an individual a member of a species. This question requires a preliminary stance toward essentialism. Essentialism is a metaphysical thesis: it depends on the ‘What is it’-question, in that it aims at revealing what makes something *what it is*, namely, why something belongs to the species it actually belongs to. In what follows I shall confine myself to deal with essentialism in biology, focusing on what makes an individual a member of a natural kind⁴², which “biological factor”—if any—contributes to its membership into a species. I shall start by providing a brief summary of the current debate on essentialism in philosophy of biology. Then I shall propose a general characterization of it.

⁴⁰ Further details on Aristotle’s way of treating this issue can be found in Loux 1991, pp. 13-48.

⁴¹ See Lowe 2008, p. 11. According to him, however, predicates such as *to be a human being* or *to be a cat* are not ultimate in pointing out what something *is*, since the universals corresponding to such predicates are not ontological categories, but only natural ones. A real ontological category, says Lowe, is “living organism”, but, as stated above, this is not our line of thought. The reason is simple: Lowe makes clear assumptions on the essential properties of individuals, i.e., *to be a living being* is essential, *to be a cat* is not. On the contrary, we will say that species-predicates, from an Aristotelian viewpoint, are essential ones because of their no-further-analyzable relationship to individuals. A different perspective on the topic is provided by Ali Khalidi 2013.

⁴² Sometimes “natural kind” and “natural species” are understood as synonym, within these pages. Actually, “kind” has a wider scope: in contemporary literature it refers to inanimate world’s classification, like “gold” and “water”; sometimes—it is not our case—it refers to the *genos*, according to taxonomical classification of living world, like “animal” or “plant”. This last subject is particularly difficult from both a historical-conceptual and etymological viewpoint. More differences are Dupré 1981.

§5.1. *Why Essentialism is Banished from Contemporary Biological Inquiry*

We may begin with an example taken from chemistry. It is commonly known that the arrangement of the periodic table is grounded on the elements' most fundamental property, i.e., their atomic number. Each individual sample of material is associated with one property expressing its atomic number, if an atomic-number property belongs to a sample of material, this latter is said to be an instance of an element. Therefore for a sample to be an instance of, suppose, *gold*, is to have atomic number 79. Atomic number articulates a chemical structure upon which several properties depend. We can legitimately ascribe a list of properties to a sample of gold: hardness, melting point, density, all physically derivable from the atomic number. The upshot is: the property expressing atomic number is the *essence* of each chemical element, the causing feature for those above-mentioned derived properties and its role must be considered as both epistemically and ontologically explanatory. For instance, given a sample of material, it is gold *in virtue of* having atomic number 79. As a consequence, all samples of gold are essentially said to have a certain atomic number and a set of essence-derived properties.

According to contemporary biologists, this picture suits well with chemistry, but is quite inaccurate if applied to biology⁴³. For Ereshefsky, for instance, chemistry's essentialist model could lead to counterintuitive conclusions in biology⁴⁴. Throughout the history of evolutionary biology, essentialism has been charged of stating the existence of species "as universal and extra-mental things" *instantiated* in individuals, but irreducible to the sum of their instantiations. Co-specific individuals, thus, have to share *something*, an essence or essential property, in order to be members of a species, something "lying midway" between the individual and its proper species. But Ghiselin reasonably showed, according to Ereshefsky, that species themselves are individuals⁴⁵

⁴³ The distinctiveness of biology among both exact and experimental sciences has been proven. See Mayr 2004.

⁴⁴ Ereshefsky 1992.

⁴⁵ Ghiselin 1974 and also Hull 1978. Nowadays this is the orthodox view on the status of species, but not without opponents, see Kitcher 1984 and Millikan 1999.

rather than classes, and no essential feature is needed to explain what links a species to its specimens: these latter are *parts* rather than *instantiations* of the former, just like organs and tissue are parts of the organism⁴⁶. This is a very Platonic way of construing essences, and I am about to show that it is a misunderstanding.

Ereshefsky warns the advocates of biological essentialism, again, that a common feature shared by all the members of a species cannot be a biological characteristic. He makes this mental experiment. Suppose that scientists find a feature E, shared by all and only the members of the same species S, and take it as responsible for their membership to S. In biology, a genotypic or intrinsic feature could play the role of essence for species⁴⁷. But, as a matter of fact, no genetic property is shared by all and only the members of a species; quite the opposite, many scientists have shown that genes and DNA properties are not uniform within the same species: my DNA properties are maybe more akin to a casual ape's DNA than to my sister's. Additionally, even if we found one, so remarkable are mutation, random drift and so on, that most likely it will get lost shortly afterwards: thus, no essence is provided this way.

Could then the essence be a phenotypic feature? On the one hand, an external feature may be shared by all and only the members of a species, and it would be a complex property summing up of several characteristics, such as being two-footed, wingless, featherless with reference to Homo Sapiens. But on the other hand, such feature would be inadequate to give the "in virtue of" condition above sketched: it could be the case that something exhibited the feature that identifies a species, yet it could even not belong to that species⁴⁸.

In sum, according to Ereshefsky, essentialism looks for a fixed biological common feature owned by all the members of a species⁴⁹. Does it really exist a

⁴⁶ This is not the case for chemistry, whose elements are thought to be classes rather than individuals, see Ereshefsky 2010.

⁴⁷ Just like atomic number is, in the case of chemical elements. Note that some deny the intrinsic/extrinsic properties distinction. See Ali Khalidi 2013.

⁴⁸ Cf. Putnam 1975.

⁴⁹ Ereshefsky 1992, p. xv.

“biological factor” common to all species’ members? However the case may be, if such a biological factor existed, it is clear that it should be considered as the essence of the species. But what, if it could not be found? Should we abandon essentialism? I think this is a very naive way of understanding essentialism, as I try to show in 5.2 below.

Generally speaking, the strongest reason that evolutionary biologists have for rejecting essentialism relates to the recently introduced idea of “bio-population”⁵⁰. This idea denies that two intra-specific individual can be identical in any respect. This possibility seems instead to be allowed by an essentialist account, which makes the case for a common feature causing “superficial” characteristics—as in chemistry—and thus rendering individuals undistinguishable from one another “in some way”. But according to contemporary evolutionists, individuals do not share any feature, and membership into a species is a matter of conceptual economy. If so, essences would not play any role in the biological explanation.

§5.2 *What Properly Essentialism Aims at (First Clues)*

There is skepticism about the metaphysical need of providing the causal factor thanks to which something is *what it actually is*: the essence looks like an abstract thing *in virtue of* which a thing is a human being or a rose, for instance. According to this interpretation, an essence must be understood as a “preexisting cause” of the organisms’ being. This picture shows that Ereshefsky and many others match essentialism with a Platonic-inspired understanding of essences.

The problem is prickly and it is now time to spend some words on the most flashy contemporary biologists’ bias, i.e., the thought that essences are entities that links

⁵⁰ What is a bio-population? Following Mayr, «In a biopopulation [...] every individual is unique, while the statistical mean value of a population is an abstraction. No two of the six billion humans are the same. Populations as a whole do not differ by their essences but only by statistical mean values. The properties of populations change from generation to generation in a gradual manner. To think of the living world as a set of forever variable populations grading into each other from generation to generation results in a concept of the world that is totally different from that of a typologist» (Mayr 2004, pp. 29-30).

individuals to their species. Let us consider more closely what makes an individual *what it actually is*. It will become then clear that the essence of something must not be understood as a *per se* entity⁵¹. If it were, the essence itself would in turn have to possess a distinct essence to exist, and we thus would fall into an infinite regress. As a consequence, essences would lose any explanatory force. Essences are *what* makes something what it *is*, namely they allow us to delve deeper into the ‘What is it’-question and to *explain why* an individual, say Socrates, is a man. Thus they give the very criterion thanks to which something is what *it is*. If one is willing to say that there is a reason in virtue of which something is *what it is*, one must agree that there are essences.

Not necessarily an essentialist will reduce essences to Platonic Forms, especially if one endorses an Aristotle-inspired kind of essentialism. For many essentialists, essences are what makes things *what they are*, not something over and above the things themselves. For instance, Lowe refers to the case of chemistry as an illicit reification of an element’s essence, which is identified with its molecular structure⁵². Independently of their real or conceptual status, Lowe holds that essences only disclose the reason in virtue of which things are *what they are*.

I agree with Lowe and this is the reason why we assumed that something is *what it is* in virtue of having an essence⁵³. We said that a sample of metal is gold *in virtue of* having atomic number 79. By this, we are declaring what it means *to be gold* for a

⁵¹ With Lowe, it could be held: «To know something’s essence is not to be acquainted with some further thing of a special kind, but simply to understand what exactly that thing is. This, indeed, is why knowledge of essence is possible, for it is a product simply of understanding — not of empirical observation, much less of some mysterious kind of quasi-perceptual acquaintance with esoteric entities of any sort. And, on pain of incoherence, we cannot deny that we understand what at least some things are, and thereby know their essences» (Lowe 2008, p. 16).

⁵² Lowe 2008, p. 19.

⁵³ “In virtue of” is a common phrase that should be used carefully. Its use is legitimate when the ‘Why is it’-question applies, namely, when we can ask *why* something is such-and-such. By applying the “in virtue of” condition we mean that x *causes* y to be *what it is*. Anyway, this meaning of “causality” is not the one envisaged among natural phenomena, it rather has to do with the Aristotelian notion of “kath’hauto”, that I will better explain in Chapter II. See Scaltsas 1994, pp. 169-88.

sample of metal, why something is a member of the natural-kind gold⁵⁴. The chemical essence, indeed, whilst not being a *per se* entity, reveals why something is *what it actually is*. “To be gold” and “to have atomic number 79” are not equivalent: the former reveals what something *is*, the latter why something is *what it is*, what renders a thing that very thing. The role essences play give us definite information about what essences are. This topic will be discussed in Chapter II⁵⁵.

§5.3. *Essentialism: General Description*

Now we can turn to the second point mentioned above, i.e. providing a general characterization of essentialism.

Essentialism concerns both individuals and kinds grouping particular individuals into specific categories, for instance: natural kinds, like *gold* and *water*, natural species, like *whale* and *sunflower*, but also artifactual kinds like *chair* and *painting*. As often remembered above, in this work I shall limit my attention to the cases for individuals and natural species’ essentialism. So let us consider only natural species like *human*, *horse*, *daisy*, which are largely-accepted commonsensical taxonomical unities, and their individual members. The reader should bear in mind that my argument works once assumed that, for a biological entity, to be *what it actually is* is to be a member of a natural species.

There is a different form of essentialism that we will not examine, but which is worth mentioning. This has to do with individual essences and it originates from rephrasing the question as to what makes something *what it is*, not according to its species or kind membership, but according to its distinctiveness as *that* particular species-member. This kind of essentialism maintains that the essence of Socrates, for instance, consists of the sum of individual-essential features possessed only by Socrates as an individual of a given species. The individual essence of Socrates is opposed to his

⁵⁴ As said, when applied to inanimate natural individuals, “natural kind” is here taken as synonymous to “natural species”.

⁵⁵ For an overview see Lowe 2008.

specific or general essence, it is in fact composed by the individual properties possessed only by Socrates, and it is not made up by his specific traits alone. According to Lowe, «If X is something of kind K, then we may say that X's general [or specific] essence is what it is to be a K, while X's individual essence is what it is to be the individual of kind K that X is, as opposed to any other individual of that kind»⁵⁶. I will deal only with the essences of species, understood as what makes an individual *what it actually is* as a species member.

A first thing to note is that, if you are to maintain that common properties occur when dealing with species, you are not an essentialist yet. You are not an essentialist even if you think that an individual is by necessity related to some general features in order to belong into the species of which it is actually a member. An additional clause must be added: some properties must not only be *sufficient* for membership to a kind, they must also be *necessary*. Therefore, by biological “essentialism” I mean the conjunction of two claims:

i) Each biological species may be described by a great amount of properties, but only a subset of them is essential for identifying all its members⁵⁷;

ii) For an individual, it is necessary and sufficient to possess the properties of such a subset for being a member of a species: those properties are thus essential to the individual for being *what it is*.

These two claims suggest that, according to an essentialist account of biological species,

iii) Each species is associated with a distinctive set of essential properties;

⁵⁶ Lowe 2008, pp. 11-12.

⁵⁷ The case for the blue tit species is very nice. Ornithologists mention the feature “a dark spot on the head “ in the description of the blue tit species. However, the size of this dark spot, as well as its actual presence, is uninteresting for the classification, indeed many individuals lack it. This shows that, even if the dark spot is regularly mentioned in the blue tit species' description, it does not figure among the essential features of the species, i.e., the identifying conditions of the blue tit species.

iv) An individual must be characterized by one and only one set of essential properties for otherwise it could belong to different species, and this would be a contradiction;

v) The set of essential properties of an individual expresses its proper essence, which is nonetheless shared by all the co-specific members of the species.

Claim i) could generally be hold even if one is not an essentialist. The difference is made by ii), which is strongly denied by anti-essentialist accounts. Here we must return for a while to the critics above. As already mentioned, we have still to discover a biological feature common to all and only the members of a species. Because of this, some biologists support the idea of a polyvalent membership of an individual to many taxonomical species. This is called species pluralism⁵⁸: it is the idea that organisms can be grouped into many and equally *real* species. The membership of an organism to species A and B at the same time is made possible if one is willing to assume that all the species-concepts are equally correct, but one must give up the belief that a species predicate reveals important traits of the individual. This is not our case. In our framework, indeed, the species predicate is the answer to the ‘What is it’-question, and essences are what explain *why* a species is predicated of an individual.

Moreover, some others maintain that essentialism is incompatible with the Theory of Evolution, as the former postulates unchangeable criteria for a thing to belong to a natural kind. According to Mayr and many others, essentialism entails fixism⁵⁹.

We can however argue that essentialism does not necessarily imply fixism. If you maintain that individuals have essential properties thanks to which they can be identified under some natural kind, you are not still committed to the claim that species are fixed or immutable or eternal. Rather, you are claiming that individuals have features that make them *what they are*. There is no proof to derive fixism from essentialism. The claim “essences are immutable” can indeed be taken to mean that an

⁵⁸ Kitcher 1984. A detailed account of the debate is found in Dupré 1993 and Ereshefsky 2001.

⁵⁹ Mayr, 1959 and Mayr 1982 and also Hull 1965.

individual cannot stop being *what it is*, thus what makes it *what it is* cannot change within the organism itself.

Furthermore, far from embracing an exhaustive compatibility theory between evolutionist and essentialist stances⁶⁰, I admit that evolutionary theories do not necessarily rule out an Aristotelian-inspired form of essentialism. Although it is customary to say that species evolved from other species, one cannot deny that we actually have some specific criteria to establish if an individual belongs or does not belong to a species, even an extinct one. The aim of anthropologists, indeed, is to find the features in virtue of which a species S1 is an *evolution* from the species S2.

In general, essentialism about species seems to be only committed to the idea that the actual identity of a species relies on some of its features, and something is *what it is* in virtue of something else. Hence, the role essences play is to grant for the organisms' identity. This will turn out to be one of the leading points within these pages.

To sum up Chapter I: after having introduced, on the one hand, the skeptic attitude of biologists toward philosophical concerns and, on the other hand, the metaphysical commitments of biology, I proposed a theoretical framework in the light of which the Aristotelian metaphysics can be approached. This theoretical framework keeps together metaphysics and biology in that it focuses on the question as to *why* something belongs to the species it actually belongs, which is a metaphysical as well as a biological matter. Firstly, I showed the importance of answering the 'What is it'-question, applied to an organism, by mentioning a specific property. The species, indeed, reveals a lot of details about the organism at stake and is epistemically satisfying. Secondly, once answered to the 'What', I turned to the 'Why is it'-question. This latter question concerns the reasons why a thing belongs to its proper species, and it is usually associated with essentialism. Essentialism is a metaphysical theory, mostly denied by biologists, according to which a thing is what it is virtue of its essence. I disambiguated the concept of essence to make it clearer that an essence is not an entity like a Platonic form, but it simply is *what* explains specific predication.

⁶⁰ Like Boulter 2012.

In the next chapter, I will try to consider our theoretical framework in the light of the Aristotelian thought. I shall examine how Aristotle answers the ‘What’ and the ‘Why is it’-questions in the *Categories*, in the *Posterior Analytics* and in the *Metaphysics*. I will finally conclude that Aristotle’s metaphysics consists in searching for the reason in virtue of which, for instance, Socrates is a human being. Moreover, I will maintain that the essentialism of Aristotle can be “split” in two different forms: one concerns his answer to the ‘What is it’-question and can be found in the *Categories*, the other is about the ‘Why is it’-question and is related to the *Metaphysics*. As the ‘Why’-question depends on the answer to the ‘What’-question, the second form of essentialism depends on the first one.

II

ARISTOTLE'S METAPHYSICS FROM THE 'WHAT' TO THE 'WHY'

It is now time to set our theoretical worries in the framework of the Aristotelian works. We were initially bothered by the question 'what something *is*', assuming that an exhaustive answer has to be found in individuals' membership in a species, understood in a rather commonsensical manner. Then we introduced the notion of essentialism and related essences to the question 'why something is *what it is*', what we called the 'Why is it'-question.

Now, I maintain that the same conceptual scheme can be found in Aristotle's metaphysics. Taken as a one single doctrine from the *Categories* to the *Metaphysics*, it can provide us a solid basis to deal with the living things and the role essences are supposed to play in biology.

§1. *Overall Plan*

In this chapter I shall aim to achieve, step by step, a pondered account of the Aristotelian essentialism. My final conclusion will be that two different forms of essentialism emerge from the analysis of the Aristotle's metaphysics. A "simpler" form is based on the necessary attribution of a specific predicate to a given subject and it relates to the 'What is it'-question. A second, more complex, form is instead related to the procedure of explanation and the realization of an inner principle, which answers the 'Why is it'-question.

I will divide this chapter into four paragraphs (§1 is excluded because it is purely introductory to the topic), §2 is an interpretative introduction, while §3-5 are the

core of our investigation on the metaphysics of Aristotle. In them the ‘What is it’ and the ‘Why is it’-questions will be closely examined. More in detail, in §2 I shall provide an interpretative framework that will make the project of the whole chapter clearer. I shall explain why the Aristotelian metaphysics develops by step, from species-attribution and definition-acknowledgement to the search into essences. I shall discuss the works of some contemporary interpreters of Aristotle, above all the interpretation of David Charles.

§3 is reserved to the ‘What is it’-question. Therein, I shall develop an insight stemming from the *Categories*, the treatise about things that occur as subject or predicates in the logical analysis. In his logical works, Aristotle purportedly puts a parallelism between the linguistic and ontological planes, on the conviction that the logical relations mirror the ontological ones. This conviction may be considered a distinctive feature of all the Aristotelian production⁶¹. With respect to our inquiry, the role that the *Categories* play is to answer the ‘What is it’-question by a standard categorial formula such as “x is P”. This formula provides both i) the x we are referring to and ii) a predicate P. In brief, Aristotle holds that x must be filled with a formula such as “this man” referring to an individual substance, whereas P consists in a universal-species predicate. Once understood *what* something is—to say it in today logical terms: when a proper name is associated with a sortal term⁶²—, we shall then become able to ask *why* something is what it actually is, i.e., what makes something *what it is*.

In §3.1. and §3.2 we shall suddenly complicate the picture by looking for a proof that the individual living thing is the proper object whose *being* must be investigated. It

⁶¹ *De interpretatione* provides us with a clear isomorphic assumption that we ought to remind (*De int.*, 1, 16a3-7).

⁶² “Human being”, “tiger”, “daisy” are all general sortal terms, sortals for short. In contemporary metaphysics they gain special interest in the context of the everlasting “problem of universals”. It is commonly hold that, because sortals are countable common names, as opposed to “water” and “gold”, the use we make of them in statements reveals something about the very nature of their referents. My only concern here will be to declare an ontological relation of interdependence between individuals and their biological species, which is signified by the befitting sortal. For a general overview on the topic, see Grandy 2016.

will become clearer why Aristotle elects the individual substance as the ultimate subject of predication as well as the *substratum* of existence for non-individual substantial things, namely, why he fills the “it” in the ‘What is it’-question with an individual biological subject. The reason is given by what I called the Aristotelian “ontological” foundationalism: the need of establishing an ultimate ontological substrate upon which all the other things rely to exist. Given this background, further evidence will be provided in §3.3 for the Essentialist claim that the species-predicates inform us about what biological subjects essentially *are*.

Our second step will consist in clarifying *why* something is *what it actually is*, which can be understood as *what* makes an individual *what it is*. This additional question may be interpreted in two ways, according to the *individuation* principle or to the *unity* principle⁶³.

The former way consists in seeking the reason in virtue of which an individual is *unique* among its conspecifics, why Socrates differs from any other man, for instance⁶⁴. In other words, we are looking for what helps us to *individuate* Socrates among the other specimens of the human species and the response, for Aristotle, depends on the matter of Socrates. We will leave aside this interpretation of the ‘Why is it’-question, since this puts into play also the notions of accidents and matter, which would divert our attention far from the Aristotelian argument⁶⁵.

The latter way is a corollary of the Aristotelian conceptual framework we will present in §3. We shall look for the metaphysical reason *why* something is what it actually is *as a species-member*, for example, *why* Socrates is a man, rather than, suppose, a horse or an olive tree, and we shall see that this metaphysical reason is, for Aristotle, the soul. Clearly, this way of interpreting the question as to ‘what makes

⁶³ Cohen 1984 pp. 44-50 clearly makes the point.

⁶⁴ This is called a weak version of the principle of individuation, as opposed to a strong one, asking for the reason of the uniqueness of the individual among every individual belonging to every species.

⁶⁵ Aristotle often recalls that individuals lack a proper essence. Cf. e.g. *Met.*, Z 15, 1039b27-1040a7; Z 11, 1037a27. See Furth 1988, pp. 234-5.

something *what it actually is*’ assumes that co-specific individuals are *identical* under the species, and this permits us to leave aside the individual differences. It only matters the reasons in virtue of which all the specimens belong to the same species, i.e. *are of the same sort*. Looking for the reason *why* something is of some sort amounts to seeking for the cause of its *being*, its specific essence⁶⁶.

But before to consider closely what an essence is for Aristotle, in §4 we shall give an account of *what* definitions *are*. This is a necessary move, for the ‘What is it’-question, which is preliminary to the ‘Why is it’-question, gives both the species and the definition of something, as clarified in §2. Far from being a mere linguistic tool, Aristotelian definitions are particularly committed to the ontology. We shall prove that, on the one hand, definitions can be predicated of universals as well as of their instances, in force of the relationship of existential interdependence between the species and its specimens (the thesis discussed in §3). On the other hand, we shall show that, for Aristotle, definitions apply to ontological items, and not to general terms, because they articulate the essence of some existing thing: only *what exists* has an essence and a definition. The key factor about definitions is their function of *linguistically* expressing the essence of something: they play an explanatory, rather than descriptive, role. Definitions concern the species, both from a logical⁶⁷ and ontological viewpoint: they linguistically express the specific properties that something possesses *in virtue of itself*⁶⁸ and, at the same time, they provide informations about the ontological structure of a species. As expected, the *Posterior Analytics* will be our main reference book when we shall deal with definitions.

In §5, I shall turn to essences. In the *Categories* and in the *Analytics*, Aristotle explicitly states that species-attribution is a form of essential predication, and this

⁶⁶ See in *Met.*, Δ 6, 1016b33.

⁶⁷ See e.g. *Cat.*, 5, 2a19-25.

⁶⁸ Maybe the *per se* features could be included into what we today call “intrinsic property”, the one something has purely *in virtue of itself*. It would be very interesting to make a comparison between the notions of “per se property” and the concept of “having a property in an intrinsic fashion”—an additional variation on the very general concept of intrinsic property—stated in Humberstone 1996, p. 206.

invites us to understand species as essential properties supplying an *identity condition* for the subject. If compared with the *Metaphysics*, this way of dealing with essences looks almost “naive”, or unaccomplished, for it is mostly influenced by foundational and logic-inspired commitments. Indeed, species as essential properties are necessarily associated with individual things, for individual things *are* inasmuch as essential properties belongs to them. In the *Metaphysics*, Aristotle pushes his investigation ahead for he aims at clarifying the *causes* of the being of the species: not the way things *are*, but *why* things are exactly *what they are*. This is no more a matter of individuating properties, but a matter of revealing principles and causes at a deeper level of metaphysical inquiry. And if, in the *Metaphysics*, individuals and species, are “obsolete” matter of investigation, their metaphysical-causal components are instead at stake. Essences understood as the formal constituent of the species—composites of form and matter—explain why species are such-and-such characterized and also why individuals are of some sort at the macro-level of reality.

§1.1. *The Priority of the Categories*

I shall begin my metaphysical investigation from the *Categories* because the reading I suggest seems to me borne out by the following hint. As Aristotle points out in *Posterior Analytics*, «All teaching and learning of intellectual kind proceed from pre-existent knowledge [...] of some things we must already believe that they are»⁶⁹. From here two conclusions follow. First, knowledge is articulated into levels and what constitutes intellectual knowledge comes after the knowledge that something *is*⁷⁰. Second, pre-existent knowledge cannot be of the intellectual kind, for otherwise an infinite regress would follow; thus, the pre-existent knowledge must be of a different kind⁷¹. Since, for Aristotle, the object of sensitive knowledge is opposed to the object of

⁶⁹ See *An. Post.*, A 1, 71a1-2; 12.

⁷⁰ Cf. *Met.*, Δ 11, 1018b31-2.

⁷¹ See *An. Post.*, A 18; B 19, 99b15-100b18.

the intellectual one⁷², we may infer that the knowledge of empirical singular things can be a good candidate for the role of the pre-existent knowledge. Aristotle goes on:

«Things are prior and more familiar in two ways: for it is not the same to be prior by nature and prior in relation to us, nor to be more familiar and more familiar to us. I call prior and more familiar in relation to us items which are nearer to perception, prior and more familiar *simpliciter* items which are further away. What is most universal is furthest away, and the particular are nearest»⁷³.

The process of natural knowledge begins from what is prior and more familiar to us, namely, from the individual things we are acquainted with by means of sense-perception. From there, we move to know what is prior by nature, but posterior as to us, i.e. the universal⁷⁴.

To my mind, the *Categories* provide us with the first step in knowledge, since they show the essential nexus holding between individuals as primary substances and species/universals as secondary substances, emphasizing the primary status that particular individuals play in logic and ontology. The primary substances of the *Categories* may be equated to the above-mentioned “things we must already believe that they are”, understood as inseparable from their species. These latter present the sort of things individuals *are*, namely, the essential way they exist⁷⁵. The *Categories* therefore acquire special significance in our route. In that work, Aristotle underscores the importance of establishing a “name” for singular things, namely, to attach a sortal to

⁷² See *An. Post.*, A 31, 87b29-33.

⁷³ See *An. Post.*, A 1, 72a1-5. Parallel formulation recur in *Met.*, Z 3, 1029b1-9 and *Phy.*, A 1, 184a16-21. Conceptual clarity through intellectual knowledge is inversely proportional to sensible clarity through perception.

⁷⁴ See also *Met.*, Δ 11, 1018b31-4.

⁷⁵ We know empirical singular things through sense-perception. Roughly speaking, perception is about concretely existent things (as illustrated in *De anima*), and I am about to claim that, in the *Categories*, Aristotle identifies “to exist” and “to be of some sort or kind”, as was suggested by Furth 1988 and Loux 1991.

an individual subject, which cannot be a bare particular. This procedure is the first step forerunning the investigation into definitions and essences.

The *Categories* are also important because Aristotle grounds on them his metaphysical analysis. If metaphysics consists in an investigation into the nature of *something*, we are supposed to know this “something” before we investigate its very nature. Individual things or “things we must already believe that they are”, together with their specific way of being, are the foundational elements upon which the metaphysical investigation rests. All this invites us to interpret Aristotle’s metaphysics as a stratified analysis: Aristotle starts from the everyday ontology to discover what is the cause of being of the commonsensical objects⁷⁶.

§2. *An Interpretative Digression*

Before developing my argument, I would like to suggest a blueprint behind the scene of the Aristotelian general attitude, inasmuch as I displayed it. My suggestion is that one cannot fully understand what Aristotelian essences *are* outside of his progressive metaphysical inquiry. Aristotle thinks that of a thing we can know, in order:

A- the name;

B- the definition;

C- the essence.

Aristotle seems to admit that in order to bring to light the very essence of a (living) thing⁷⁷ (thus answering the ‘Why is it’-question), we must first ascertain its name and definition⁷⁸, which respectively constitute the answer to the ‘What is it’-

⁷⁶ The same line of reasoning can be found in the biological works: in the *History of Animals*, Aristotle proposes the commonsensical natural phenomena, then he looks for their metaphysical causes in the *Parts* and in the *Generation of Animals*.

⁷⁷ In this consists the true knowledge of something according to Aristotle. See *Met.*, Z 6, 1031b6-7 and b20-2.

⁷⁸ This is clearly stated in *An. Post.*, B 8, 93a25-6.

question. The argument will be exposed later; here I confine myself to present the interpretation that inspires it.

Looking for the name of a thing means to attribute a sortal or specific term to it, the first step toward the knowledge of it. When something is known “by its name” the definition of the name is then required and this definition has to clarify which features are associated with it⁷⁹. For instance, once known that this (x) is a thunder (T), one is expected to clarify the definition (D) of thunder, in order to spell out the representative features of *thunder*, which are also representative of each single instance of thunder. The essence of things, to be understood as what-it-is-to-be for a thing can be better known through definitions that *identify* the *being* of the species of the thing. Thus, the inquiry into essences as what makes something *what it is*, needs a previous knowledge of the species and of the definition of the thing under inquiry.

In short, for Aristotle, the search into both the name and the definition of something foreruns the search into essences, which is fully developed in the *Metaphysics*. This latter inquiry needs a solid ground, which is given by the investigation put forward by the *Categories* and the *Posterior Analytics*⁸⁰.

I endorse David Charles’ “three-stage knowledge” interpretation of Aristotle’s scientific inquiry, which he illustrates in his book *Aristotle on Meaning and Essence*. His interpretation makes clear that, for Aristotle, there is a hierarchy to reach a full knowledge of what something *is*. Approximately, Charles shows that, in *Posterior Analytics*, Aristotle:

«appears to separate three distinct stages of inquiry as follows:

Stage 1: This stage is achieved when one knows an account of what a name or another name-like expression signifies (section[A]: [*An. Post.*, B 10,] 93b30-2).

⁷⁹ Clearly, this procedure holds not only in the case of biological things. A chair, a stone, a river, all are known first as members of a species (as confirmed by the use of sortal terms). For the sake of brevity, I limit myself to biological things.

⁸⁰ Degrees of knowledge are introduced by Aristotle to avoid Meno’s paradox, explicitly referred to in *An. Post.*, A 1, 71a29-30. For a clear discussion, see Bronstein 2016.

Stage 2: This stage is achieved when one knows that what is signified by a name or name-like expression exists (section[B]: [*An. Post.*, B 10,] 93b32)

Stage 3: This stage is achieved when one knows the essence of the object/kind signified by a name or name-like expression (section [B]: [*An. Post.*, B 10,] 93b32-3)»⁸¹

Stage 1 is committed to the pre-empirical phase of establishing what “a name” *signifies*, that is, to a merely linguistic move⁸². At *Stage 1*, for instance, even “goatstag” *signifies* something. But Aristotle claims that definitions are possible only for existent things⁸³, whereas the goatstag is the paradigm for unreal entities. It is therefore clear that *Stage 1* only provides terms with an approximate and preliminary meaning, far from the real definitional process expressing the essential features of things. *Stage 1* provides inessential and non-ontological informations about term-usage ability.

It is within *Stage 2* that Aristotle’s investigation on the ‘What is it’-question develops⁸⁴, necessarily forerunning the inquiry into the ‘Why is it’-question introduced in *Stage 3*. In *Stage 2* we are supposed to know the things on which the ‘What is it’-question is put, namely, the objects under inquiry, necessarily together with *its essential way of being*: we know that a thing signified by a name exists. In this case, the definition associated with man will be *real* other than nominal, because it picks out

⁸¹ Charles 2000, p. 24.

⁸² Actually, to say “what a name signifies” is a definitional practice, but it seems to be dismissed by Aristotle (see *An. Post.*, B 7, 92b25-8). Aristotle would say that the definition of unreal entities is a matter of associating accidental features with “a name”, features which do not convey into a definition (see *An. Post.*, B 8, 93a21-7). For instance, the definition for goatstag could be “half-goat half-stag animal”: far from revealing something about goatstags, it simply shows the linguistic components of the name “goatstag”. Moreover, if any formula signifying the same as the name were a definition, even the *Iliad* would be (*Met.*, Z 4, 1030b7-10).

⁸³ See *An. Post.*, B 7, 92b26-8.

⁸⁴ Charles’s account of the second stage is here delimited, since it was initially connected to the role demonstration has to play in scientific knowledge. A complete wording is however unnecessary for our narrower purpose.

something that exists in some way⁸⁵. These *Stages* establish an order in our knowledge. Indeed, at Stage 3 where one knows a thing's essence, one must have previously clarified the thing at stake at a "more superficial" level of knowledge. Thus, to state that something *exists*, or that it is called after a name/sortal, is a necessary condition for the investigation into its real essence, since one cannot delve deeper into the reasons *why* something is *what it is* jet lacking the 'what it is'.

To sum up: to say what something *is* amounts to obtaining its name and definition⁸⁶. Again, the name give us the sort of thing our object of investigation *is*. Definitions are accounts of what something *is*⁸⁷ also because they express the *per se* or essential features of the species to which the thing belongs. In doing so, definitions are also picking the what-it-is-to-be of the species⁸⁸. Definitions are what links name-attribution to the knowledge of the essence, since the role they play is to answer both to the 'What is it'-question—with reference to the species—and to the 'Why is it'-one by disclosing, at a linguistic level, the essence of the species⁸⁹.

§3. The 'What is it'-Question: Interdependence and Explanation

⁸⁵ As noted in the *Metaphysics*, a substance cannot *be* without *being a this something*, namely *a being that exists in some (essential) way*. For instance, see *Met.*, Γ 2, 1003a33-4 and b5-11. On this, see Sellars 1967, Witt 1989, Loux 1991 and Charles 2000, p. 60.

⁸⁶ Clearly this is also strictly linked to the previous stage, as well as: «The initial grasp on an account of what "F" signifies provides a springboard from which one can come to know non-accidentally that F exists, and, thus, for a successful investigation of what F is» Charles 2000, pp. 36 and 198.

⁸⁷ See *Cat.*, 4, 2a20-1.

⁸⁸ Definition is explanatory because it points at the causes of the thing's being, it crosscuts the 'What is it'-question and the 'Why is it'-question. See *An. Po.*, B 2, 90a15-23, where the relationship between the 'What is it' and the 'Why is it' (here with reference to a natural phenomenon) is clearly stated.

⁸⁹ See *An. Post.*, B 10, 94a15-17.

Our analysis of Aristotle has revealed that the ‘What is it’-question can be articulated into two sequential phases. The first concerns the attribution of a species’ name, the second one is about the definition of that name.

My first target in §3.1 is to articulate the Aristotelian answer to the ‘What is it’-question according to the “prior and more familiar way in relation to us”. As I have just pointed out, for Aristotle, saying that “Socrates is a man” or “Bucephalus is a horse—generally, that “x is P”, where “x” refers to a commonsensical biological individual and “P” to a specific property— is the right answer to the ‘What is it’-question posed on Socrates and Bucephalus. The reason is the ontological and logical relationship of no-further analyzable interdependence between individuals and species (or specific universals), a foundational stance one can find in the *Categories*. We can name the ‘What is it’-question raised about singular concrete individuals the ‘What is it’-question₁. This question is different from the ‘What is it’-question₂ that is put on the species through which we answered the first question. The response to the second question generates a definitional formula, while the response to the first only the attribution of a name.

Indeed, according to Aristotle, in some cases the ‘What-it is’-question entails a further practice, i.e. definition, thanks to which we can answer the ‘What is it’-question by *explaining* the salient features related to the species. At this stage, the thing on which the ‘What’-question is put is no longer the concrete individual but the species (previously attributed to the concrete individual), whose *being* needs to be clarified. In §4 we shall consider closely the role that definitions play to complete the answer to the ‘What is it’-question₂, and jointly to contribute to the ‘Why is it’-question by pointing at the essence of something’s being.

§3.1. *The What: Primary and Secondary Substance as Foundational Commitments*

The aim of this section is to explain *why* Aristotle maintained that the question ‘what something *is*’ is answered by attributing a species-predicates to an individual. It is a line of thought lying in the background of the *Categories*. From here, it derives a naive form

of essentialism: species-attribution amounts to saying of what sort the individual thing *is*, i.e. the way something exists as fixed and grounding entity. The species gives the individuating criterion for what *is primary*.

Leaving aside the essentialist commitments, the basic idea is that an extra-mental individual (*tode ti*), understood as a *primary substance*, is like a variable in need for a function⁹⁰. Specifically, this clarification is made possible by appealing to an essential feature of it⁹¹. This marking feature is expressed through an intra-categorical predication, the one that picks out the lowest-level categorization within the category of substance, namely, the species-predicate. My point is that, for Aristotle, it is an unanalyzable fact that individuals *qua* primary substances are members of a species. If we are willing to say that individuals exist as the ontological bricks of reality, they must *exemplify* a secondary substance, a species. The specimen-species relation is both logically and ontologically primitive, hence unanalyzable. If this were not the case, we would fail in accounting for an ultimate subject of predication and, ontologically speaking, an ultimate *substrate* upon which universals depend, turning the question of the ‘What is it’ into a nonsense.

Let us turn now to Aristotle’s texts in order to ground our interpretation.

When dealing with ‘what something is’ as well as with ‘what makes something *what it is*’, one should first cast light on what “being” means here, and one way or another this lead to the notion of *substance*.

According to Aristotle’s *Metaphysics Z*, «We speak in many ways of what is [...] the primary thing that *is* is what a thing is, which signifies substance»⁹². Here Aristotle seems to be committed to the idea that primary meaning of “being” is achieved as soon as the ‘What is it’-question is answered, and this happens with reference to substance,

⁹⁰ On the description of the individual as “this something” (*tode ti*) (*Cat.*, 5, 3a10-3), see Frede and Patzig 1988.

⁹¹ See *Cat.*, 5, 2a13.

⁹² See *Met.*, Z 1, 1028a10-5.

since substance is signified by the ‘what it is’⁹³. Moreover, substance has a key role in metaphysics, since it is what is *primary* “in definition, in knowledge and in time”⁹⁴.

A clarification is here in order. When the ‘What is it’-question is referred to substances, it acquires two different albeit interrelated meanings in the Aristotelian thought⁹⁵.

— First: What is a substance or Which substances are there? Some scholars called it the “Population Question”; the goal here consists of listing which things are substances, namely, to list which things primarily *are*. The *Categories* have the task to answer such a question providing an elementary list of *what there is*, which mirrors the way things appear into a sentence. Individuals, together with their essential predicates, represent the ground zero of the ontology. But this is only the first step toward a full list of things that are substances, for a complete inventory of substance-items can be reached only after a complete metaphysical analysis of this basic ontology has been developed⁹⁶.

— Second: What is the substance *of* something or What is the nature of *what there is*? In *Metaphysics Z*, this is how the question is addressed. Some scholars called it the “Nature Question”, for one is supposed to investigate deeper the *nature* of what we previously called substances, i.e. the population of *what there is*. By providing the “natures” of things, Aristotle increases the tools thanks to which he can explain the ontology. In different terms, seeking for the *substance of* something amounts to pick something—one of the members of the substance-population earlier depicted, for instance—and looking for its essence. This is an eminently metaphysical investigation. *Metaphysics* aims at clarifying the inner structure of *what there is*, which is made up of form and matter.

⁹³ See Loux 1991.

⁹⁴ See *Met.*, Z 1, 1028a31-b2.

⁹⁵ Cf. *Met.*, Δ 8, 1017b23-6, where the meaning that “substance” has in the *Categories* is extended: as has been said, from «mono-argumental to bi-argumental». See Galluzzo 2003. See also *Met.*, Z 11, 1037a25-6; Z 15, 1039b20-2.

⁹⁶ Some commentators hold that a full ontology is reached only after the search into essences comes to an end, for instance, Witt 1989.

These two concepts of substance—as things that *are* substances and “things” that are the *substances of* things—gave credits to the thesis of the inconsistency of the *Categories* with the *Metaphysics*. Aristotle says, in the *Categories*, that individuals are “primary substances”, but in the *Metaphysics* he acknowledges that essences are “primary substances”, and since individuals and essences are irreducible one another, there seems to be an inconsistency or a change of mind on the concept of “primary substance”. Compatibilist interpreters, instead, noted that, in the hylomorphic framework of the *Metaphysics*, the latter concept of substance is a natural continuation of the question as to ‘what substance is’, from a simpler to a refined level of investigation⁹⁷: we have perfect knowledge of what something *is*, indeed, when the substance of it is grasped.

By the way, having introduced the notion of “substance”, we are forced to get a glimpse first on the *Categories*, where the class of substance is earlier portrayed in order to answer the ‘What is it’-question. I do not plan to rephrase Aristotle’s introductory logical treatise where an early concept of “being a substance” is disclosed. To fully vindicate the weight the *Categories* carry within the ‘What is it’-question, all we need is to keep in mind two familiar Aristotelian notions: i) the intra-categorical (said-of) predicates, which give us enough details for answering the ‘What is it’-question; ii) the need for an ultimate subject of predication (an issue explicitly raised in *An. Post.*, A 22, 83b28-30), which makes available a “it” on which the ‘What is it’-question is focused on.

§3.2. *Individuals as Primary Substances: Achieving the “It”*

Let me start from ii). Symptom of Aristotle’s empirical attitude, the concrete individuals of common experience hold a special, decisive, place in his logical and ontological analysis⁹⁸. The *Organon* is the earlier fertile ground upon which processing such an account: there, linguistic investigation mirrors *what there is* and its way of being.

⁹⁷ Cf. Furth 1988 and Loux 1991.

⁹⁸ See Frede 1987b, pp. 49-71.

Aristotle calls what primarily *is*, in a logical and ontological sense, “primary substance”. By means of the logical concepts of “subject” and “predicate”, Aristotle describes the concrete individuals signified by singularized expressions⁹⁹ as the ultimate subjects of predication¹⁰⁰ as well as the *substrata* for the existence of non-individual substances and non-substances¹⁰¹ (secondary substances and universal accidents). In the *Categories*, “x is P” is the lowest-allowed predication, since it reflects the lowest ontological relation between a thing and its way of being. We shall return on this in §3.3.

Behind this assumption, there is a clear rationale. Even if Aristotle is well aware that commonsensical things are made up of “parts”, like elements (water, air, earth, fire)¹⁰², and are even *synola*, compounds of matter and form, he chooses the individual “*tode ti*” as primary substance¹⁰³. In the *Categories*, it is charged with a special logical and ontological status, a grounding role: “all the other things are either said of the primary substances as subjects, or are-in them as subjects”¹⁰⁴. Individuals are “keystones”.

⁹⁹ In the *Categories*, these are indefinite-articled common names like “a (certain) man”: «All substance appears to signify that which is individual. In the case of primary substance this is indisputably true, for the thing is a unit. In the case of secondary substances, when we speak, for instance, of “man” or “animal”, our form of speech gives the impression that we are here also indicating that which is individual, but the impression is not strictly true; for a secondary substance is not an individual, but a class with a certain qualification; for it is not one and single as a primary substance is; the words “man”, “animal”, are predicable of more than one subject» (*Cat.*, 5, 3b10-2).

¹⁰⁰ See *Cat.*, 4, 2a11-5.

¹⁰¹ See *Cat.*, 5, 2b5-6.

¹⁰² Natural elements compose only the matter of the individual. See *De Caelo*, B, 3.

¹⁰³ This procedure is not very far from our modern way of ostensibly baptizing individuals, which are always taken as a whole. Indeed, according to Aristotle: «The fact that the parts of substances appear to be present in the whole, as in a subject, should not make us apprehensive, lest we should have to admit that such parts are not substances: for in explaining the phrase “being present in a subject”, we stated that we meant “otherwise than as parts in a whole”». (*Cat.*, 5, 3a28-30).

¹⁰⁴ Cf. *Cat.*, 4, 2a34-5.

In the *Categories*, individuals are “atomic” but also opaque. They are enough to anchor both ontology and logic on a basic, indivisible, and commonsensical item. Thus, by calling “primary substance” the concrete individual (in the logical as well in the ontological sense), the ‘What is it’-question reaches at least one irreducible subject that we can name (remember that we are here concerned with the ‘What is it’-question₁). According to Aristotle, indeed, an infinite regress in predication is impossible¹⁰⁵, both logically (by essential predication)¹⁰⁶ and ontologically (the substrata are irreducible to the sum of their parts/elements). Commenting on *An. Post.*, A 3, 72b5-15, Terence Irwin makes explicit that «an infinite regress [implies] an infinite task»¹⁰⁷: an infinite explanation of what a thing *is*¹⁰⁸. This would render the explanation of what something *is* inconclusive, even the ‘What is it’-question₁ would lack its sense, and this is highly counterintuitive. Aristotle’s usage of a grounding or foundational statements (“x is P”) and ontological relations (x is P) lean on the certainty of a foundational and fixed—though in a commonsensical way—subject, from which we can start to obtain further knowledge.

§3.3 *Species as Essential Way of Being: Achieving the ‘What is it’*

We stated that individuals are primary substances, or what primarily *is*, and according to Aristotle, a primary substance cannot just be, but it must be *in some way*¹⁰⁹.

Here the first notion I initially mentioned (i.e. the intra-categorical predication) needs to be clarified. In the *Categories* Aristotle calls the logical relationship holding between an ultimate subject of predication and the *proximae species* predicated of it the “said-of” predication. Because of this relation, species are called “secondary

¹⁰⁵ See *An. Post.*, A 3, 72b1-15.

¹⁰⁶ See *An. Post.*, A 20, 82a22-4.

¹⁰⁷ See Irwin 1988, p. 129.

¹⁰⁸ See Charles, 2000, ch. 7.

¹⁰⁹ Cf. *Cat.*, 5, 2a16; *Met.*, Γ 2, 1003a33-4 and b5-11.

substances”¹¹⁰. This kind of predication reveals something about the ultimate subject, something *ontological* about it, by disclosing the very nature of the individual the proper name or the singularized phrase refers to¹¹¹. Essential predicates (we may call them the “said-of predicates”), really differ from any other possible predicate that are in the subject accidentally (we may call them the “be-in predicates”)¹¹². Species-predicates provide «the most complete and informative answer to the ‘What is it’-question»¹¹³, stating the simplest and necessary condition for an individual’s identity and being. Precisely, even if individuals’ ability to change may accommodate different non-substantial predicates, once the species is fixed, individuals cannot cease to be *what they are* as species members. For instance, whilst something can pass from the supine to the prone posture (a subject can accommodate for several “be-in” predicates), it cannot pass from the human to the horse species¹¹⁴. This latter instance is not properly “passing”, but rather “passing away”. By passing away, an individual is no more the same subject, since its essential property—the *what it was*—got lost.

In the *Categories*, Aristotle establishes other differences between essential and accidental predicates. Let me provide a couple of Aristotelian cases suiting our purpose.

First, when said-of/essential properties like *human being*, *horse*, *oak tree*, are possessed by individuals, they are possessed by them under the same respect, in the same way¹¹⁵. I mean that for Aristotle no *tode ti* can admit of degrees in itself about an essential property: one *is* or *is not* a member of a species, one cannot simply be “a little” or “very much” a human being, as one can be a little or very much hungry. It follows a

¹¹⁰ They hold the second place within the ultimate-subjects ranking. See Irwin 1988, ch. 3.

¹¹¹ Cf. also *An. Post.*, A 22, 83a24-6.

¹¹² See *Cat.*, 5, 3b24-4b19.

¹¹³ Loux 1991, p. 30.

¹¹⁴ Actually, identity-preserving change is allowed whether accidental predicates are concerned. Death is the sort of extreme change “stealing” essential predicates and making the individual chasing to exist (to be what it is). See *Phys.*, V 1-2.

¹¹⁵ See e.g. *Cat.*, 5, 3b35-6.

strong conclusion: if I am a human being, and you are too, we are human beings in the same way.

Second, individuals necessarily instantiate a said-of/essential property¹¹⁶. Individuals exist as essentially qualified, *tade tina*, namely, as instances of a species:

«those things [essential properties] are called substances within which, as species, the primary substances are included; also those which, as genera, include the species. For instance, the individual man is included in the species “man”, and the genus to which the species belongs is “animal”; these, therefore-that is to say, the species “man” and the genus “animal”,-are termed secondary substances»¹¹⁷.

Species, in turn, exist as instantiated universals, they are synchronically individuated. Synchronic individuation consists in the existence of the species simultaneously with the existence of its members. This is not a small matter since embodies the fundamental reason for the Aristotelian refusal of Platonic *eide*. To say it in today terms: the extension of a sortal term, for instance, “humankind”, consists in individual human beings, not in an ontologically separated entity: to exist, a species must necessarily be instantiated in at least one individual.

Finally:

«Species and genus, however, do not merely indicate quality, as “white” merely indicates quality. Accident, that is, like white, means a quality simply and merely, but species and genus determinate a quality in reference to substance. They tell you what sort of a substance»¹¹⁸.

Here Aristotle holds that the said-of relation does not put really different things in contact, like the inherence relation does, but rather it reveals *of what sort* individuals

¹¹⁶ See *Cat.*, 5, 2a14-5. Frede claims that Aristotle denied the existence of universals understood as Platonic forms, whereas he accounted for the existence of properties instantiated by individuals. See Frede 1987b, p. 64.

¹¹⁷ *Cat.*, 5, 2a14-9.

¹¹⁸ See *Cat.*, 5, 3b18-21.

are¹¹⁹. Because of this, “this man” and “man” are synonym¹²⁰. Synonymy between “man” and “this man” is not a grammatical relation, but a metaphysical one, revealing the *structure* of an extra-mental thing.

On my interpretation, Aristotle’s usage of the said-of predicates implies that the species is what fully articulates what an individual thing *is*, since it provides the identity condition for an individual to exist as fixed and immutable entity. From a different viewpoint, a species-predicate answers the ‘What is it’-question because the “it” on which the question is put is a concrete individual thing necessarily instantiating a species, and this can be taken «as a brute fact»¹²¹. As Loux observes, «it is a primitive fact about individuals that they exist as species members»¹²². The predication “x is P” corresponding to x’s being P is an irreducible fact, it is the lowest level of knowledge, and is supported by the irreducibility of the biological subject, with respect to both its material structure and its functions.

To sum up. Intra-categorical predication suits the purpose of justifying the ‘What is it’-question₁ by referring to a species-predicate, and that allows intra-categorical predicates (sortals) to disclose the *structure* of the individual they are predicated of. The ‘What is it’-question₁, which is applied to a primary substance, calls for an answer that can be found among substantial predicates. Intra-categorical predication has not only to be understood as a linguistic device, but it has an ontological significance. As said, this essential feature stems from an Aristotelian “ontological” foundationalism, whose aim is to find out an ultimate subject of predication (with the primary substance as ontological equivalent) to avoid any infinite regress in predication.

§4. *Definitions Between the What and the Why*

¹¹⁹ Cf. *Cat.*, 5, 2b31.

¹²⁰ *Cat.*, 5, 3b8.

¹²¹ Cf. Loux 1991, pp. 34-6.

¹²² Loux 1991, pp. 4, 34.

«Definitions show what something is»¹²³, accordingly, the purpose of this paragraph is to investigate the interplay between the ‘What is it’-question and definitions. In what follows our focus will be especially on the ‘What is it’-question². Not only this: if definitions actually state what something *is*, and if to know what something *is* means to reach its causes as its explanation¹²⁴, the definitions have to do with the ‘Why is it’-question and explanation as well¹²⁵. Indeed, definitions connect the ‘What’-question and the ‘Why’-questions to each other. For Aristotle, by the act of defining, we say *what* the species *is*; we do that by expressing its *per se* attributes, and the *per se* features of a species have to do with its essence.

Let me clarify my point. After answering to the ‘What is it’-question¹ through the attribution of a species to a concrete individual. Aristotle moves to fulfilling the ‘What is it’-question according to a deeper degree of investigation, namely, to reveal *what* the species *is* in itself. But how to disclose the essential features of an item that in itself expresses the essential features of another item? What we are seeking for are those “intrinsic” features of a species that are *essential* to the specimens. Just like in the case of the ‘What is it’-question¹, the ‘What is it’-question² is a procedure that guides us to the essential properties of an instantiated species. To be clearer: the claim “Socrates is such-and-such”, rather than “Socrates is a man”, is supposed to reveal which essential features are associated with being a man. One could raise the following issue: if the relationship specimen-species I previously supposed to be unanalyzable, in what sense is Aristotle now admitting a further investigation? The Aristotelian inquiry is driven from a deeper metaphysical viewpoint: once established a primitive ontological status signified by a primitive logical claim, Aristotle delves deeper into the what-it-is-to-be of the universal: a higher intelligible element, the species. On the one hand, Aristotle needs

¹²³ Cf. *An. Post.*, B 3, 91a1.

¹²⁴ For causes are utmost *explanatory* and thus answer to the ‘Why is it’-question. Cf. *An. Post.*, I 2, 71b10–12; II 11, 94a20; *Met.*, A 1, 1981 a 28–30.

¹²⁵ In the *Analytics*, this will be matter of interpretation, but the nexus comes out plainly in the *Metaphysics*, even if the definable object is firstly the form, and the species only in a derivative way.

to ground metaphysics on a primary element, but on the other hand, this does not mean the inquiry ends. On the contrary, the metaphysical search into substance acquires the meaning of an inquiry into the cause of being a substance. This is the role played by definitions according to my interpretation of Aristotle's *Posterior Analytics*.

In sum, scholars seem to share the view that the essence of something “is captured in a predicate-expression attributed to the thing of which it is the essence”¹²⁶. This claim seems to lead however to an unwelcome consequence: if things can be defined by pointing to their essences, we have to admit a distinction between a thing and its essence. There is instead disagreement about this consequence. My point is that this idea is not inconsistent with what Aristotle states in *Metaphysics Z 6*, where he proves that primary substances (understood as the *substances of things*) are the same as their essence¹²⁷. The inconsistency does not hold, according to me, because the “primary things” that are identical with their essence are the forms of the species, not the species themselves that are not primary substances, as forms instead are, in the *Metaphysics*. The forms explain why species are such-and-such, therefore they cannot be identical with the species themselves, for otherwise they would not be explanatory. Since forms are the primary substances, they must be identical with their essence, for if they had an essence different from themselves they would not be primary substances as well. We shall see the distinction species-forms in detail later.

§4.1. A Preliminary Epistemic Reflection

Once stated the ontological interdependence between an individual and the species predicated of it, we can respond to the objection raised by some authoritative Aristotelian interpreters about a general lack of epistemic coherence in Aristotle. Many

¹²⁶ Cf. Angioni 2014, p. 77.

¹²⁷ For further discussion see §4.2. Actually, this will be the proof that definitions have to do with explanation, for the essence is both the ultimate answer to the ‘Why is it’-question and also *that* which *primarily* has a definition, according to the *Metaphysics*. For the present, I am not interested in the things that primarily have definition, but in the species, which have a definition anyway.

commentators maintained, indeed, that a split “between the real and the intelligible”¹²⁸ is located within the Aristotelian works and it stems from two apparently «incompatible strands of thought»¹²⁹. On the one hand, we find the individual *tode ti* as the bedrock for epistemic foundationalism. On the other hand, anyway, scientific knowledge has to do with universals. How to solve this tension?

We previously credited the common-experienced individual to be at stake in order to ground knowledge *tout court*, because of its primary ontological and logical role¹³⁰. This evidence bears witness to the Aristotelian most empirical attitude towards what primarily is acquainted (by means of perception, opposed to deductive or scientific knowledge¹³¹) because of its ontological priority, since it sustains the existence of any non-individual or non-substantial thing¹³². Individuals are “the bricks of reality”.

So far, so good. Things get provisionally discouraging once scientific-demonstrative knowledge, or *episteme*, is introduced in *Posterior Analytics*. Scientific knowledge is of the *universal*¹³³, whose definition is «that which is of such a nature as to be predicated of many subjects»¹³⁴. What is universal is the most (scientifically) knowable object, whereas particular things are “merely” objects of sense-perception¹³⁵. This is the Platonic legacy¹³⁶. This twofold tendency leads to an *aporia*, which I report with Walter Leszl’s words:

¹²⁸ See Cherniss 1944, p. 340.

¹²⁹ See Leszl 1972, p. 278.

¹³⁰ For further proofs, see *Cat.*, 5, 2b15-6.

¹³¹ Cf. *An. Post.*, A 18, 81b1-9.

¹³² Cf. *Cat.*, 5, 2b3-6.

¹³³ Cf. *An. Post.*, A 24, 86a6-9 and 29-30.

¹³⁴ See *De int.*, 7, 17a39-40. Here, I make the case for the most overall meaning of the term, whatever it refers to: universal sentences and demonstrations (*An. Post.*, A 24, 85b15-6) or definitions or even predicates.

¹³⁵ See *An. Post.*, A 31, 87b28-88a17.

¹³⁶ According to Zeller 1921 but already Werner 1910.

«The difficulty now mentioned can be formulated more precisely by means of the following, incompatible, propositions: (1) What has full existence, what belongs to the higher order of reality, is the individual substance and not what is universal [*Cat.*, 5, 2b5; *Met.*, 1, 1028a25-31]; (2) the object of knowledge is what primarily is [*An. Post.*, B 10, 93b32-3]; (3) knowledge, i.e., science in the strict sense (which involves the use of definition and demonstration) is of the universal, has nothing particular as its object [again *An. Post.*, A 24, 86a6-9; 29-30, *Met.*, Z 15, 1039b27; 1040a7]»¹³⁷.

The above-mentioned ontological commitments¹³⁸ help us to disentangle this *prima facie* discrepancy. First, the universal species is only apparently derivative with respect to the individual (which is said *to be* primarily); indeed the individual exists in an essentially qualified way, as a species member; in turn, the species exhibits the same degree of existence as its specimens. Second, even if knowledge applies to what universally *is*, this could not *be* apart from what particularly *is*¹³⁹. Roughly speaking, the impossibility for a *tode ti* to be an unqualified individual, or a “brute this”, together with species’ dependence on the existence of its members, avoid the inconvenience of claiming that individuals are unknowable and universals do not exist at all.

§4.2. *The Roles of Definitions*

We can approach a definition as a linguistic tool which, albeit secondarily, concern not only species, but also their specimens¹⁴⁰. Evidence is supplied by the *Categories*:

¹³⁷ See Leszl 1972, pp. 278-9.

¹³⁸ This is also stated in *Met.*, Δ 6, 1016b6-9 and 35-6.

¹³⁹ Cf. *An. Post.*, A 24, 85b15-21.

¹⁴⁰ Aristotle excludes that definitions are reached through the knowledge of singulars only. See *Met.*, Z 15, 1040a5-7. Here Aristotle seems to say that the individual made up of matter and form cannot have a definition because of its being unique. Witt explains this passage in a slightly different way: since individuals have essences, at least the essence of their species, and what has an essence has also a definition, individuals can have a definition. See Witt 1989, p. 109.

«both the name and the definition of the predicate must be predicable of the subject. For instance, “man” is predicted of the individual man. Now in this case the name of the species man is applied to the individual, for we use the term “man” in describing the individual; and the definition of “man” will also be predicated of the individual man, for the individual man is both man and animal. Thus, both the name and the definition of the species are predicable of the individual»¹⁴¹.

Here, definitions are applied to both primary and secondary substances¹⁴². Definitions make perfect sense in the framework of the synonymy relation¹⁴³, since they can be predicated equally of the individual thing and of its *way of being* (i.e., of the species)¹⁴⁴. In this particular passage, secondary substances are the true “objects” of the definitional practice, since definitions-attribution is a matter of universal knowledge¹⁴⁵ concerning all and only the specimens of the same species. This is borne out also by Aristotle’s suggestion that a subject *instantiates* a species because the species’ definition shows the *what-it-is* of the species itself¹⁴⁶—what-it-is-to-be a tiger, for instance.

Honestly, things get harder as we look into the relationship holding between substance and definition. Even if the claim that the secondary substances of the

¹⁴¹ Cf. *Cat.*, 5, 2a19-25.

¹⁴² We take for granted that, for Aristotle, substances are the only definable things. See *Met.*, Z 5, 1031a1. Not however because they alone really are, but just because they are mainly addressed as definable. Moreover, of non-substantial things Aristotle seems to yield a different definitional procedure, because they rely on substance for their existence and, thus, for their definition. Definitions of non-substantial things include a reference to a different category, what does not happen in the cases of the items included into the category of Substance. For a standing-out voice see Furth 1988: he claims that the same conceptual scheme is relevant also in the cases of definitions-seeking non-substantial things.

¹⁴³ Cf. *Cat.*, 5, 3b6-9.

¹⁴⁴ Cf. *Cat.*, 5, 3a33-6.

¹⁴⁵ Moreover, only what is universal helps to «make the explanation plain» (*An. Post.*, A 31, 88a5-6). See also *Met.*, Z 15, 1039b27-1040a6.

¹⁴⁶ Cf. *An. Post.*, A 4, 73a37; compare also with *Met.*, Δ 18, 1022a26-8; Z 4, 1030a6-11, 17-20; 1030b3-6; Z 5, 1031a1.. For further analysis, see Loux 1991, pp. 74-5.

Categories are definable does not appear very troublesome, the claim that species are the *primary* definable objects must be approached carefully. Below I shall take the *Posterior Analytics* as guideline, for in this work definitions will be mainly considered with reference to their *role* of fulfilling the ‘What is it’-question and their function as linguistic equivalence of essences, the proper answer to the ‘Why is it’-questions¹⁴⁷.

If not said otherwise, to be clearer, in my analysis of definitions I will avoid any commitment into the scholarly debate over the *proper* object of definition, a very thorny matter for now¹⁴⁸. In the literature, it is a commonplace that, for Aristotle, *man*, *horse* and so on can be defined. But Aristotle makes it clear, in the *Metaphysics*, that “man” is *non-univocally* predicated of different things¹⁴⁹, for instance, Socrates, the species *man*, the form of thehylomorphic composite¹⁵⁰. Which of these items is the authentic reference of the definitional formula for “man” is challenged by Aristotle in the *Metaphysics*, so we must proceed carefully when identifying the proper object of definition lightly. It is quite plain, by contrary, that in the *Categories* secondary substances are true definable things. This is the reason why I shall start from here to derive my argument.

The *Posterior Analytics* offer us a further extensive search into both the ‘What/Why is it’-questions¹⁵¹. In what follows, I shall provide a better characterization for definitions by turning to the texts. I will illustrate why definitions follow name-attribution, to set them in our theoretical framework. Indeed, definitions needs to be

¹⁴⁷ Within the *Analytics*, this role is largely working into the context of demonstrative knowledge. Anyway, I shall pay attention to the act of defining something, released from its place in deductions.

¹⁴⁸ On this topic, see e.g. Driscoll 1981, Code 1984, Frede-Patzig 1988, Gill 1989, Frede 1990, and Loux 1991.

¹⁴⁹ Cf. *Met.*, Z 10, 1035a7-9; 1036a13-25; H 3, 1043a29-b4.

¹⁵⁰ For a clear account on the object of definition, see Frede-Patzig 1988 and Gill 1989.

¹⁵¹ As explicitly raised: “We seek for four things: the fact, the reason why, if something is, what something is” (*An. Po*, B 1, 89b24-5). Even if the treatise holds together demonstrative and definitional practice, my focus will be only on the latter.

grounded on *what there is*, for they must be *real* other than nominal: they must bring to light the essential and constitutive properties of *what there is*, replicating the scheme previously applied in the case of the ‘What is it’-question¹ and individuals.

§4.2.1. First Role (I): Theoretical Fulfillment of the ‘What is it’-question

As previously stated in §2, the ‘What is it’-question both provides us with the sortal and the definition of something, for “to know what something is” means to know its name and definition, and from here we can start investigate its essence. Let me provide now some textual evidence from the *Analytics* in support of the claim that, when passing from the *Categories* to the *Posterior Analytics*, the ‘What is it’-question “evolves” methodically from species-attribution to definition-acknowledgement.

In the *Posterior Analytics* Aristotle holds that the practice of defining develops following few criteria: for instance, by the act of defining, we state what a *name* signifies¹⁵², but at the same time, we do not mean to state that *what is defined* actually has a reference¹⁵³. Only things that *are* can have a real other than a nominal definition¹⁵⁴, and the *Categories* can be interpreted as providing the basic ontology, based on individuals and instantiated species, which foreruns the search into the “significance” of the name. These two conditions, at least, make perfect sense in the framework of the previous reasoning on the scope of definitions, only attachable to real things, individuals that *are of a certain sort*, and posterior to the logical and ontological practice of name-attribution. In fact, Aristotle concedes that even “goatstag” has some sort of definition, specifically the one that states what “the general term” means¹⁵⁵. But only instantiated-secondary substances can have real definitions, because only what

¹⁵² By the “name”, Aristotle refers to the sortal term indicating a secondary substance, whose relationship to primary substance I earlier illustrated.

¹⁵³ See *An. Post.*, B 7, 92b19-25. If defining any term would provide us that which *is*, unreal entities would exist.

¹⁵⁴ Lexicon taken from Locke’s *Essay*.

¹⁵⁵ See *An. Post.*, B 8, 93a25-6.

actually exists (*is* of some sort) has a metaphysical *nature* that can be further investigated. Indeed the third criterion in the definitional practice consists in “pointing at” the essence¹⁵⁶.

§4.2.2. *First Role (II): Practical Fulfillment of the ‘What’ by Means of Genus-Differentia Predicates*

How do definitions actually state *what something is*? In the *Categories*, Aristotle holds that definitions must include, at least, two components:

«For it is by stating the species or the genus that we appropriately define any individual man; and we shall make our definition more exact by stating the former than by stating the latter. All other things that we state, such as that he is white, that he runs, and so on, are irrelevant to the definition»¹⁵⁷.

Here, the goal of definition consists in rephrasing a *definiendum*—generally, a species term—by referring to the proximate genus and the specific *differentiae*. For instance, the definiendum “man” is definable by reference to “animal” and “two-footed” plus “wingless” plus “mortal”—this is not an exhaustive example of definition, anyway. We must not understand the scheme genus-difference in an “absolute” sense: “vertebrate” is the genus with respect to “two-legged”, which is a *differentia*, but “vertebrate” is also a *differentia* with respect to “animal”, which is a genus¹⁵⁸.

In the *Categories* Aristotle seems to suggest that one has first to identify the genus as the *ti esti* of the definable thing, an intra-categorial predicate referring to several *definienda*; then, one has to choose the most relevant *differentia*, a qualifying

¹⁵⁶ See also *Met.*, Z, 5, 1031a11-4.

¹⁵⁷ Cf. *Cat.*, 5, 2b31-6. Compare with *Top.*, Z 4, 141b25-7 and *Met.*, Z 12. Moreover, per se predicates should be limited in number (see *An. Post.*, A 22, 82b39-40; 84a9-11), and they should state the *ousia* of things (*An. Post.*, A 22, 83a30-5).

¹⁵⁸ See Balme 1962.

(*poion ti*)¹⁵⁹ feature representative of the *definiendum* alone. Aristotle does not rule out the possibility for many differences to enter into a definition at the same time; it is customarily when biological species are at stake to include more than one difference in the definition.

At a superficial glance, the *differentia* seems less important in the definition, both because the genus is said to be prior in knowledge¹⁶⁰ and because it has the power of revealing the real *nature* of the substance to be defined¹⁶¹. But on closer look, the difference “assimilates” or “incorporates” or “includes” the genus, as “two-footed” includes “footed”: it is the genus therefore that seems redundant¹⁶². Ergo, the difference as well is capable of showing the *ti esti* of the *definiendum*. Some scholars account for the relationship between the species and the genus according to the scheme “determinable-determinate”. For instance, Granger holds that the *differentiae* simply are “more determinate forms of the genus and the genus is nothing apart from its *differentiae*”¹⁶³, so the last difference incorporates the higher *differentiae* and thus the genus. This is the reason why, ultimately, the *definiens* can be *reduced* to the last *differentia*¹⁶⁴, since this latter “includes” its higher genera¹⁶⁵. From here, many

¹⁵⁹ «Qualifying with reference to substance» (*Cat.*, 5, 3b15-21).

¹⁶⁰ An ontological priority comes to be disclosed in the definitional order, as expressed in the *Posterior Analytics*: *what causes something* is prior to it by nature, and even in the definitional practice this prescription must be respected. Compare also with *Top.*, Z 11, 149a14-28.

¹⁶¹ See *Top.*, Z 3, 140a27-9. Several passages seem to give evidence to the non-substantiality of the difference, to the inter-categorical value of the predicates of *differentiae*. See e.g. *Cat.*, 5, 2b29-31; *Met.*, Δ 14, 1020a33-6; H 2, 1042b33-9. Some other passages, instead, state the opposite: see e.g. *Cat.*, 5, 3a25-31. Granger 1984 identifies three different approaches to the genus-differentia relationship in Aristotle.

¹⁶² See *Met.*, Z 12, 1038a22-4.

¹⁶³ See Granger 1984, p. 17.

¹⁶⁴ *An. Post.*, II 13, 97a17-9, but also *Met.*, Z 12, 1038a19-20; 29-30.

¹⁶⁵ With this insight as background, many envisaged an Aristotelian attempt to establish a hierarchy of differences, corresponding to a sort of taxonomical classification. See footnote 4.

questions arise: first, is only the last difference that picks out the essence of the species, or even the genus must be anyway included in the definition. In the former case, arguments are needed to “get rid” of the genus; in the latter case, one must explain why genus is not redundant in definitions, after all. A second interesting question can be about clarifying the ramification of the above mentioned-issues, if definitions are taken to envisage more than one difference at once. There is no room here to deal with all these questions in every detail. For my argument it will suffice to discuss the assumption that the difference is the very defining element. It has a strong impact in the issue of expressing the essence of the species defined.

With Granger’s interpretation in mind, we can understand all those passages from the *Metaphysics* where Aristotle purports the view that definitions *are* actually one single thing, even if they are composed of parts¹⁶⁶, together with the view that definitions actually refer to one thing taken as a whole and not to its parts¹⁶⁷. This is the greatest issue left unresolved in the *Organon*, as Aristotle points out in the *Metaphysics*¹⁶⁸.

In *Metaphysics* Z 12, Aristotle confesses that how all the differences involved into a definition arise from a unitary and unique object of definition is problematic. In *The Parts of Animals*¹⁶⁹, again, Aristotle says that defining by genus-*differentiae* is useless in fact. It is not a sufficient condition for the unity of definitions that several features—which belong to something—are simply gathered together in a defining-look like expression. The cases for natural species is particularly irksome, since no decisive definition is provided by Aristotle for a species-term, neither for *human being*, whereas

¹⁶⁶ See *Met.*, Z 12, 1038a5-8; 19-20; 29-30.

¹⁶⁷ «A definition is an account, and every account has parts, and part of the account stands to part of the thing in just the same way that the whole account stands to the whole thing» (*Met.* Z 10, 1034b20–22). According to Bostock’s commentary on the *Metaphysics*, the unity Aristotle refers to is the species, thus the question in Z 12 is: How can a compound formula and a simple word signify the same thing? See Bostock 2003, pp. 176-83.

¹⁶⁸ See *Met.*, Z, 12, 1037b8-9.

¹⁶⁹ Cf. *De Par. an.*, A 2-4.

the essence of it is taken for granted and identified with “the soul”¹⁷⁰. Let suppose that Granger’s scheme “determinable-determinate” provides us with a good tool to solve the problem. In this case, if the *differentiae* are obtained by “differentiating the *differentiae*”¹⁷¹, the last *differentia* will entail the definition¹⁷² in its entirety, so that the entire definition will be reduced to only one element (which alone will express the essence of the thing defined). This conclusion, though, raises two major problems, which show that the question of the unity of definitions cannot be solved only with reference to the determinable-determinate scheme.

First, there is a textual problem, which concerns the non-inclusiveness of the proximate genus into the last *differentia*. Of course, “two-footed” is said to include “footed”, but the reducibility of “animal” to “two-footed”—in order to have a unique-worded definition for “man”—is stated by Aristotle nowhere. Although the defining thing is supposed to be simple, Aristotle seems to concede that the definition is syntactically complex.

The second problem is methodological and concerns multi-*differentiae*-assembled definitions, such as “humankind”, the case to which I limit my attention. Aristotle offers us several possible features, jointly converging into incomplete definitions for humankind: biped, wingless, animal, mortal.... Even if these *differentiae* are achieved by division of the genus—so as to comprise any intra-categorical predicate under the genus—, how they actually pick a unified thing rather than its parts is left unanswered. The definition of man as “wingless, two-footed animal” may refer to three different features of humankind, rather than to the unique essence of it—for if something is a unitary thing, just like a species, also its essence must be unique. For the

¹⁷⁰ Cf. *De an.*, A 1, 402a5; B 1, 412a19-21; see also *Met.*, Z 10-11.

¹⁷¹ Cf. *Met.*, Z 12, 1038a9.

¹⁷² «If the genus remains in some sense a part of the species and the species is defined by the *differentia*, then the *differentia* would certainly seem to entail the genus» (Granger 1984, p. 17).

moment, we can end here our discussion of the topic of the unity of definition¹⁷³ and return to the linguistic components of definitions.

§4.2.3 Second Role (II): Explanation by Means of Per Se Predication

Throughout the *Topics* and the *Metaphysics*, Aristotle repeatedly deals with definitions and their task of expressing the essences. The essence, or the what-it-is-to-be, is the explanatory factor of something because it causes it to be *what it is*. This theme is pressing also in the *Analytcs*, where Aristotle says that you know what something is (by defining it) as soon as its *explanation* is unveiled¹⁷⁴, suggesting in this way that definitions and explanations are interdependent¹⁷⁵.

Here, I use “explanatory” as suggested by some commentators, a sort of predications that fully makes something “clearer” by selecting its most relevant features, and that, at the same time, reveals the essential nature of the subject¹⁷⁶. I will say that, according to Aristotle, both in the *Analytcs* and in the *Metaphysics*, we know the cause of something as soon as we know its intrinsic *constitution* or what makes that very thing *what it actually is*. The *per se* predicates, the linguistic constituents of definitions, refer to the inner constitution of the species, to its metaphysical form¹⁷⁷. The inner constitution of a species—actually only its formal components upon which material components depend¹⁷⁸—is the essence. Thus, the definitional formula reveals what is

¹⁷³ A conclusive solution is provided by Aristotle in *Metaphysics* H. For a thorough discussion see Frede-Patzig 1988 and Bostock 2003.

¹⁷⁴ Cf. *An. Post.*, B 2, 90a6-8; *Met.*, Z 17, 1041a26-33.

¹⁷⁵ According to the Aristotelian jargon, “cause” and “explanation” must not be understood according to our commonsensical Humean-borrowed way. The theory of the four causes (*Phys.*, B 3; *Met.*, Δ 2, 1013a24-34) bear witness to such discrepancy between the contemporary and the Aristotelian usage of the term. On this, see Frede 1987b, pp. 49-71, and Witt 1989, ch. 3.

¹⁷⁶ See Ferejohn 2013, p. 97, and Angioni 2014, pp. 76-7.

¹⁷⁷ The *propria* are excluded. These latter are those that can be attributed to all and only the members of the same species, but that nonetheless are not essential to it.

¹⁷⁸ Cf. *Met.*, Z 7, 1032b1-2; Z 10, 1035b32; Z 11, 1036b28-30

causally responsible for a thing's being¹⁷⁹, they are «the epistemological counterpart of essence»¹⁸⁰, namely, linguistic formulations of what *causes* something to be *what it is*¹⁸¹.

If we are to explain a thing's being—the traditional Aristotelian example is leaf loss with reference to broad-leaved trees—, we have to follow a procedure whose purpose is, roughly speaking, to indicate the cause of that thing¹⁸², what is more intelligible. Let me quote a passage from the *Metaphysics* where Aristotle makes explicit this point:

«one could ask why a man is such a kind of animal. [...] what one asks is why it is that one thing belongs to another (it must be evident that it does belong, otherwise nothing is being asked at all.) Thus one might ask why it thunders, for this is to ask why a noise is produced in the clouds [...]. It is clear then, that what is sought is the cause—and this is the what-being-is [...] that for the sake of which the thing exists [is in some way]»¹⁸³.

At first sight, definitions are supposed to rephrase a species predicate, to provide an *intensional* condition for species-attribution, that is, the predicate “to be man” and the predicate “to be such-and such” must be the same. But the function of definition is actually far from being merely “descriptive”. Definitions play an ontological role which consists in seeking for a causal factor, an intrinsic causing feature that renders the thing

¹⁷⁹ For the essence is the cause of the being of something jet in *An. Post.*, B 8, 93a3.

¹⁸⁰ See Galluzzo 2006, p. 78. Compare with *Top.*, A 4, 101b21-37; A 8, 103b9-10, and *Met.*, Z 4, 1029b13, 1030a6-8.

¹⁸¹ As Charles suggests: « Interdependence between the practices of explanation [deducing the cause by means of a syllogism] and definition is matched by a further metaphysical claim: that the essence and the explanantia and explananda cited in structural explanation are co-determined. [...] Indeed, a feature can only be essential if it is the per se structural cause, and can only be the latter if it is essential. The thesis of the co-determination of essences and explanantia concerns the structure of reality rather than our practices of defining and explaining» (Charles 2000, p. 248).

¹⁸² By means of the Platonic *diairesis*. See *An. Post.*, B 13, 97a23, 97b25.

¹⁸³ Cf. *Met.*, Z 17, 1041a22-8. Compare with *An. Post.*, B 1-2.

into question higher intelligible¹⁸⁴. “To explain a thing” precisely amounts to providing the most intelligible reasons for the *being* of something, namely, to supplying for an «intensional immediacy»¹⁸⁵.

This is made possible since definitions, for Aristotle, must pick out the so-called “*per se* determinations” of a thing:

«Something holds of an item in itself (*kath'hauto*) both if it holds of it in what it is—e.g. line of triangles and point of lines (their essence comes from these items, which inhere in the account which says what they are [the definition])—and also if what it holds of itself inheres in the account which shows what it is—e.g. straight holds of lines and so does curved, and odd and even of numbers, and also prime and composite[...]. Similarly in other cases too it is such things which I say hold of items in themselves. What holds in neither way I call incidental, e.g. musical or white of animal»¹⁸⁶.

The following formulation represents the first case: P is predicated of S *kath'hauto* iff P is predicated of S and P enters into the definition of S. Here an example: “line” is predicated of “triangle” *kath'hauto* because “line” is predicated of “triangle” and “line” enters into the definition of “triangle” (triangle is in fact a three-sided figure). The second case, less useful for our purpose, is of the form: P is predicated of S *kath'hauto* iff P is predicated of S and S takes part into the definition of P¹⁸⁷. In this latter case a *kath'hauto* predicate does not take part into the definition of its subject. For example, “odd or even” is predicated of “number” and “number” takes part into the definition of “odd and even”, not vice versa¹⁸⁸. In the *Topics*, the former kind of predication is called

¹⁸⁴ Cf. *An.Po.*, A 2, 71b9-11; B 11, 94a20.

¹⁸⁵ Ferejohn 2013, p. 96; cf. *An. Post.*, B 9, 93b21-7.

¹⁸⁶ Cf. *An. Post.*, A 4, 73a34-73b5. See also *Met.*, Z 5, 1030b18-26.

¹⁸⁷ This “formalization” is inspired by Barnes 2003, pp. 112-4.

¹⁸⁸ Cf. *Met.*, Δ 30, 1025a30-2. I take the disjunctive property odd or even to play the role of *per se* predicates: it is a falsehood that all numbers (integers) are odd, but every number is odd or even.

“essential” or “in the what-it-is”¹⁸⁹, while many commentators call the latter “in itself incidental”¹⁹⁰.

Setting this distinction in our framework of the definitions of biological species, an instance of the former case is given by “animal” that is predicated of “man” because “animal” belongs to the definition of “man”. On the contrary, an instance of the latter is given by “femaleness” and “animal”, for femaleness cannot be defined without animal, but it does not participate into the essence of animal. Generally speaking, when a predicated P is said of something S *kath’hauto* in the first sense, S cannot fail being P, thus it is necessarily that S is P.

Kath’hauto predication is bound to essence inasmuch as the essence of something consists in what “that thing is said to be in itself”¹⁹¹. *Kath’hauto* essential predicates are related to their subject universally and necessarily and they capture the essence of the subject¹⁹². Accordingly, the role of definitions is to present an additional account of *what something is*¹⁹³ in terms of its essential predicates, achieved through

¹⁸⁹ See *Top.* A 4, 101b22.

¹⁹⁰ See Granger 1981. “Coincidental” is preferred by Ferejohn 2014, p. 91.

¹⁹¹ Cf. *Met.*, Z 4, 1029b13.

¹⁹² According to Angioni, in the *Posterior Analytics* there are at least three usages of *kath’hauto* with reference to the predicates—essential predicates and *propria*—, one with reference to the subject—things existing in themselves or independently—, in the *Analytics*. He stresses the Aristotelian *lôgikos* approach to definitions, which brings the issue as to discover the essence and definition of a contingent composite, as opposed to the metaphysical approach in the *Metaphysics*, where «it remains open whether this *lôgikos* definition is helpful for establishing that the *ousia* of a substance is its essence» (Angioni 2014, p. 86). Compare with Barnes 2002, p. 112.

¹⁹³ Cf. *An. Post.*, B 10, 93b32.

differentiation of the genus¹⁹⁴, or by any other method¹⁹⁵—indeed genus-difference predicates are predicated *kath'hauto*. In different terms, only *kath'hauto* or *per se* essential attributes are involved in definitions¹⁹⁶: these former disclose *what something is*, simultaneously they point at its essence. In particular, definitions, composed of such-and-such (*per se*) properties, *reveal* the inner and more intelligible structure of *what there is*, or explain the what-it-is-to-be for something¹⁹⁷.

§4.2.4. Second Role (II): Explanation through Demonstrations

The task of definitions in answering the ‘Why is it’-question is also strengthened by their role within demonstrative knowledge. This concerns explanatory syllogisms. To *explain* something amounts to making its cause explicit, and definitions are explanatory in two ways. The first is a corollary of the foregoing paragraph: definitions are formed by *kath'hauto*-essential predicates; indeed, they disclose the real nature of the defined thing—moreover, they properly refer to essences, which are utmost explanatory. The second reason why definitions are explanatory is that they are involved in demonstrative science¹⁹⁸, which aspires to reach the causes¹⁹⁹.

Explanations occur in several study-fields and it is customary to link them to demonstrations. The query to be solved consists in clarifying *why* the explanatory force

¹⁹⁴ Here, something ontological is detected. On the opposite, Aristotle considers the Platonic method of division only a conceptual tool. See *An. Post.*, B 13, 97a23-6.

¹⁹⁵ LeBlond 1979 claims that Aristotle proposes at least three different and incompatible schemes for definitions: a) definitions by genus-difference; b) definitions by a primary causal feature; c) definitions by matter-form. On the contrary, Charles argues a) and b) are to be identified in the context of the Analytics, because of the interdependence of the practices of differentiating and explaining. See Charles 2000, pp. 247-8.

¹⁹⁶ Cf. *An. Post.*, B 13, 97a24-5. Also *An. Post.*, B 4, 91a16: «What a thing is both is proper to it and is predicated in what it is».

¹⁹⁷ See also Cohen 2009, ch. 12.

¹⁹⁸ Cf. *An. Post.*, A 7, 75b18-21.

¹⁹⁹ Cf. *An. Post.*, B 2, 90a6-7.

“weighs” on definitions—as components of demonstrations—rather than on demonstration themselves. It is quite plain to show how definitions play this role of explanatory factor.

The answer is that demonstrations derive their explanatory role by assuming definitions as bricks of the demonstrative procedure²⁰⁰. What is looked for in a demonstration is the *what* or the *why* a phenomenon is²⁰¹, necessarily achieved by a valid procedure that necessarily follows from the assumptions—for otherwise it would be not a demonstration at all. Therefore, whenever a demonstration provides an explanation or an essence, these must have been already present in the premises.

Now, Aristotle did not exclude that the conclusion of a syllogism reveals the essence of a thing, thus, suppose it is the case. If the conclusion of a syllogism follows by necessity from the premises, and the conclusion points at the essence of something or it is its explanation, these latter must have already been present, in some way, in the premises²⁰². Among the premises, indeed, there are definitions, whose explanatory force demonstrates the explanatory force of the syllogism.

§5. *The ‘Why is it’-Question: Essences as Principles/Causes*

This is the central paragraph of our work. Here I shall deepen into Aristotle’s essentialism, assuming that we better understand his philosophy if we suppose that two forms of essentialism are present in his works. The first form is based on the essential-properties attribution especially developed in the *Categories*, and the second one revolves around the notion of formal cause, or principle, which is instead addressed in the *Metaphysics*.

But first, a clarification is required to locate essentialism within our general framework about the ‘What/Why is it’-questions. We stated that the principal role of the metaphysical inquiry is to give a complete account on what things *are*, from a more

²⁰⁰ A clear account is provided in Ferejohn 2014, ch.3.

²⁰¹ See *An. Post.*, B 13.

²⁰² Aristotelian reasoning can be found in *An. Post.*, B 8, 93a1-28.

“naive” to a refined degree of investigation. In the *Metaphysics*, Aristotle reaches the finest accomplishment of his metaphysical project, as we have interpreted it so far, for he provides the answer to the ‘Why is it’-question, namely, he explicitly makes the point as to why something is *what it actually is*. By answering to the ‘Why is it’-question one provides the explanatory factor responsible for the being of something, according to Aristotle; indeed, the deeper metaphysical answer to ‘what something is’, consists in a full understanding of something by the knowledge of the “why something is what it is”²⁰³, namely, in virtue of its essence.

By delving deeper into essences, Aristotle supplies an insight into what *explains*²⁰⁴ the existence of everything but whose being is no further explainable, something basic and foundational at a deeper level of investigation, besides the commonsensical commitments formulated in the *Categories*. The new line of thought assumes that commonsensical things²⁰⁵, together with their specific properties, *have* essences that are different from those things themselves, for otherwise essences would not explain anything. Moreover, what emerges from this framework is that, given that *what causes something* comes first²⁰⁶—even if it is reached later in knowledge—, the essence of things we called “substances” is the *substance of* substances at a lower metaphysical level. The status of essences—as *substances of* something—differs from the status of things of which they are essences of. A proof for this is that not the things themselves, but the *substances of* them are said to be identical with their essence. Essences, then, acquire the status of metaphysical primary substances, opposed to individuals as sensible primary substance. In the *Categories*, primary substances are identified with the concrete individuals of common experience, so no reification of essences is allowed. If essences existed alongside the individuals, they would have

²⁰³ See *Met.* A 1, 980a20-982a3; B 2, 999b12-20.

²⁰⁴ A ‘Why is it’-question is a question about the explanation of something.

²⁰⁵ By “things”, I refer here to the universe of the *Categories*. Cf. Angioni 2012.

²⁰⁶ When we ask for the why something is *what it is*, we are asking for its causes, which are supposed to forerun our object of inquiry. Cf. *An. Post.*, A 2, 71b31; *Met.*, Δ 11, 1018b9-1019a14.

essences too and so on *ad infinitum*. In the *Metaphysics*, where the need for a commonsensical grounding commitment is left behind, Aristotle attaches a different meaning to “primary substances”: no more the bricks of commonsensical-sensible reality, but rather the metaphysical explanation of it, those causal factor in virtue of which what *that is real* is precisely *in the way it is*. The metaphysical deeper level of reality reached by Aristotle strengthens, rather than undermines, the commonsensical conception of individuals coming as essentially qualified entities, as will become clear in §5.1.

According to my interpretation, taking the essence as a causal factor, Aristotle provides us the reason for explaining both: 1) *why man*, understood as a species, is a such-and-such kind of animal, or why *man* is definable with reference to *per se* properties, and 2) *why Socrates* is actually a human being rather than a horse or an oak tree, or *why Socrates* is a such-and-such kind of animal²⁰⁷. Aristotle’s answer is that once the essence of a species—for essences belong to universals²⁰⁸— is identified, then the essence of the species is, at the same time, the essence of each specimen *qua* member of its species. In particular, the primary and basic status of essences explains the existence of anything else, instantiated species and their specimens. Thus, the essence is the reason in virtue of which a species is a such-and-such thing, for the essence explains *why* such-and-such features recur, and it also explains why an individual is *what it is* as a species-member, or why it exemplifies the common

²⁰⁷ Aristotle explicitly denies that Socrates has an essence that belongs only to him.

²⁰⁸ A distinction should be here introduced, and it will turn to be useful later, the one between i) things that *have* essences (i.e. the species of the composite things) and ii) things that *are* essences (i.e. the forms of composite things). See *Met.*, Z 10, 1035b27-32. I approach the Aristotelian controversial claim that «no universal is substance» (restated all along *Metaphysics* Z 13) in the light of this distinction: universals *have* essences in that they are definable, but they *are* not essences, for otherwise they would be the form of the composite rather than the composite itself. Therefore, since “essence” is said to be the primary meaning of substance in Z 8, and universals *have*, but they *are* not, essences, universals are not substances according to the ordinary usage of the term carried out in the *Metaphysics*.

characters of a species. Briefly: if the essence is what makes something *what it is*, hence something, a species or an individual, is *what it is* in virtue of its specific essence.

In particular, if Socrates is actually a man, the reason in virtue of which he is a human being is the same as the essence of humankind. By definition, “Socrates is a human being” means the same as “Socrates is a two-footed, wingless, rational (and so on) animal”. Such more extended expression suggests that belonging to a species means, for Socrates, to perform a series of functions—biped-walking, animal-behaving...—: the reason in virtue of which Socrates looks like and act in a certain human way is the cause of his being a member of humankind. This is valid for all the specimen of the same species: indeed the specific essence is both the reason or cause in virtue of which each specimen is *what it is* as species-member, and the reason why the species—understood as necessarily instantiated by individuals—is *what it is*, namely, a such-and-such kind of being. The unique answer to both i) and ii) stems from the understanding of essences as last explanatory item.

“Principle” is here the keyword²⁰⁹. The essence of Socrates as well as the essence of his species is explanatory because it is the principle or cause²¹⁰, that in virtue of which individuals can fulfill a series of functions²¹¹ (or on a logical level, that in virtue of which something is predicated of something else). A metaphysical principle, then, can be accounted for as an explanatory factor of reality, and can be considered “real” as soon as it establishes the functions associated with the *per se* features included into the definition of the thing.

The search into essences as principle or causes of *what there is*, clearly differs, in some relevant respects, from the search into the essential or said-of predicates of individuals, which has been our earlier subject-matter. In the *Categories*, *man* is essentially predicated of Socrates, since it is said-of Socrates, but in the *Metaphysics*

²⁰⁹ A principle satisfies the necessary condition associated with essence-hood, for instance: to be primary, to be-in things but not to be-a thing, and more.

²¹⁰ In the first book of the *Metaphysics*, “archē” and “aitia” are used interchangeably. Moreover, every cause is a principle (*Met.*, Δ 1, 1013a17)

²¹¹ Explicitly depicted by definitions.

Aristotle changes his point of view. Although *man* is an essential feature of Socrates, it is neither (a) the essence of Socrates²¹², nor (b) the essence of the species predicated of Socrates. The essence is that in virtue of which something belongs to something else, but the reason why man belongs to Socrates cannot be attributed to his “being a man”, neither his “being two-footed, wingless and so on”. Indeed, the attributes cannot come first the thing they belong to, for otherwise they should also be separable²¹³—and this is not the case, for Aristotle rejects the Platonic doctrine of Ideas. In other words, essences give us the *explanation* in virtue of which both a species exemplifies such-and-such properties and the *explanation* in virtue of which a specimen and its species are closely related.

We can here specify the reading we earlier only sketched out. The metaphysical investigation aims at reaching a deeper understanding of *what there is* by answering the ‘Why is it’-question. This led us to a deeper metaphysical stage where the being of individuals and species is supposed to be explainable with reference to a different item, namely, essences. In order to be explanatory, at least the essence must be something “coming first” individuals and species, a primary metaphysical reality. This will be the reason in virtue of which things are *what they are*. We shall see better this point in §5.1.

In §5.2. I will also maintain that, in the *Metaphysics*, Aristotle realizes that essences have no alternatives but to be principles or causes, not things or properties. The soul, which is the true essence for humankind, is nothing over and above Socrates, but a principle/cause by which we characterize the functions performed by human beings, like two-foot walking, to be rational and so on. If Socrates undergoes a certain principle or “depends” on a certain cause, he is what he actually is as species-member, because he performs the functions regulated by his form. The soul is a principle in virtue of which a number of functions occur, and these are in the subject as the result of the “activity” of the principle. The soul explains why a said-of predicate can be attributed to a subject.

²¹² I shall maintain that the essence *qua* essence must bring an explanation. On the contrary, the specific universal cannot be an essence since it comes together with the individuals that instantiate it.

²¹³ See *Met.*, Z 13, 1038b24-9

Finally the two forms of Aristotelian essentialism will be discussed in §5.3. These will be associated to the gradual metaphysical analysis and its issues. The former kind of essentialism is linked to the issue of the “subjecthood” in the *Categories*, lying at the heart of the ‘What is it’-question which provided the identity condition for things. The more sophisticated kind of essentialism is linked to the issue of “causehood” in the *Metaphysics*, stemming from the ‘Why is it’-question which presented the deeper but primary metaphysical level of knowledge.

§5.1. *Switching Subjects: from the Individual-Substance to the Substance-of*

In Aristotle’s works, the metaphysical inquiry into the concept of substance develops from individuals commonly considered together with their essential way of being to the reasons *why* individuals are *what they are*. The real aim of the ‘Why is it’-question consists in deepening into what we know at a first, superficial and commonsensical way, i.e. the ‘What is it’ level of knowledge. As made clear in Z 17, Aristotle claims that it is a nonsense to ask *why* a thing is the very thing it is, without a preliminary knowledge of it *in some way*²¹⁴. Namely, to ask why “a man is a man” for instance, is silly if we understand this question only *de dicto*. On the contrary, it is legitimate to ask *why* “this man is a man”, in a *de re* understanding²¹⁵. The ‘Why is it’-question aims at explaining the cause in virtue of which something *is* in some way, or logically speaking, why something is predicated of *something else*. This cause is the essence, what ultimately explains the specific instantiation and predication. Thus the search into the being as substance turns out to include essences, understood as the substances *of* the population preliminary provided, or primary²¹⁶.

This presupposes a switch in the notion of “priority” in the *Metaphysics*. Prior in being is no longer the individual thing of common experience, but that which is

²¹⁴ See *Met.*, Z 17, 1040b10-7.

²¹⁵ A more extended account is provided in Bostock 2003, pp. 242-4.

²¹⁶ The identification of *essence* and *primary substance*—according to the meaning of the *Metaphysics*—is carried out in *Met.*, Z 6, 1031a15-8.

metaphysically explanatory of *what there is*. The upshot is that the species attribution acquires a new meaning in the light of the analysis carried out in the *Metaphysics*: from being an unanalyzable matter of fact it turns out to be an *explainable* fact, but only at a deeper level of metaphysical investigation.

To better clarify the previous paragraph, let me return to the Aristotelian reasoning illustrated in §3. According to its prevailing meaning, “substance” refers to the primary substances recorded in the *Categories*: the individuals of common experience, described as qualified “*tade tina*”. Aristotle holds that individuals are primary substances because they cannot be predicated of anything²¹⁷—logically speaking—and they sustain the existence of everything else²¹⁸. Species are said to be secondary substances because of their distinctive role as predicates.

But even if individuals and their species are said to be members of the category of Substance, this is only the first step toward a clearer account of substance *qua* substance²¹⁹. Once achieved some understanding on *what there is* (that which exists in some essential way), to ask *why what there is* is what it actually *is* is legitimate²²⁰. Both the species and the *per se* attributes can be predicated of the individual because they signify an ontological relationship, and, in the *Metaphysics*, this becomes an explainable fact²²¹. What Aristotle looks for, in the *Metaphysics*, is fairly expressed by Frede:

²¹⁷ They avoid the criterion of the “said-of and being-in” (Cat, 5, 2a11-2)

²¹⁸ Cf. *Cat.*, 5, 2b15-7.

²¹⁹ Cf. *Met.*, Z, 3, 1029a33-1029b11.

²²⁰ Cf. again *Met.*, Z 17, 1041a22-8; and *An. Post.*, B 1-2. Once a basic ontology is provided, one can legitimately ask why something belongs to something else: in the case of the elementary ontology, one can ask why an individual belonging to a species has exactly such-and-such features rephrasing the species.

²²¹ An equivalent way of reasoning is expressed in *Met.*, Z 15, 1039b20-2. Here Aristotle says that composite substances are substances because something cause them to be what they are, whereas essences are substances (of) because they cause something to be a substance, thus essences are primary substances with respect to things that are caused.

«[...]the ordinary objects of experience are the objects together with their properties—an ordinary object has a certain size, weight, temperature, color, and other attributes of this kind. So, if we ask what is it that underlies all these properties and makes them the properties *of a single* object, we cannot answer: just the object. For the object, as ordinarily understood, already is the object together with all its qualities; what we, however, are looking for is that which underlies these qualities»²²².

It seems that a sort of skepticism is at work in pointing at the individual as the last subject of predication, because it does not provide the explanation as to why it is as *it actually is*²²³.

The Aristotelian reasoning as expressed by Frede is, briefly, that a thing itself cannot be responsible for its bearing essential—but also accidental—properties, for “something” underlies the species instantiation and said-of predication²²⁴. But if something *else* is responsible for the *being* of individual substances and their ontological and logical interdependence to specific universals, it thus must have a paramount role in metaphysics: and it is addressed as “substance” *of* things, whose status is of being primary. In *Metaphysics Z 3*, Aristotle explicitly switches the topic of investigation from individual-substances to the *substance of* them, «that which is more intelligible»²²⁵. From here on, the meaning of *substance* as *substance of* something must be of prime importance because it is supposed to answer the ‘Why is it’-question.

From an ontological point of view, the primary substances (*of*) acquire the meaning of primary realities because they are what underlies the existence of everything but whose existence is not further in question. Here it is undeniable that, even if Aristotle states that individuals taken together with their species can be further investigated, he still trusts in an ontological-foundational account providing for one last unanalyzable element upon which everything else depends on.

²²² Cf. Frede 1987b, p. 64.

²²³ Loux interprets this reasoning as a mental experiment of “stripping away” properties. Loux 1991, pp. 54-64.

²²⁴ This is plain as soon as things are considered as composites of matter and form

²²⁵ Cf. *Met.*, Z 3, 1029b3.

From a metaphysical viewpoint, moreover, the status of the substance of something is supposed to *explain* why individuals are such and such because it is metaphysically prior to individuals and their species. The primary substance (*of*), thus, has a different *nature* from what it is the substance *of*²²⁶: it has to be *kath'hauto*²²⁷. In fact, the primary substance is identical with its essence (as will be clarified later), namely, it is *what it is* only in virtue of itself (from *Metaphysics Z 6*). The *substances of* will consist in a new and different primary “item” in virtue of which we carry a substance-attribution out. This reasoning formally increases the Aristotelian previous metaphysical tools, switching what we called “primary substance” from a commonsensical macro-object, into a refined and more primitive element. Indeed, it is a principle what he looks for, according to my interpretation, one last un-caused cause²²⁸.

To sum up, if the previous reasoning is correct, we must attach a different sense to “primary substance” as primary meaning of being, quite far off the *Categories*’ meaning. What Aristotle is now looking for in the *Metaphysics* is not a primitive ontology or *what that is*, he is facing the metaphysical task of revealing what makes something *what it is*²²⁹. We can now delve more deeply into the reasons *why* Socrates is actually a man, which seemed apparently unexplainable once the individual of common experience was our first subject of inquiry. From a logical viewpoint, the said-of predication was supposed to be unanalyzable as accounting for a primitive relationship among individuals, meant as primary substances, and species as secondary ones. This

²²⁶ Cf. *Met.*, A 9, 991b18-21.

²²⁷ Cf. *Met.*, Z 6, 1032a5-6. On the contrary, again, individuals and species which can be explained with reference to their substance, depend on it and cannot be *kath'hauto*.

²²⁸ Cf. *Met.*, Δ 1, 1013a16-7.

²²⁹ According to Witt, this procedure would return a greater ontology increased with essences: «[...] Aristotle thought that the final resolution to the population question was posterior to an investigation of the nature of substance[...]. A final, complete answer to the population question depends upon a prior answer to the definition question (“we must first outline what a substance is”). This ordering of the two question makes sense, since it is only when we know what substance is that we can make secure judgement concerning which things are substances and which are not» (Witt 1989, p. 8).

was due to the essentialism of the *Categories*, according to which, by providing a species predicate, one is able to fix individuals as bricks of reality. Now I shall claim that the substances *of*, or metaphysical primary substances, *explain* specific predication because they are the metaphysical components that make the species predication possible²³⁰.

§5.2 *Forms, Essences, Principles*

It is now time to deal with what plays the role of substance *of* or primary reality. We can condense our position in some claims about it. In *Metaphysics* book Z Aristotle develops his most mature doctrine of the essence, hence, in what follows, I will use it as fundamental text.

First, the form is the primary substance. In *Metaphysics* Z 3 Aristotle lists the three candidates for the role of primary substance: the matter, the form and the *composite* of matter and form²³¹ (the composite of matter and form refers to individuals as well as to their species²³²). At the end of the chapter, Aristotle chooses the form as the best candidate for the role of substance *of*, or primary reality²³³.

According to Bostock's commentary, the most suitable candidate for the status of *substance of* must fulfill three conditions²³⁴:

- to be what that ultimately *underlies*;
- to be determined, or a "this"²³⁵;

²³⁰ Actually, definitions already paved the way to a sharper analysis into species membership, as they point the out said-of or essential features linked to secondary substances. These features reveal that species have a complex structure to be further investigated.

²³¹ *Met.*, Z 3, 1029a2-5. Cf also *Met.*, Δ 8, 1017b10-6.

²³² *Met.*, Z 10, 1035b27-1036a3.

²³³ Cf. also *Met.*, Z, 15 1039b20

²³⁴ Bostock 2003, p. 85. Cohen envisages only the last two. Cohen 2006.

²³⁵ *Met.*, Z 3, 1029a28. Moreover, a brief and exhaustive definition of the primary reality as understood in the *Metaphysics* is expressed by Aristotle: « by "primary" I mean what is not expressed by one thing being in another which underlies it as matter » (*Met.*, Z 11, 1037b2-4).

- to be separable²³⁶.

Now, even if the composite is separable (it has independent existence) and it is also a *tode ti*, it is not a primary substance²³⁷, for it is *its being* that must be clarified, because it does not ultimately “underlies” its bearing properties. Indeed, the knowledge of the composites is shallow, whereas, by the knowledge of its metaphysical components, we can get its very being²³⁸.

Even the matter cannot be the primary substance, for matter is something undetermined at all by definition²³⁹, thus it is not separable (for separability seems to depend on determinateness), anyway it is object of controversy whether the matter is what ultimately underlies the coming-to-be and passing-away of individuals²⁴⁰.

Only the *form*, understood as element of the hylomorphic composites, seems to meet these conditions, and clues for its being the primary substance are provided in several passages. First, the form “underlies”²⁴¹: it is non-generated and source of the generation of individuals²⁴², so it is prior to the individual composite²⁴³. Second, the

²³⁶ *Ibid.* As for the meaning of “separable”, cf. *Met.*, Δ 8, 1017b17-20, for the substance *of* only exists in particular things, but it is the metaphysical cause of their coming-to-be as composites, thus it is supposed to be separable as a cause *in re*.

²³⁷ A species or an individual are not substances of themselves, for otherwise the analysis into their being as such would be redundant.

²³⁸ See *Met.*, Z 3, 1029b1-12.

²³⁹ See *Met.*, Z 3, 1029a20-6.

²⁴⁰ See Graham 1987.

²⁴¹ According to Bostock, what that underlies has the status of primary substance, but what it really means “to underlie” is a complex story. See Bostock, 2003, pp. 81-2.

²⁴² Cf. *Met.*, Z 8, 1033a31-3; b5-8.

²⁴³ Compare *Met.* Δ 11, 1018b9-12 with *Met.*, Z 3, 1029b1-12. The individual is posterior in the sense of “dependent”, see *Met.*, Z 3, 1029a31.

form is a “this”²⁴⁴, a determined item, rather than the composite (which is determined by it and it can be divided into its constitutive elements). Finally, the form is also understood as *separable* because it can be separately formulated from the composite²⁴⁵. Forms of composites, therefore, are primary realities, but whether forms are also the essences of species (and therefore individuals) or the explanatory factor in virtue of which something is *what it is*, remains unanswered in the light of *Metaphysics Z 3*.

Second, the primary substance (the form) is the essence. The analysis about essences is not always “plain” as depicted above. By the end of Z 3, Aristotle plans to deal with *form* according to its meaning as—primary—substance. Anyway, Z 4 begins by a rough description of what-being-is for something, as if he shifted the topic: Aristotle approaches the things—substances—that *have* an essence, rather than things that aim to *be* essences. According to Frede-Patzig, the untold reason in Z 4 consist in the Aristotelian precondition of identifying the form and the essence²⁴⁶.

At a first glance, this change of topic raises some complications. I previously introduced (footnote 208) a distinction between things that *have* essences and things that *are* essences: if something *has* an essence, a lower causing item is expected to explain the thing’s being; if something *is* an essence, its being is that which underlies the being of a portion of reality. It seems rather puzzling how something can *have* an essence and *be* an essence at the same time: the case for forms is anyway an exception. I wish to show that forms, understood as primary substances, both *have* an essence—thesis of Z 4 and 5—and *are* essences—thesis of Z 6—. The upshot will be that forms *have* essences because they are the primary definable objects, moreover forms *are* essences because are the primary realities.

²⁴⁴ See *Met.*, Δ 8, 1017b25; H1, 42a26-31. According to the interpretation of Owens 1978, the form is neither particular nor universal, but simply a *tode ti*, for “*tode ti*” is better translated as “individual” rather than as “particular”, which is opposed to universal.

²⁴⁵ In contrast to the matter which is totally undetermined. See Bechler 1995, ch. 2-3-4.

²⁴⁶ See Frede-Patzig 1988. Evidence is provided in *Met.*, Z 4, 1030a29-31, but the identification is made explicit in Z 7: «by form I mean the essence of each thing, and its primary substance» See *Met.*, Z 7, 1032b1; and also Z 8, 1033b5-7; Z 10, 1035b33-1036a2.

Just to start, let me analyze the following and apparently misleading Aristotelian claim:

«A what-being-is [essence], then, will belong to nothing but what is a form [*eidōs*] of a genus. Only these would have a what-being-is, for these seem not to be expressed by predicating one thing of another by way of participation, or as an attribute, or coincidentally»²⁴⁷.

Here Aristotle seems to deal with things that *have* an essence, among which we earlier identified individuals and specific universals. Anyway, if forms are supposed to *have* essences, and essences have a different status from what they are essences of, it should be added something *deeper* than forms in the metaphysical explanation of *what there is*. This argument could therefore weaken my interpretation of the hierarchical metaphysical analysis ending with forms as *what that is primary* (conclusion driven from the previous paragraph).

First, I shall try to solve this inconsistency by emphasizing an ambiguity over a term: the Greek word “*eidōs*” may receive a twofold translation, as “species” or as “form”. Over the last years, some scholars drew attention towards an unnoticed gap between the use of “*eidōs*” intended as “species” and its use as “form”²⁴⁸. As first pointed out by Balme, in particular, “*eidōs*” has been mainly translated as “species”, and this translation has influenced many interpretative issues. Balme says that «*eidōs* can refer to more general composite universals [E.g. *Gen. an.*, I 719a7; *Phys.*, V, 227b12] and also to the matterless essence at varying levels of abstraction [*Met.*, Z 1037a1; 1035b16, 32; H, 1044a36]»²⁴⁹. Which of the two uses is preferable is context-dependent. The general upshot will be: “species” is the correct translation if we are interested in discussing the universal that is attributed to the individuals, as identity condition or as structure-revealing feature; “form” should instead be preferred if we are

²⁴⁷ *Met.*, Z 4, 1030a11-3.

²⁴⁸ Balme 1962 and Balme 1987, Lennox 2001 and many others, versus Irwin 1988 and Woods 1993.

²⁴⁹ Balme 1987, p. 296.

interested in metaphysics, i.e. in singling out the functional principles driving life of the individual or, extensively, of the species itself. Ontological commitments are clearly taken for granted: the species existence depends on the individuals', and the form is the cause in virtue of which an individual exists as an essentially qualified "this".

Now, we can make sense of the passage above by substituting the occurrence of the word "eidos" with "species" rather than "form"²⁵⁰. According to this interpretation, the whole statement would turn to mean something very different. But the substitution is not successful after all. Let me divide the passage in two: «A what-being-is [essence], then, will belong to nothing but to what is a ~~form~~[species] of a genus», namely, species are supposed to have an essence, and this make perfect sense for our general account²⁵¹. This claim must also be interpreted in light of the second part; «Only these [species] will have a what-being-is, for these seem not to be expressed by predicating one thing of another by way of participation, or as an attribute, or coincidentally». This latter reverses the situation: that species are predicated of individuals is an undeniable fact, and an essence—primarily—belongs to what that is not predicated of something else. What *that is primary*, primary substances or reality, does not presuppose a "lower" predication, and only what *that is primary* have an essence. In a primary sense, then, we will follow the translation of "eidos" as "forms", rather than "species", for the latter is ruled out by the clause of non-predication. Hence, we will admit that forms *have* essences

Let me add *why* it is so significant that forms *have* essences, and this has to do with definitions, the formulas of what *that is primary*. In Z 4 and 5, Aristotle follows this way of reasoning: things that (primarily) have a definition—which belong to the thing in its own right (*kath'hauto*)—*have* an essence. Now, only what will have a definition will also have an essence²⁵², even if this claim must be interpreted *stricto*

²⁵⁰ Form of the species.

²⁵¹ See *Met.*, Z 4, 1030b12-3.

²⁵² Cf. *Met.*, Z 4, 1030a6.

sensu. Indeed, by looking for things that *have* a definition, Aristotle here looks for things that primarily *have* a definition, or that are the primary definable objects²⁵³.

According to our interpretation in §4, we have three candidates for the role of definable things. We stated that i) species have definitions according to the *Posterior Analytics*, but also ii) individuals have definitions in a derivative way²⁵⁴, according to the *Categories*. Yet we introduced that iii) the form as nominee, this is derived from the equivocality of *man*, which is the definable word referring ambiguously to Socrates, the species and the form of the hylomorphic composite. In the *Metaphysic*, where the individual composites are said to lack definitions²⁵⁵, ii) and iii) are the alternatives for the status of *primarily* definable things. Now, in this hylomorphic context, definitions primarily belongs to that which is *kath'hauto*²⁵⁶, or to primary realities: what that do not need to be explained by anything else, even by a further predication²⁵⁷. Species predication is supposed to be explainable, this means that a previous predication must hold. Species, then, cannot fulfill the conditions for being *kath'hauto* and fail to be primary objects of definitions: Aristotle does not deny that species have definitions or essences, he only claims they do not have them *primarily*. There must be something that underlies species and that has both definitions and essences *primarily*. Forms are the last candidate for being definable in a primary way²⁵⁸. Therefore, forms, just because are the primary definable objects, they must be approved to *have* an essence.

²⁵³ Plausibly several things have a definition in a derivative way, also accidental composites like “pale man”. Anyway only forms have a definition in a primary sense.

²⁵⁴ The definition of the species applies to its specimens. Recall *Cat.*, 5, 3b6-9.

²⁵⁵ See *Met.*, Z 15, 1039b27-1040a2. Individuals are marginal subjects of investigation because they are corruptible. At stake, in the *Metaphysics*, there are individuals’ necessary components, matter and form, which would explain the individual and its “corruptibility” according to a deeper metaphysical level.

²⁵⁶ See *Met.*, Z 4, 1029b13-4. The formula must contain per se essential predicates according to the meaning of 4.2.3.

²⁵⁷ See *Met.*, Z 4, 1030a11-2.

²⁵⁸ This is very useful in Z 10-11 where both the definition of the composite and of the form is at stake.

But now, if forms have essences, and essences *have* a different status from that of which they are essences, the essences of forms must be the very primary realities as substances of forms. How can Aristotle face this complication, without run into an infinite regress?

All this can be solved by reference to the main (and very controversial) thesis of Z 6 that: «a thing is thought to be no different from its own substance, and what-being-is for a thing is said to be the substance *of* the thing»²⁵⁹. In light of the previous paragraph, the claim could be paraphrased in this way: a form is the same as its substance, and its substance is also its essence, therefore a form is the same as its essence. Forms are the same as their essence because they *are* essences²⁶⁰.

Here Aristotle is defending his ontological foundationalism: primary realities *have* essences—since they are the primary definable items—, but they also are identical with their essences—in fact they are the basic explanatory items—: they are *what* that can be explained only by reference to itself²⁶¹. To bring the classic example: the soul, an instance of the form-class, *has* an essence (for it is signified by a formula), but the soul *is* also an essence, for the soul is the last explanatory item of a portion of reality (of what that depends on it).

Third, forms/essences are principle/causes of everything. So far, we have characterized forms as the primary realities, what that is primarily definable, and the

²⁵⁹ Cf. *Met.*, Z 6, 1031a17-8. There are at least five lines of interpretation over this topic, listed in Cohen 1978. My line of argumentation partially borrows his conclusion; anyway I explicitly assume that the distinction species/forms is paramount here, for forms *are* essences, whereas species *have* essences but they *are* not essences themselves. Cohen's worries focus on how not to derive that, if things are the same as their essence, then Socrates is the same as his essence, and he is thus an essence. I am not troubled by this, for I claim that this is a special usage of the term "Socrates", which can be confirmed by this passage: «Socrates [and Coriscus] are twofold if Socrates is also his soul (since some regard him as a soul, and some as a combined whole» (*Met.*, Z 11, 1037a7-9).

²⁶⁰ I endorse the view that species, on the contrary, *have* essences but they *are* not essences, if by "essences" we mean what explains specific predication, i.e. a causal factor in the metaphysical analysis.

²⁶¹ Cf. *Met.*, Δ 18, 1022a32-5; Z 11, 1037a

essences. Anyway this way of treating forms is a very abstract way of answering the ‘Why is it’-question. If you say that Socrates is a human being in virtue of his form, namely, his soul, or if you say that a man is a rational biped and wingless animal in virtue of human soul, it seems you are somewhat begging the question. What does it mean to have a certain soul, and moreover, what exactly is a soul, or generally, a form? The answer will allow us to fully understand the causal role of essences in the explanation of reality.

Two things are left to explain:

A. The *status* of forms or essences, which should be a different one from things they are essences of: the answer is that essences are principles or causes of things but they are not “things” themselves.

B. How principles and causes are explanatory respectively of:

1. *why* man is such and such of animal, or generally, *why* a species can be defined with reference *to per se* features;
2. *why* Socrates is a man, or generally, *why* an individual belongs to its species rather than to another.

Namely, B has to do with an explicit answer to the ‘Why is it’-question. Our final step is an examination of the notion of principle/cause. Our goal is to show that essences and forms are principle or causes of that whose being can be explained.

As Aristotle says, Z 17 is a “fresh starting-point” in *Metaphysics Z*, for the primary substances, namely, essences and forms, are there considered as causes. They are principles or causes of things, and, when we consider the relationship between a thing and its essence, it becomes clear that essence must be understood as the “origin” of the thing as *it is*. Indeed, we fully know something when we grasp its first principles or causes, according to Aristotle:

«It is clear that we must obtain knowledge of the primary causes, because it is when we think that we understand its primary cause that we claim to know each particular[?] thing. Now there are four recognized kinds of cause. Of these we hold that one is the essence or

essential nature of the thing (since the "reason why" of a thing is ultimately reducible to its formula, and the ultimate "reason why" is a cause and principle)»²⁶².

The essence is the formal cause that is signified by a definition, and it consists in the ultimate "reason-why", or explanation, of something. In order to be an ultimate reason, essence must be understood as a principle.

An Aristotelian principle (*archē*) can successfully be translated as "source" or "origin"—rather than as "rule" or "law" according to our current conception—, for the original idea behind this lexicon is that of *dependence* of things from their principles.

According to Aristotle, the notion of principle includes many "sub-notions", like *cause* and *element*²⁶³. But Aristotle is quite clear that the metaphysical analysis, looking for "the principle of something", aspires to reach what will be expressed by the formula of a substance, i.e. its essence or form, rather than to disclose the *elements* (i.e. the material component) that integrate a composite thing²⁶⁴. Although material elements are principles *de facto*, they do not express the what-it-is-to-be for a thing. Aristotle is here also alluding to the fact that the metaphysical analysis differs from the physical one, for this latter aims at revealing the principles of change, whereas the former shows the principles of being *qua* being. The essence is the formal principle, whereas the

²⁶² Cf. *Met.*, A 3, 983a24-9. The three other causes are the material, the efficient and the final one. The four must all be considered to explain phenomena, and when natural facts are at stake, often the formal and the final causes corresponds *Phys.*, B 7, 198a21–26. *The Parts of Animals* A, again, deal with this topic. Moreover, Aristotle holds that his predecessor focused on the material cause of reality as well as the efficient one, but «As for the essence or essential nature, nobody has definitely introduced it» (*Met.*, A 7, 988a34).

²⁶³ Cf. *Met.*, Δ 1, 1013a19-23.

²⁶⁴ See *Met.*, B 3, 998b11-3, and compare with *Met.*, Z 10, 1035a6-31.

constituents are the material one, and only the former explains the *being* of things²⁶⁵. A thing is not explainable by reference to its material constituents, but, rather, by reference to its essence, linguistically expressed through the definition²⁶⁶.

As for the “sub-notion” of cause²⁶⁷, Aristotle says that every cause is also a principle²⁶⁸, but the two do not coincide except for the case of primary principles and primary causes²⁶⁹. I will assume, then, that in the cases of forms as essences, they are both principles²⁷⁰ and causes²⁷¹. As previously sketched (footnote 176), indeed, our commonsensical notion of cause as “event” has very little to do with Aristotle’s, according to whom a cause is an explanatory *item* to be grasped in order to have perfect knowledge of commonsensical things²⁷².

Therefore, the status of essences is not the status of commonsensical things. By showing this, Aristotle declares that the essences of things are the principles or causes of them. This primary principles or causes, the destination of the metaphysical analysis, are not only the explanatory tools of the generation and corruption of individuals and natural species, but also of a thing’s being in a certain way. In particular, if we consider the soul, an instance of essence (for humankind), this is the principle in virtue of which

²⁶⁵ Berti holds that, «For him, the form is a principle and the parts of the form, i.e. the genus and the specific differentia, are also principles (even if these latter two are principles in two different senses). Matter is a principle in the same way and so are the parts of matter, namely the elementary bodies (earth, water, air, and fire). However one must not confuse the way in which form is a principle with the way in which matter is a principle. Likewise, one must not confuse the way in which the genus is a principle with the way in which the specific differentia is a principle, not to mention the moving cause, which is a principle but is not necessarily an element» (Berti 2009, p. 119).

²⁶⁶ Cf. *Met.*, Z 10, 1035b28-32.

²⁶⁷ See also Frede 1987c, pp. 125-150.

²⁶⁸ Cf. *Met.*, Δ 1, 1013a16-7.

²⁶⁹ Cf. *Met.*, Γ 1, 1003a28-32.

²⁷⁰ According to *Met.*, Δ 1, 1013a18-9.

²⁷¹ According to *Met.*, Δ 2, 1013a26-8.

²⁷² Again, see *Met.*, A 1-2.

human beings are essentially such-and-such kind of things. “Man”, by definition, can be paraphrased with reference to its per se (essential) properties as “two-footed, wingless, mortal, rational animal and so on”. But it is the soul that is responsible for human being’s intrinsic such-and-such constitution: it is the soul as a form that structures the matter and the resulting such-and-such composite gives the *what it is*.

Our initial way of interpreting the ‘Why is it’-question can be now understood in the metaphysical hylomorphic framework: why an individual or a species-composite acts and plays functions in a specific way. The definition of the species, must linguistically summarize the functions performed by all the members of the same species²⁷³, so it must be made of formal and material components²⁷⁴. For instance, it seems quite meaningless to define a man without reference to its flesh and bones, for every man is made of them. But flesh and bones are not the essence of man, neither its principal defining components. It is the form and the formal component of *man*, what “supervises” and directs the material parts. This formal component exhausts the essence of the species²⁷⁵, since the material features of the composites depend on the form²⁷⁶. I will largely reemploy this idea in Chapter III.

The form and the formal part involved into the definition of man and thus into its essence, are the *ratio* why man is such and such. This becomes particularly plain when we realize that we define species with reference to their functions. A function needs a material ground to be exercised, but the material constituent is triggered by a principle. The form is responsible for the matter’s being configured in a certain way as to compose a thing that is the object of our sensorial knowledge.

§5.3. *Two Forms of Aristotelian Essentialism*

²⁷³ This topic, discussed at length in the biological works, exemplifies the Aristotelian deep naturalistic commitments.

²⁷⁴ See *Met.*, Z 11, 1036b28-30.

²⁷⁵ Cf. *Met.*, Z 7, 1032b1-2; Z 10, 1035b32; H 4 1044a36.

²⁷⁶ Cf. *Met.*, Z 10; H 2, 1043a12-26.

We have spoken at length about species as essential properties and forms as primary causes and principles of *what there is*. We have also drawn attention to the distinction about the twofold translation of “eidos”, as “species” and as “form”. Finally, we have discussed the two main Aristotelian issues behind our topic, i.e. the search for a subjecthood-condition and for a causehood-one, which characterize Aristotle’s investigation in the *Categories* and in the *Metaphysics*, respectively. All these are the marking notions involved into what I called the two forms of the Aristotelian essentialism.

§5.3.1. *Early Aristotelian Essentialism and the Problem of Subject-hood*

In the *Categories*, what *that is essential* are the said-of properties which belong to particulars: these former establish the individuals’ *way of being*. This essentialist idea, upon which this “early” form of essentialism is grounded, stems from the logical analysis as basic tool to fix the ontology. The undeniable ground upon which this Aristotelian form of essentialism develops is the logical analysis of primitive statements, like “x is P”, where “x” refers to a single individual and “P” a said-of predicate. Anyway, logic is strictly bound to ontology, as plain-spoken in *De Interpretatione*. The essential predication aims at articulate something ontological about the subject: the unanalyzable relationship between a thing and its way of being as the member of a species.

“Particular things are essentially of a certain sort”: this is the easiest formulation of the first form of Aristotelian essentialism. But such a claim can be *explained*, for we can give the reason why Aristotle endorsed such form of essentialism. It stems from the Aristotelian everlasting worry: to find a grounding entity upon which everything else depends on, this would be an ontological support and the primary subject of predication. In the *Categories*, it is well-known that individuals play the role of grounding entities, and they are the ontological counterpart of logical individual subjects. Aristotle fixes the individuals of common experience as bricks or reality and of logic, but he needs to give at least one commonsensical identity condition over this

primitive entity, and he finds it in essential predication. The comparison between individuals and variables helps the understanding. In logic, a variable outside of its function is incomplete, for variables need a qualification. Recalling §3, something cannot “just be” without be *in some way*, and the secondary substance gives the sort of things individuals basically or essentially are. To be a member of a species is essential for individuals, species-membership is the identity condition for individuals to be primary substrates, something fixed and immutable in a certain way.

§5.3.2. *Later Aristotelian Essentialism and the Problem of Cause-hood*

Once Aristotle has reached a satisfactory understanding of commonsensical items, he turns to what that is “farthest from everyday knowledge but prior by nature”, namely, the metaphysical components of reality. The metaphysical investigation is about causes or essences or forms, what makes the ordinary things *what they are*. To grasp an essence/form is a metaphysical complex business because it implies the investigation into a non-commonsensical and deeper level of reality of which we have intellectual knowledge²⁷⁷.

Once one has grasped the essence of, for instance, humankind, that is the rational soul, one has not acquired knowledge of a different basic *thing*, but she has reached a deeper metaphysical level of investigation. To grasp an essence is awkward because one has not to do with everyday perceptible things, but with *what* that makes them *what they are*, what that is primary by nature (not primary as for us) and which would *explain* why things are in a certain—essential—way. Aristotelian essences are not ontological separable entities just like Platonic Ideas, which are causes of commonsensical things by participation: Aristotle provides several reasons for this, among these we find the everlasting problem of the infinite regress²⁷⁸. But essences are anyway separable in some sense, because they are object of metaphysical investigation, even if they come together with things of which they are the essences of. At the same

²⁷⁷ Cf. *Met.*, Z 6, 1031b6.

²⁷⁸ Cf. *Met.*, Z 6 1032a2-4.

time Aristotle contends that, because of their explanatory role, forms and essences are prior to the composite²⁷⁹.

The essences, then, must be something prior and causal, non-separable from individual composites and with a different *nature*, but, by grasping them, we are supposed to understand a thing deeply, because we reach the *why*. In the *Metaphysics*, the relationship specimens-species—depicted in the *Categories* as unanalyzable—becomes explainable on the condition that a further and deeper metaphysical “tool” is introduced: to explain something amounts to make it more intelligible, and that which is more intelligible is the essence or form of *what there is*. To find the essences or causes is a matter of delving deeper into the inner structure of commonsensical things: this structure is nothing over and above individuals, but simply more intelligible and posterior in knowledge, but prior by nature. Since what causes something is somewhat prior to it, the metaphysical components of things are candidates for the role of causes. And they actually are, according to the doctrine of the four causes.

The four causes together contribute to the full knowledge of things. In particular, as for natural species and individuals, the formal and the final cause often correspond. The formal cause of man is the soul, as well as its final cause: these are the principle of man being such-and-such.

The more sophisticated form of Aristotelian essentialism, then, stems from the investigation of the metaphysical causes of what there is—which is grasped in a commonsensical way as irremediably bound to its properties. But essences are not properties, they are causes or principles which explain *why* we know ordinary things such-and-such. Essences as causes has very little to do with logic: this does not mean that Aristotle gives up the comparison between the ontological and logical analysis in the *Metaphysics*, but the search into the metaphysical causal components of reality develops at a different and deeper level of *being*, far from individuals understood as last and opaque grounding entities.

²⁷⁹ Cf. *Met.* Z 10, 1035a12; b18-20.

III

ARISTOTLE'S BIOLOGY AND HIS CRITICS

The aim of this section is to introduce some clichés generally attributed to Aristotle by contemporary philosophers of biology—and not only. I shall show, then, that many current opinions on the Aristotle's metaphysics and biology are nothing more than mere stretches and that several contemporary judgements on Aristotle, endorsed by biologists, are mistaken. In this chapter, in particular, I will develop a theoretical investigation of some alleged bio-metaphysical Aristotelian issues in the context of the Aristotelian philosophy of biology and his metaphysical inquiry.

The beliefs usually attributed to Aristotle that I will challenge concern:

- A. Typological Essentialism
- B. Eternality of Species
- C. Extrinsic Finality

They stem from a misunderstanding of fundamental Aristotelian thoughts. The first belief is a consequence of a Platonic way of reading the Aristotelian essences, a way characterized by the identification of forms and species. The second belief is connected to the first, but it can be somehow approved if species are understood as endless chains of co-specific things, on the basis of some Aristotelian biological assumptions. The third belief, finally, arises from a misinterpretation of the claim that the form is the final cause toward which natural phenomena tend.

§1. The Science of the Living World and its Metaphysical Commitments

Let me begin by focusing on some general works of Aristotle. In the *Meteorology*, Aristotle makes clear that

«We have already discussed the first causes of nature, and all natural motion, also the stars ordered in the motion of the heavens, and the physical element-enumerating and specifying them and showing how they change into one another-and becoming and perishing in general. There remains for consideration a part of this inquiry that all our predecessors called meteorology. It is concerned with events that are natural, though their order is less perfect than that of the first of the elements of bodies[...]When that has been done we may say that the whole of our original undertaking will have been carried out»²⁸⁰.

Here Aristotle introduces the project of creating an *encyclopaedia*, and what is left to expound is the natural science of “imperfect things”, those that «happens by chance»²⁸¹. Even if the living world is generated and perishable, unlike the celestial realm or the mathematical world, we can have great pleasure in investigating the living beings: indeed humankind, the others animals and the plants share the same *nature*.

The claim that all the living being share the same nature does not simply mean they share the status of coming-to-be and passing-away: living beings partake of a general and teleological order present in nature. As Aristotle declares:

«For what is not haphazard but rather for the sake of something is in fact present most of all in the works of nature; the end for the sake of which each animal has been constituted or comes to be takes place in the good»²⁸².

The synopsis is this: each animal is such-and-such for a purpose, and this purpose is “the good” for the animal itself²⁸³. In the biological works—at least in the *Parts of Animals* and in the *Generation of Animals*— according to Aristotle, each animal, which must be understood as the sum of a formal and a material constituent, is made for the sake of its proper “good”. It calls for a clarification here what Aristotle means by “the

²⁸⁰ Cf. *Meteor.*, I 1, 338a20-338b30.

²⁸¹ See *An. Post.*, A 30; 33.

²⁸² *De Par. an.*, A 5, 645a22-5.

²⁸³ The “good” has primarily to do with the individual, then with the species. The claim that the “good” has to do with a specific standard led to the attribution of the typological essentialism.

good for something”. What he actually intends is a metaphysical notion reached by the investigation of the natural world. First, Aristotle observes that the vast majority of living beings share a lot of living functions: reproduction, locomotion, nourishment, sleep. Second, he notes that all these functions are performed by living being in different ways through the agency of their material components. In biology, “good” has nothing to do with axiology, but with performing biological vital functions in the best possible way, both in a relative and in a holistic sense—namely, both with reference to the single organ performing a single function and with reference to the whole body acting to live²⁸⁴.

The key intuition Aristotle had to reconcile his biology with his metaphysics is to connect functions and organs with each other. At the beginning of *Parts of Animals* Aristotle makes it clear that the form is a principle that determines the vital functions performed by the material parts (the organs and tissues) of animals. The material organic parts develop to perform the function determined by the principle, and the body of animals as a whole develops to live, that is, to perform all the essential functions required by its form. To my mind, this is a correct biological way of translating the discourse made in the *Metaphysics*, where Aristotle claimed that the form acts upon the matter to give rise to a unified composite. All the bodily parts or organs of biological individuals perform vital functions, thus contributing to the life of the animal as a whole: this is the “good for individuals”.

The good for individuals, therefore, is the *endurance*, which is ensured by their form through the living functions performed by the material parts. The relationship function-organs is not “unidirectional”, according to Aristotle. The life of the individuals made possible by performing vital functions, is for the sake of the form itself. To be clearer: the individual’s life—as the actualization of living functions—is *directed by* a formal cause, and, according to Aristotle, life is also the aim or final cause of the natural phenomena. This means that the formal and the final causes equate, and the form directs the vital functions performed by the bodily parts for the sake of itself, namely, it acts upon matter for the self-realization, as will be better explained later.

²⁸⁴ See *De Par. an.*, A 1, 641b23-4.

All this makes also clear that the Aristotle's biology is strongly characterized by the metaphysical distinction form-matter. Nevertheless, biological phenomena cannot be exhausted only with reference to the formal component of animals, since matter is the concrete way for accomplishing the "good" of the living organism.

§1.1. *The Uniqueness of the Aristotelian Bio-Metaphysics*

For Aristotle, biology is a discipline whose goal is to discover the causes of phenomena connected to life: it must explain *why* living beings are *what they are*²⁸⁵.

The science of living being was or course matter of investigation even before Aristotle, although, according to him, his predecessors reached incomplete results in the explanation of why natural realities are such-and-such. Aristotle supports his claim with two reasons. The first reason is expressed in the *Parts of Animals*, and it echoes what said in the *Metaphysics*, where Aristotle accused his predecessors of not having achieved a full metaphysical understanding of *what a thing is*, namely: they neglected the account of essences or formal causes²⁸⁶. Even in biology the formal causes are utmost explanatory, because every thing depends on its essential principles—in the science of the living world, moreover, the formal and the final causes are one and the same, even if in the *Metaphysics* book A the equation is matter of debate²⁸⁷. Aristotle thinks that, in biology, the omission of a formal explanation is well exemplified by the physiologists, who were only concerned with the description of the material components or bodily parts of animals. If biology were limited to the analysis of the material component of bodies, though, it would be an insufficient explanation of the living individual. A dead body, indeed, is still the material part of an individual, but it no longer belongs to the living world, for this latter is characterized by the fact that «a

²⁸⁵ See *De Par. an.*, A 1, 639b9-21; *Gen. an.*, A 1, 715a1-28; 4, 717a11-6.

²⁸⁶ Cf. *De Par. an.*, A 1, 640b4-28; 642a25-6; *Met.*, A 7, 988a34.

²⁸⁷ Cf. *Met.*, A 2, 982b2ff, with *De Par. an.*, A 1, 641a17-642a1.

given form or principle is in a given matter»²⁸⁸. As a matter of fact, a given matter is no living in virtue of itself, it can only perform a function determined by the form²⁸⁹.

There is also a second reason for Aristotle's claim. Some of his predecessors showed no interest in the *real* world and in the observation of it, turning instead to «practical virtue and politics»²⁹⁰. But if one considers the examination of nature worthless, and she feels “childish disgust” in the study of the «less valuable animals»²⁹¹, therefore she will regard as meaningless even the study of human beings, since all the living beings share the same *nature*²⁹². Aristotle, on the contrary, makes large use of both investigations, in the framework of his search into the (four) causes of the phenomena that occur in the living world.

With respect to the metaphysical investigation into the *causes*—above all the formal ones—of living beings, the biologist differs from the metaphysician in that «one

²⁸⁸ See *Gen. an.*, A 19, 726b22-3.

²⁸⁹ Indeed Aristotle cites as exemplary the way of studying the venous system of animals “in action” in this way «to starve to emaciation, then to strangle them on a sudden, and thereupon to prosecute his investigations». Cf. *Hist. An.*, Γ 3, 513a13-4.

²⁹⁰ *De Par. an.*, A 1, 642a29-30

²⁹¹ *De Par. an.*, A 4, 645a15-6

²⁹² Cf. *De Par. an.*, A 4, 645a25-35. This must not lead to the interpretation of the Aristotelian natural universe as a homogenous whole in which “*natura non facit saltus*”. Even if Aristotle says that «In fact nature passes continuously from soulless things into animals by way of those things that are alive yet not animals, so that by their proximity the one seems to differ very little from the others» (*De Par. an.*, Δ 4, 681a12-5; see also Δ 10, 686b29-35), he saves for humankind a place of honor in the living world: «Animals, however, that not only live but feel, present a greater multiformity of parts, and this diversity is greater in some animals than in others, being most varied in those to whose share has fallen not mere life but life of high degree. Now such an animal is man. For of all living beings with which we are acquainted man alone partakes of the divine, or at any rate partakes of it in a fuller measure than the rest. For this reason, then, and also because his external parts and their forms are more familiar to us than those of other animals, we must speak of man first; and this the more fitly, because in him alone do the natural parts hold the natural position; his upper part being turned towards that which is upper in the universe. For, of all animals, man alone stands erect» *De Par. an.*, Δ 10, 686a24ff. See also *De Par. an.*, A 1, 641b5-9.

[a biologist] should not speak of all soul; for not all of the soul is a nature, but some part of it, one part or even more»²⁹³. Here Aristotle alludes to the role of the soul of causing bodily functions (and bodily parts, as a consequence), and to the soul as object of metaphysical inquiry. The biologist must investigate into the four causes, above all the formal ones, of living beings and processes, but he must not be troubled by the deep issues that rest with the metaphysician—for instance, the distinction between the practical and the theoretical uses of reason or the activity of discursive reasoning and many more²⁹⁴. Yet,

«If men and animals and their several parts are natural phenomena, then the natural philosopher must take into consideration not merely the ultimate substances of which they are made, but also flesh, bone, blood, and all other homogeneous parts; not only these, but also the heterogeneous parts, such as face, hand, foot; and must examine how each of these comes to be what it is, and in virtue of what force.[...]shape and structure must be included in our [biological] description. For the formal nature is of greater importance than the material nature»²⁹⁵

In the *Parts of Animals A*, in particular, the science of living things is depicted as a matter of investigating into the formal and the final cause in virtue of which individuals

²⁹³ Cf. *De Par. an.*, A 1, 641b8-9.

²⁹⁴ Cf. Lennox 2001, pp. 142-4.

²⁹⁵ See *De Par. an.*, A 1, 640b23-8.

are made in such-and-such way, as well as of understanding their material components, which are characterized “necessarily” by a determined function²⁹⁶.

According to Aristotle, indeed, there is a twofold order of explanation in the natural world. In particular, when we consider the biological methodology, we can reclassify the four Aristotelian causes according to two general viewpoints: the “good” and the “necessary”. As Balme points out:

«In Aristotle’s usage a species is the universal generalized over all animals that have the same essence, as they appear in nature. The explanatory power of essence is that it reveals the teleological features. The account of the species gives this plus an explanation of the material appearances and accidents. This yield the double explanation which characterizes the *Parts of Animals*.[...] Aristotle subsume essence and teleology under the good, matter and movement under the necessary»²⁹⁷.

Aristotle formulates two guidelines for the explanation of the organization of animals: a teleological explanation and a very special kind of explanation based on the notion of

²⁹⁶ The case for the *History of Animals* is quite different: it was a first approximation of the living beings, causal-commitments free. Here, some very brief historical remarks can be of interest. Since Aristotle’s biological production is wide and developed over many years, the evolution of his metaphysical thought has a deep influence on his biology. If by “metaphysical analysis” one means the search into essences as forms, the first Aristotelian biological treatise, the *History of Animals*, is far from being metaphysics-committed (unlike the *Parts of Animals* and in the *Generation of Animals*). Because of this, historians are inclined to date the *History* as an early work, whereas the *Parts* and the *Generation of Animals*—which explicitly show the metaphysics of form-matter—date back to the period of the elaboration of his mature metaphysics. This is the reason why the *History of Animals* was overshadowed for Centuries, while philosophers were mostly interested in the latter.

²⁹⁷ Balme 1987, p. 298.

necessity, what has been called “conditional” or “hypothetical” explanation²⁹⁸. The biologist must investigate *that for the sake of which* a natural phenomenon occurs—for instance, breathing is for the sake of living—and the conditions thanks to which the purpose can be reached—for instance lungs are (conditionally) necessary to breath.

In different terms. On the one hand, the biological investigation intends to show that the formal cause and the final cause require the accomplishment of the vital functions in order to reach the “good” or the life of the individual. On the other hand, biology has to show *why* each organ performs such-and-such function, and this has to do with the *dependence* of the bodily parts from the form. The bodily configuration of an organism is such-and-such because it must reach a goal: therefore the digestive system, the perceptive organs and so on, are necessary, but in a conditional way, in order to preserve the individual alive. Hence, in nature conditional necessity has nothing to do with materialism and the organization of matter that a thing receives from its efficient cause²⁹⁹: what is biologically necessary is in virtue of a formal principle or for the sake of performing a vital function. According to Aristotle, in biology the “good” and the “necessary” viewpoint actually complement each other: the good for the organism can be reached only if necessary vital functions manage to be performed.³⁰⁰ With the words of Tipton:

«A certain understanding of necessity turns living bodies into tools. The need for nourishment by living things provides the first example of how we are to think about this

²⁹⁸«One should explain in the following way, i.e., breathing exists for the sake of *this*, while *that* comes to be from necessity because of *these*. But necessity sometimes signifies that if *that*—i.e. that for the sake of which—is to be, it is necessary for these things to obtain, while at the other times it signifies that things are thus in respect of their character and nature» *De Par. an.*, A 1, 642a32-5. The conditional necessity encapsulates both the notions of causality, the concept of final cause and the concept of necessary dependence. See also Irwin 1988, pp. 111-4.

²⁹⁹ But it neither denies that the natural elements of the physical world behave according to their nature.

³⁰⁰ The more complete formulation of the interdependence between the good and the necessary is the Aristotelian claim that “nature shapes organs to fit the living functions”. Cf. *De Par. an.*, Δ 12, 694b13-4.

form of necessity (642a7) in that nourishment is necessary as a condition for the body or organism to fulfill its purpose. If an organism's purpose is in its living, then its way of life is that which directs the organization of the *trophê* into parts. The need for nourishment dictates the necessity of certain parts, in a certain arrangement. The “for the sake of which” necessitates the structure of the body; that is, the struggle to live organizes matter. Matter alone does not organize itself, as is implied by Aristotle's predecessors (640b13). Air or water cannot be both material cause and efficient cause. Even if they could, the fact would not explain the origin of life»³⁰¹.

Another point needs here to be clarified, and it consists in the value of observation as starting point for the scientific knowledge. Some interpreters envisage in the *History of Animals*—the (early) zoological treatise that provides plenty of information about the physiology, functions, behaviors and reproduction of animals without any (apparently) metaphysical commitment—, a vast arrangement of observed (and inferred from observation) data, which are to be causally examined in the *Parts of Animals* and in the *Generation of Animals*—which instead carry a metaphysical purpose. In brief, the *History* seems to give us the ‘What’—the natural phenomena that *are*—, whereas the *Parts* and the *Generation of Animals* provide us the ‘Why’—the reason in virtue of which natural phenomena are *what they actually are*.

Even if some commentators hold that Aristotle actively contributed to the biological investigation with the direct examination of natural phenomena, the dissection of animals, the placement of dolphins among the viviparous—that can be assimilated to the category of mammals—, others maintain that Aristotle must only be praised for his deep conceptual analysis, apart from his—sometimes temporary—empirical conclusions.

In my opinion, anyway, there is a clear interdependence between observation and conceptual analysis, which cannot be neglected³⁰². It is unquestionable the role that direct observation plays in the whole Aristotelian philosophical system: Aristotle takes

³⁰¹ Tipton 2014, p. 43. Compare with Lennox 2001, p. 149.

³⁰² There is a clear philosophical rationale behind his attitude toward observations: yet, observation supplies the ‘What’ upon which the ‘Why’-question applies. Cf. Bourgey 1955.

advantage from the “*empeiria*”³⁰³, understood as the practical knowledge of common people like fishermen, butchers, farmers..., whose familiarity with animals is used as the starting-point for the development of a deeper analysis into the causes in virtue of which a natural phenomenon occurs³⁰⁴.

The great significance Aristotle attributes to the information obtained by humble-workers also reveals his general attitude and method. What he aims at is an explanation of the commonsensical and visible phenomena; for instance, he wants to answer questions such as: why individuals are split into female-male, or why the heart is the first organ developed in the embryo, or why individuals share many functions but not the material “support”³⁰⁵. All the natural phenomena that need an explanation are listed in the *History of Animals* and analyzed at a deeper—metaphysical—level in the *Parts* and in the *Generation of Animals*. Not only does Aristotle derive the biological topics from experienced people, but also the biological terminology, showing no interest in challenging the common language—except for the addition of few technical terms like “form”, “essence”, “cause”. In sum: Aristotle’s approach consists in listing commonsensical interesting phenomena and in developing a metaphysical inquiry into their causes. As a result, the commonsensical phenomenon will not turn out to be a different and more complex event, but the same one investigated in his metaphysical-causal aspect.

§2. Aristotle and Typological Thinking

As far as I can tell it, part of the criticisms that some contemporary philosophers address to Aristotle are rooted on a general misunderstanding of the Aristotelian essentialism.

³⁰³ Cf. *Met.*, A 1; *An. Post.*, B 19.

³⁰⁴ There is a discussion about practical knowledge and its role in the scientific inquiry. Aristotle maintains that empirical knowledge is the source for intellectual one, but if empirical knowledge in itself is sufficient to reach the universal remains unclear. For instance, Frede supports a strong Aristotelian rationalistic attitude, in spite of his empiric fondness. See Frede-Stiker 2002, pp. 157-73.

³⁰⁵ On this topic, see Randall 1960.

Most of the critics take it as one single doctrine which lead to one single position: the essences of things are their natural *species*. On the contrary I developed an interpretative framework in that I suggested distinguishing two different forms of essentialism, based on species as essential properties and on forms as the essences of species. The form or essence of man, for instance, is a set of organized functions usually associated with man; the species man, instead, comprehends both the formal functions along with the material parts which perform those functions and that depend on the form. The identification of form and species is wrong, but it was long the orthodox position. As Balme points out:

«Since Porphyry, the traditional interpretation has tended to treat essence and species as synonyms referring to the first order of generality above particulars, and to regard this generality as an absolute form characterizing all the species-members alike»³⁰⁶.

The distinction between the two possible translations of “*eidōs*”—i.e. as “species” and as “form”—, has long been neglected and “species” and “forms” have been understood as synonym. This equation implies that a unique meaning of “essence” is envisaged in the clichés usually attributed to Aristotle.

The equation of form, essence and species, together with the (mis)interpretation of some Aristotelian biological claims, has been responsible for the false belief that Aristotle had supported “typological essentialism”, both as a metaphysician and as a natural scientist³⁰⁷. A typological essentialist makes two general claims:

1. In nature, there is a “perfect” model or “archetype” which exemplifies the essential traits associated with each species;
2. Individuals are actually imperfect exemplification of the specific model³⁰⁸;

³⁰⁶ Cf. Balme 1987, p. 296.

³⁰⁷ See Popper 1952, Simpson 1961, Mayr 1963, Hull 1965, Dobzhansky 1970 and many other. According to Lennox, on the contrary, the general attitude of Aristotle can be called “teleological essentialism”. See Lennox 2000, p. 179.

³⁰⁸ Cf. Mayr 2004, pp. 103; 174-7.

These claims seem to have had great impact on the biology, for “typological” thinking is said to be “unable to accommodate variation”³⁰⁹, and thus to be inconsistent with the Theory of Evolution. Between the 18th and the 19th Century, for instance, “typology” led to the counter-evolutionist idea that species need to be defined by a list of eternal and invariable characters, for otherwise they would just be an arbitrary exercise of taxonomists³¹⁰: but this kind of definition gets rid of the empirical findings that, on the contrary, prove the evolution of specific traits by natural selection³¹¹. Again, “typological” thinking also led to the ideology of Scientific Racism, as explicitly stated in Chapter I³¹². This kind of typological essentialism was attributed to Aristotle on the basis of the explanation he provides of a certain number of natural phenomena. Let me quote a pair of sources for this attribution.

The first evidence can be found in the *Generation of Animals*, where Aristotle tries to explain the development of the embryo toward parental likeness. If one refuses to put any distinction between form and species, then, once one admits that, for Aristotle, the preservation of the form is the *end* of any natural process, one must also say that the preservation of the species is the *goal* of any natural process. The focus of the typological essentialist conception consists in the following idea: the preservation of the species is the end of reproduction and the individual must primarily develop toward the specific likeness³¹³. This is the reason why some Aristotelian interpreters explain the development of the embryo, illustrated by Aristotle in book Δ, with reference to the realization of the species. The offspring develops in such-and-such way because the species exemplified by its parents must be preserved, and the conservation of the species fulfilled by reproduction is the reason why the progeny resembles the parents.

³⁰⁹ Mayr 2004, p. 27.

³¹⁰ Hull 1965, pp. 319-20.

³¹¹ Mayr 2004, p. 104.

³¹² Cf. also Mayr 2004, p. 27: «Caucasians, Africans, Asians, and Inuits are types for a typologist that differ conspicuously from other human ethnic groups and are sharply separated from them. This mode of thinking leads to racism».

³¹³ Cf. Balme 1987, p. 291.

A second evidence for attributing typological essentialism to Aristotle can be found in the sexual bias that the female is a “defective male”³¹⁴. This is a corollary of the general claim that human generation is naturally directed towards the generation of a male. It is the male that transmits the form on the embryo through its semen, but extrinsic conditions could “fail to be optimum”, and in this case the embryo acquires the female sex³¹⁵. The true problem does not touch upon the prejudice in itself. Many commentators here envisaged the Aristotelian latent belief that there is a “perfect standard” to be reached by individuals, and this standard has to do with the species. The perfect standard is the perfect model that the individuals aim at reaching: it is the final cause of the individuals’ development. The idea of a “perfect standard or model” seems to be the common thread linking the embryo’s development to the imperfect-status of females.

Typological thinking is today understood as the nemesis of the newly-introduced paradigm of the “Population thinking”, which denies the assumptions 1) and 2) of typological essentialism³¹⁶. The main concept here at stake is “bio-population” based on the notion of variability: in a bio-population (for instance the tiger-population, the human-population and so on) no two individuals are identical and common traits are nothing but abstractions. Within a bio-population, then, variation is taken as basic premise—versus 2)³¹⁷—and the “standard individual” is understood as a “simple

³¹⁴ Cf. *Gen. an.*, A 19, 728a17.

³¹⁵ It is a matter of *hot* and *cold*, according to Aristotle: at the time of the reproduction it happens the concoction of the semen—the “hot” vehicle of the form—and the catamenia—the “cold” vehicle of the matter. If the process preserves the *hot*, the embryo will acquire the male sex transmitted by the father, while if the *hot* undergoes a cooling in the medley, the female nature—colder than the male’s nature—is acquired. Cf. Balme 1987, p. 292.

³¹⁶ Sober maintains that essentialism and Population thinking are incompatible. See Sober 1980.

³¹⁷ As Mayr points out «To say that all members of a population are unique does not mean that they differ from one another in every respect. On the contrary, they may agree with one another in most respects, as do conspecific individuals, for instance. Yet each member of a species has a unique constellation of characteristics, some of which are found in no other individual» (Mayr 1988, p. 15).

abstraction”, idealized from a narrow group of individuals belonging to the same species—versus 1).

The attribution of typological thinking and the subsequent form of essentialism to Aristotle was ruled out by Balme, if the basis for this kind of essentialism has to be found in the above-mentioned examples.

As to the development of the embryo toward the specific form inherited by the parents, Balme showed, with reference to many passages from the *Generation of Animals*, that the embryo’s development is toward the parental likeness (including also non-essential traits), rather than toward a specific standard. Indeed, the typical characters associated with the species “accompany” the development of the fetus and are only a consequence, not a cause, of the reproduction. Nonetheless, the family-resemblance can be explained with reference to the transmitted *form* of the father and to the matter provided by the mother, according to Balme, rather than by turning to the species as final cause of the embryo’s development. The form to be transmitted is present in the semen, which is the residual of nutrition, and since nutrition is useful in every bodily parts for the sake of the growth, the semen will acquire, and then transmit, the whole likeness (comprehensive of essential and inessential traits) of the father to the fetus: this is the reason why the offspring resemble the male parents³¹⁸. The female characters, conversely, prevail only in the case of non-optimum conditions, i.e. when the heat transmitted by the semen is lost in the reproduction. According to Balme, then, the form transmitted by the male-parent is also responsible for the transmission of the father’s non-essential characters.

Balme’s viewpoint is harshly criticized by Witt, a critique we can share if we limit it to the following consideration. Witt does not challenge the claim that individual development is toward parental likeness, but she casts doubt upon the idea that forms includes non-essential traits. The theory of Balme would bring «radically individual forms»³¹⁹ in the *Generation of Animals*, which would divert from any other work of Aristotle. According to Witt, on the contrary, it is the movement of the *semen* which is

³¹⁸ Cf. *Gen. an.*, A 18, 726b10.

³¹⁹ Witt 1985, p. 47.

responsible for the male-parent likeness, rather than the transmitted form, and the likeness is lost if the heat of the semen is lost in the concoction: in this case, the offspring will resemble the mother. A meaningful passage from the *Generation of Animals* can be elucidative:

«To recapitulate, we say that the semen, which is the foundation of the embryo, is the ultimate secretion of the nutriment. By ultimate I mean that which is carried to every part of the body, and this is also the reason why the offspring is like the parent. For it makes no difference whether we say that the semen comes from all the parts or goes to all of them, but the latter is the better. But the semen of the male differs from the corresponding secretion of the female in that it contains a principle within itself of such a kind as to set up movements also in the embryo and to concoct thoroughly the ultimate nourishment, whereas the secretion of the female contains material alone. If, then, the male element prevails it draws the female element into itself, but if it is prevailed over it changes into the opposite or is destroyed»³²⁰.

According to Witt, «it is a mistake to identify the movements responsible for the inherited likeness [*Gen. an.*, Δ, 4-5] with the movements responsible for the presence of form [*Gen. an.*, B 1]»³²¹, as Balme does. The semen plays two roles: it conveys the form and it transmits the male resemblance³²². While the form-inheritance can be explained only with reference to the motion of the semen provided by the male parent, the family resemblance is explained with reference to both the movements present in the semen and in the catamenia, not with reference to the movements of the form.

The alternative interpretation of parental likeness provided by Witt, anyway, does not undermine the initial claim that the individual does not aim at reaching a specific standard. The species is the result of the formal and the material components, once the process has ended. This is also borne out by the case of the mule: it first develops toward the parental likeness but the “newly-got” species is nothing but an abstraction. Indeed, the Aristotelian species, according to Balme, are simply abstraction

³²⁰ *Gen. an.*, Δ 1, 766b.

³²¹ Witt 1985, p. 52.

³²² See *Gen. an.*, A 19, 726b13-8.

obtained by collecting reiterated features, and do not have any causal, formal or final, role.

Now we shall turn to the second case mentioned above, the case of the imperfectness of the female gender, from which someone could conclude that there is a *specific* perfect standard to be reached, for Aristotle. This specific standard would include, among the other features, the male sex. Anyway, by claiming that the male is more perfect than the female, Aristotle does not mean that there is a standard for the species, as a typological essentialist does. The belief that the female is less perfect than the male, explicitly stated by Aristotle in book Δ of the *Generation of Animals*, must be interpreted in the framework of the *antithesis* between hot-cold as paramount elements for reproduction. Aristotle characterizes the male and the female by a capacity and by an incapacity: the male is the parent who concocts the blood into the semen that carries the form, the moving cause responsible for the generation of the offspring; the female only receives the semen. Since the concoction is made possible by the heat, the male is hotter than the female, “hot” acquires a positive meaning: this is why the male is more perfect than the female³²³.

The interpretation according to which the male is more perfect than the female because it is “nearer” to a specific archetype, is unsupported by the texts, and it is also a very Platonic way of reading Aristotle. But in the *Metaphysics* the existence of the Platonic *eide* as separate universals over and above particulars is strongly attacked³²⁴, even the concept of “participation” is said to be meaningless. If typological essentialism is ascribed according to 2), namely, according to the claim that individuals are imperfect instantiations of an archetype-model, Aristotle cannot be considered a typological essentialist.

What can still be obscure, anyway, is the idea that the transmitted forms determine by necessity the features usually associated with a species, namely: one could be troubled about the question as to why individuals who share the same specific form or set of formal capacities also share the same species. The relationship between

³²³ See *Gen. an.*, Δ 1.

³²⁴ See *Met.*, A 9; Z 6, 1031b18-1032a4.

specific form and species is at stake here. In the concrete, the distinction between form and species seems redundant: the transmitted form always gives rise to individuals of the same species. What I mean is that there is a strict connection between the form that is transmitted, the inherited traits and the species, so the distinction between “what causes the traits” (i.e. the form), and “what is abstracted from common traits” (i.e. the species), could appear as nothing but conceptual economy.

Again, we can take inspiration from the accurate study of Balme to prove that form and species never equate: matter is what makes the difference. The point, according to Balme, is that the traits used in the description of the species cannot be directly inferred from the description of the form—or essence—of the species, even if they are caused by it. The description of something based on its form alone is incomplete: material components are needed, for no animal is described by the form alone³²⁵. The description of the animal must include material traits³²⁶, that are not included in the form and in the definition of the form: these only depend on the matter of the composite³²⁷. Unless the species, the form or essence has to do only with functions. Indeed, Aristotle admits that an essence or form might also be realized in a different material support³²⁸: for instance, the human soul might be realized in a «matter other than flesh and bones»³²⁹. Anyway, the description of human beings must include material traits, for no animal’s essence is exhaustive of the animal itself.

Actually, as explicitly stated in the case of the mule, which is generated by parents belonging to different species, Aristotle does not rule out the possibility of extra-specific breeding as long as the two mating species share the bodily size and the gestation period³³⁰. The newborn is not characterized by its form alone, which is the

³²⁵ *Met.*, Z 11, 1036b2-7; Z 15, 1039b20-31

³²⁶ Cf Balme 1987, pp. 294-5.

³²⁷ *Met.*, I 9, 1058b2.

³²⁸ *Met.*, Z 11, 1036b2-7.

³²⁹ Cf Balme 1987, pp. 294.

³³⁰ Evidences on this topic are apparently incompatible: cf *Gen. an.*, B, 738b28-34 versus 746a30 ff. See also *Met.*, Z 8, 1033b30-1034a2.

form of the father: it is the matter which makes the difference in recognizing the offspring under a different species. With the words of Balme, «Aristotle does not give the [typological] essentialist's answer, that species is an absolute form imposed upon individuals»³³¹: the species is abstracted from both formal traits and material traits.

Balme also provides a *pars construens* to explain why the species—the traits from which the species is obtained, to be precise—is preserved in the vast majority of cases: the reason is that nature aims at reaching the “good”. As Balme points out:

«it is true that species-membership may help to explain the features of individuals, this is not because the species is an efficient cause of individual formation, but because individuals in like circumstances are advantaged by like features»³³²

There is plenty of teleological descriptions in the biological works that show the deep concerns of Aristotle, i.e., to explain why individuals differs in such and-such ways, and the ultimate answer is always the same: the way animals are is the best possible way to preserve their good. Therefore, individuals are such-and-such because, in given circumstances, they can take advantage from their specific configuration. There seems to be no reason for claiming that species should change, since they are *what they are* in virtue of their “good”. We shall return to this last point at the end of §3.

§3. *Species Are Eternal*

In the literature about Aristotle, it is a widespread commonplace that species are supposed to be *eternal*³³³. Let us first focus on the concept of eternity for Aristotle, whose fundamental parameter is “necessity”, and whose paradigm is exemplified by

³³¹ Balme 1987, p. 299.

³³² Balme 1987, p. 291.

³³³ See Sorabji 1980, pp. 145-6; Ackrill 1981, pp. 133-4. This sense of eternity concerns things, just like the Platonic *eide*.

celestial bodies³³⁴. Species are eternal if they are *necessary* beings just like heavenly entities: immutable, non-corruptible, non-generated and non-perishable. At any rate, eternity does not rule out non-essential change, but only the coming-to-be and passing-away³³⁵. Many passages taken from the *Metaphysics* seem to confirm the hypothesis of the eternity of species (*eide*)³³⁶. Yet if scientific knowledge envisages the search into *what is necessarily as it is* and it cannot be otherwise—as stated in the *Posterior Analytics*—, then biology will have to do with eternal things: one could thus infer that biological species are eternal.

This cliché is strictly bound to the accusations considered earlier in §2, because the concept of eternity is often related to the eternity of Platonic forms discussed in the *Timaeus*. If the belief in the eternity of the Aristotelian species derives from a Platonic reading of his species' concept, the belief is completely wrong. According to me, this error derives from the incorrect equation of form and species that render the word “eidos”. Let me recall the metaphysical status of the Aristotelian species, as opposed to the form. In Chapter II, we stated that species should be understood as essential properties or as secondary substances in the *Categories*. We also stated that species *exist* as soon as they are instantiated by individual things, and that, if individuals exist then individuals must be *of some species*. In the *Metaphysics*, species are understood as composites of matter and form, and the form is what structures the matter in order to “create” the composite as it actually *is*. The species is therefore the result of formal and material components. The form is the principle in virtue of which individuals are *what they are* and perform the functions they do (reproduction, nourishment...), whereas the species is an essential attribute—as soon as the logical

³³⁴ Cf *Met.*, Δ 5, 1015b10-6, Z 15 1040a29; *De Caelo*, I 3, 270a12-ff. I here follow Lennox: according to him, *being eternal or everlasting* amounts to *being necessary* and *being one in number* for Aristotle

³³⁵ *Phys.*, V 1-2.

³³⁶ We know from chapter II that “eidos” is both translated as “species” and “form”. Anyway, those who say that the Aristotelian species are eternal do not put the distinction. Actually, Aristotle says that forms are non-generated and incorruptible, whereas the species are the result of the process Cf. *Met.*, Z 8, 1033b11-9; Z 9, 1034b 7-19; Z 15, 1039b20-1040a8.

analysis is concerned—, nevertheless it is an “abstraction” from particulars, both in the *Metaphysics* and in the biological works and «its status is merely that of a universal»³³⁷. Both in the cases for the *Categories* and in the *Metaphysics*, if my interpretation of the species-concept is correct, the initial cliché that the Aristotelian species are eternal turns out to be false.

First, in *Categories*, the natural species are understood as secondary substances necessarily instantiated in individuals. Since individuals as primary substances are the bricks of reality, this entails that if all co-specific individuals died at some time, the species would extinguish at that time. Clearly, if an individual *is*, it is also an instance of a species³³⁸, but the species’ existence primarily depends on individuals’ existence: these latter undergo death and can be responsible for the perishing of their species—which means lacking any instance of a certain species³³⁹.

Second, in the *Metaphysics* Aristotle deals with species as composite of form-matter. Species are subject of metaphysical investigation in the *Metaphysics*, in spite of individuals, because they are higher intelligible, as collection of *per se* common features that individuals share. In *Metaphysics* Z 7-8-9, Aristotle holds that the principles in virtue of which something is *what it is* does not come into being or undergoes generation³⁴⁰. But such principles are the forms or essences, rather than the species, for the species only provides the ‘What’, whereas the form is the ‘Why’. Aristotle says that «the one part which is expressed as form or substance does not come into being, but the combined whole that is called after it does come into being, and that in every created thing there is matter»³⁴¹. The species as a composite is a *synolon*: it comprehends matter, thus it is “created” from the structuring role of form in the matter and it is called

³³⁷ Balme 1987, p. 297.

³³⁸ See the reason illustrated in Chapter II, §3.3.

³³⁹ Actually, some commentators envisage, in the *Categories*, a necessary criterion of instantiation for species, whereas I deny it.

³⁴⁰ *Met.*, Z 8, 1033b6.

³⁴¹ *Met.*, Z 8, 1033b16-8.

after the form itself³⁴². We can conclude that, according to my interpretation of species, the Aristotelian species are not eternal.

There is anyway, a different sense of “species”, according to Lennox, in virtue of which the Aristotelian species can somehow said to be eternal. From the reading of the Aristotelian natural works, Lennox finds out that the species are somehow eternal, but not according to the same sense of eternality as the one attributed to Platonic forms. According to Lennox, roughly, Aristotle holds in his biological works that there is an eternal generation of individuals which share the same form, and, as a consequence, the species these individuals instantiate can be said to be eternal, as an endless chain of individuals which share the same set of capacities and exist “at every moment in time”³⁴³.

Let look more closely to Aristotle’s biology, where there is some evidence that promote the idea of the eternality of species. For Lennox, the features associated by Aristotle with “unqualified” eternality, are two:

- chronological continuity;
- numerical unity³⁴⁴.

These are possessed by heavenly bodies, but also by the species, as it will become clear. Even if not explicitly stated by Aristotle, in the opinion of Lennox, we can infer the eternality of species from many passages in the biological works. In particular, there is a very meaningful passage in the *Generation of Animals*, where Aristotle claims:

«Now some existing things are eternal and divine whilst others admit of both existence and non-existence. But that which is noble and divine is always, in virtue of its own nature, the cause of the better in such things as admit of being better or worse, and what is not eternal does admit of existence and non-existence, and can partake in the better and

³⁴² We said that a term like “man” can have three references: the individual man, the man-form and the species. Here Aristotle says that we manage to call “man” both Socrates and his species because of the form they instantiate.

³⁴³ Lennox 2000, p. 133.

³⁴⁴ Cf. *Met.*, Δ 6, 1016b35-17a1.

the worse. And soul is better than body, and living, having soul, is thereby better than the lifeless which has none, and being is better than not being, living than not living. These, then, are the reasons of the generation of animals. For since it is impossible that such a class of things as animals should be of an eternal nature, therefore that which comes into being is eternal in the only way possible. Now it is impossible for it to be eternal as an individual (though of course the real essence of things is in the individual)—were it such it would be eternal—but it is possible for it as a *eidos*. This is why there is always a class of men and animals and plants. But since the male and female essences are the first principles of these, they will exist in the existing individuals for the sake of generation»³⁴⁵

Here Aristotle states that two different even if interrelated things participate to eternity: i) individuals (taken as species members), and ii) first principles or tools of reproduction (femaleness and maleness). These latter exist by conditional necessity for the sake of self-preservation. Individuals and principle of reproduction participate to eternity, in a “weakened” sense if the condition for “unqualified” eternity are chronological continuity and numerical unity. According to Lennox, individuals and principle of reproduction can be said eternal in virtue of the role they play in the generation, a kind of change that «is capable of going on eternally»³⁴⁶.

The two things that turn out to be eternal in the Aristotelian biology, individuals and the first principles of reproduction, are the means in virtue of which an eternal change can occur, and this kind of change is generation. Generation concerns the reproduction of the form present in individuals as a set of organized capacities: the individual as well as the principle of reproduction are for the sake of generation and generation is for the sake of the form’s preservation. As for individuals, they cannot survive eternally as such, so they cannot preserve their form in themselves: for this

³⁴⁵ Cf. *Gen. an.*, B 1, 731b24-32a2. Balme and Lennox translate “eidos” as “form”, Ogle prefers “species”.

³⁴⁶ Cf *Gen. et. Cor.*, A 9, 338b12-9. Generation is eternal if it is a necessary process. According to Lennox, Aristotle says that biological generation is eternal in the *Generation and Corruption* Lennox 2000, pp. 137-9.

reason, they reproduce³⁴⁷. Reproduction is indeed the function in virtue of which a form is transmitted and preserved. Therefore, there is a sense according to which individuals can be called eternal: they are so “in form”, namely, they participate to the continuous generation of beings that share the same form³⁴⁸. Actually, the eternity of individuals is the downside of the eternity of those principle that aim at self-preservation by a continuous process of reproduction. Indeed, according to Aristotle, also the principles of reproduction are somehow eternal. Aristotle seems to think that in the natural world, eternity is related to a *process* instantiated by individuals in virtue of a principle, or a formal component, that is transmitted through generation.

In this sense, *eternity*—both in the case of individuals and in the case of the principles of reproduction—is not the one attributed to celestial things, for heavenly bodies are eternally one *in number*³⁴⁹ and do not need to reproduce to preserve their form, whereas this second kind of eternity concerns an uninterrupted process of reproduction triggered by the self-preservation of a formal principle. In particular, “to be eternal in form” belongs to individual, and it is a very different sense of eternity: individuals are things, but the way they participate to eternity has nothing to do with eternal things. For Lennox, individuals are “eternal in form”; this means that they take part in a historical chain of individuals that share a formal principle, namely, a set of organized capacities.

At the same time, Lennox admits a certain sense according to which species are eternal, if we understand a species as the endless chain of individuals that share a

³⁴⁷ «One of the consequences of his doing so i.e. [to say that individuals participate to eternity by reproduction] is that living things are capable of being subjects of scientific knowledge, though each and every one of them comes to be and passes away» (Lennox 2000, p. 132).

³⁴⁸ Cf. *Met.*, Δ 28, 1024a28-31.

³⁴⁹ Extending this way of being eternal to sublunary sphere would bring Platonic eide into the Aristotelian analysis

common form³⁵⁰. This concept of species is obtained by Lennox as he tries to interpret the Aristotelian claim that there are always men, animals and plants³⁵¹. This claim does not seem to be directly inferred from the passage above, some other premises must be added. To understand why Aristotle says this, we must bear in mind a couple of Aristotelian biological assumptions. Biological individuals are perishable, yet they must reproduce to preserve “something of their nature”, namely: perishable things aim at preserving their *form* (not the species), through reproduction³⁵². In addition every thing is reproduced only by means of something prior to it³⁵³, for “it takes a man to make a man”³⁵⁴. If we add these to the eternality of the biological generation, according to Lennox, we can deduce a concept of species as chain of individuals that share the same form. The only way according to which species can be eternal stems actually from these

³⁵⁰ According to Lennox, if individuals share the same species, they also share the same form, but it is not obvious that, if individuals share the same form, they also belong to the same species. Lennox does not equate form and species but he denies that new species come into existence from the pre-existent forms: the mule share the form with the horse, but not the species, but it «has a natural tendency to revert to the female sort» and not to generate a new and different species. See Lennox 2000, p. 155.

³⁵¹ Cf. *Gen. an.*, B 1, 732a2. I think that this claim is anyway controversial, since these terms can also be applied non-univocally

³⁵² On the contrary, *things* which are eternal in themselves do not need to reproduce since their nature is everlasting. Cf. *De. an.*, B 4, 416b14-7.

³⁵³ As Aristotle points out with reference to the growth of animals as such-and-such in virtue of an intrinsic principle: «that must first come into being which has a principle of increase (for this nutritive power exists in all alike, whether animals or plants, and this is the same as the power that enables an animal or plant to generate another like itself, that being the function of them all if naturally perfect). And this is necessary for the reason that whenever a living thing is produced it must grow. It is produced, then, by something else of the same name, as e.g. man is produced by man, but it is increased by means of itself» (*Gen. an.*, B 1, 735a). Cf also *Met.*, Z 7, 1032b30-2; 1034b13-9; *Gen. an.*, A 1, 715b8-16; *Hist. An.*, 585b33. Lennox says that «this was a metaphysically fundamental principle for him. Matter could never organize itself into functional organism of high complexity—that kind of organization could only be provided by a pre-existent instance of the kind reproduced» (Lennox 2000, p. 155).

³⁵⁴ *Met.* Z 8, 1033b33.

assumptions above, namely the self-preservation of the form—whose affinity with the species has already been established in §2— the endurance of individuals with the same form together with the eternal generation. Lennox concludes:

«Just as the presently existent organism of a kind implies an everlasting series of previous such organisms, so does it imply continuous generation in the future. Each organism has, as part of his natural makeup, a natural disposition to make a copy of itself—and an aspect of that copy is the possession of the same disposition[...] This everlasting, recurrent production of organisms which are all one in form is what Aristotle is talking about when he concludes, in GA II 1, that there is always a kind of men, animals and plants. The natural way to take ‘kind’ here is in the way defined in the opening lines of Met. Δ 28—a continuous generation of individuals which are the same in form. If one thinks of a species in this genetic, historical manner, then it is tolerably clear that Aristotle held that species were eternal»³⁵⁵

Accordingly, Lennox maintains that the only biological item that get closer to the eternality *tout court* are the species. These turn out to be both numerical unities—because the co-specific individuals share the same form—and chronologically endless—since generation is endless and something can be generated only from a pre-existent individual with the same form, then the actual biological species’ generation must be eternal. Species are eternal in this unqualified sense. Lennox instead holds that the eternality of the other two biological entities, i.e. individuals and principles of reproduction, is “qualified”, or roughly, “weakened”.

This way of interpreting the eternality of species does not contradict my position, i.e., that the Aristotelian species are not eternal. According to Lennox, species are eternal in the sense that they result from the everlasting reproduction of the form belonged by co-specific individuals, which is an inner principle spread by father to son. However, this does not invalidate my claim that species are not eternal as Platonic forms are, as Lennox himself is willing to maintain. The Platonic forms play no role in explaining why there is an everlasting generation of individuals which share the same species: the self-preservation of the forms present in individuals is responsible for the

³⁵⁵ Lennox 2000, pp. 141-1.

endless reproduction³⁵⁶. Actually, the eternity Lennox admits for species is not the same that Aristotle attributes to celestial bodies, which he places in the world of “necessary beings”. In the biological investigation, there is no necessity except for the conditional one, which has to do with forms. The eternity of species is conceptually bound only to chronological continuity and numerical unity, not to the heavenly necessity.

According to many commentators, the eternity of the Aristotelian species—which we have shown to be a false theory depending upon to a narrow and Platonic-inspired interpretation of eternity—goes hand in hand with his ante litteram fixism. Indeed, if we assumed the thesis of the eternity of species together with the typological essentialism and the theory of a “standard” introduced above—and actually already rejected—it would come out that the Aristotelian species are also *fixed*: the species identified by fishermen, butchers and so on will never undergo change as well as they never underwent any evolutionary adjustment. This conviction inspired the today common-view that Aristotle laid the foundation for the fixity of species, the *nemesis* of evolutionism. Since fixism is now thought as nothing but a fantasy, for the fact that species change and evolve is ascertained as a matter of fact³⁵⁷, then the idea of the eternity of species which underlies the fixity theory must be discredited³⁵⁸.

Far from looking for any Aristotelian passages supporting some evolutionary stance³⁵⁹, to attribute to Aristotle the thesis that species are necessarily fixed is not

³⁵⁶ Cf. *Met.*, Z 8, 1033b20 ff.

³⁵⁷ Anyway, it does not imply that the contemporary Evolutionary theory is true beyond any doubt or that it cannot be contested. The Darwinian theory, for instance, already went through several adjustments.

³⁵⁸ Actually, several biologists would admit that dinosaurs never became extinct: birds are instances of evolved dinosaurs! See Benson 2014. A close examination on terms’ meaning would be convenient.

³⁵⁹ Of course, Aristotle was not an evolutionist. Nevertheless, if evolution is grounded on the concept of “ability to adapt”, and this is strictly linked to the correlation anatomical-structure and physiological function, this theme is often faced by Aristotle, not only in the biological works.

completely correct. In particular, if one ascribes to Aristotle the belief in the fixity of species is based on his teleology, this ascription is wrong.

Unlike Balme, who does not directly derive evidence for the fixity theory from the continuous reproduction of co-specific individuals³⁶⁰, Lennox makes clear that «if to continue a species is to continue replicating its form, it does entail fixity»³⁶¹. This argument stems from the idea that the specific makeup of individuals as we observe it, resulting from the combination of teleology, conditional necessity and environmental pushes, is the best way individuals have to survive, thus no adjustments in their traits is needed³⁶². Even if the offspring inherits the parental likeness, in addition to the form, the transmitted characters are inessential, therefore they only envisage a little variability within the species, whereas an evolution requires the change of a vast portion of traits³⁶³.

Anyway, both Balme and Lennox agree that teleology alone is insufficient to give raise to a well-drawn fixity theory: species are such-and-such also because of extrinsic factors (the same an evolutionist would admit), environment and lifestyle. The reason we can exclude that the idea of immutable traits in nature depend entirely on teleology is related to ecological and lifestyle factors, as the cases for the under-sided mouth of the sharks³⁶⁴ or the fecundity of fishes make clear. The form, according to Aristotle, determines the functions that the bodily parts must exercise, all in virtue of the “good”. But the “good” for the organisms concretely is reached if the bodily parts are “in balance” with the ecological niche in which the individual lives³⁶⁵. Aristotle nowhere says that the form depends on the ecological niche—which would be enough

³⁶⁰ See Balme 1972, p. 97.

³⁶¹ Lennox 2000, p. 155.

³⁶² Inessential traits like eyes-color and sex are out of consideration. Cf. *Met.*, I, 1058b2.

³⁶³ In the *Generation of Animals*, actually, Aristotle does not seem to believe in the possibility of obtaining a new species (a new chain of individuals instantiating a new universal) from an extra-specific breeding. Cf. *Gen. an.*, B 4, 738b28-34.

³⁶⁴ *De Par. an.*, Δ 13, 696b26

³⁶⁵ Empedocles had yet formulated a sort of survival-of-the-fittest principle. Cf. *Phys.*, II, 198b29 interpreted by Balme 1987, p. 280.

for an evolutionist stance— but the specific features seem so. Aristotle often matches teleology to the concreteness of survival: therefore the species is not merely established by the form, but also by extrinsic factors.

§4. *Extrinsic Finality*

Often, Aristotle has been charged of being the pioneer of the doctrine of finalism. But if by “finalism” we mean something like a *digitus dei* that guides the natural phenomena³⁶⁶, we are totally misleading.

There are several passages in the *Metaphysics* where Aristotle deals with the final cause, and the biological works are full of references to final causality. Instances of teleological commitments are, for example, the idea that nature does nothing in vain³⁶⁷, or the other idea that the individuals’ growth is for the sake of the good. According to a viewpoint which denies the metaphysical differences between form and species and which charges Aristotle of typological essentialism, the individual growth toward the good amounts to reach the perfectness of its species. As Balme points out, this would cause an ontological serious problem: by what are species directed?:

«it is here that traditional lapsed into philosophy-fiction, inventing for Aristotle such *dei ex machina* as a hypostatized Nature supervising and overall teleology, or a cosmic control operate by the Unmoved Mover, or a living universe, or mysterious entelechies and magical pneuma within animals. But there is no room for such machinery in Aristotle’s cosmology or theology»³⁶⁸.

These ideas, if set out of their context, might lead to a misinterpretation of the Aristotelian biological intuitions.

³⁶⁶ Like William Harvey did. Cf. Harvey 1651, p. 170.

³⁶⁷ Cf. *De Par. an.*, B 13, 658a8-9; 661b23-4; 691b4; 694a15; 695b19; *Gen. an.*, B 5, 741b5; B 4, 739b20.

³⁶⁸ Balme 1987, p. 299.

At the beginning of *The Parts of Animals*, Aristotle clarifies what the aim of the biological investigation within the scientific system is: the general purpose is the search into the causes of natural beings, which differ because of the form and the functions from the non-living beings. Both in the *Parts* and in the *Generation of Animals*, Aristotle restates that the “four causes” are generally responsible for the *being* of something, but, in the case for natural organisms, it is the final cause the most important, since the key that explains natural phenomena, like the processes of reproduction, locomotion, nourishment, performed by individuals.

All these natural processes require specific visible functions, and their explanation cannot be reached with reference to their efficient cause only, like female-male in the case for reproduction or legs and fins for locomotion. Efficient cause is dependent on the final one—by conditional necessity—, and it cannot be the ultimate cause. Again, also the material cause cannot explain natural recurrent processes, as already illustrated in §1. Aristotle makes clear that, in the natural investigation, the formal and the final cause are one and the same, and are necessary when a full biological explanation is in order. This identification is the focus of the Aristotelian intrinsic teleology: to fulfill its nature something must not reach an extrinsic standard, it must only realize its proper inner principle.

By identifying the form with the *telos*³⁶⁹, Aristotle implies that the nature of something is also a final cause, and the aim of something is to realize its proper nature: the aim is to be reached in the thing itself. A *telos* is nothing but the “dynamic” fulfillment of the essence: every natural process occur for the sake of the form which is fully realized through the processes³⁷⁰. The final and the formal causes only differ according to the viewpoints they are approached: the essence gives a “static” condition on things’ being—it is the fixed principle in virtue of which a thing is what it is—, whereas the purpose gives the “dynamic” condition as to why things have a determined nature. Form determines the vital functions in a certain way, it is a «unified set of goal-

³⁶⁹ *De Par. an.*, A 1, 639b12-6; *Gen. an.*, A 1, 715a4-6; 778b5-6

³⁷⁰ See Vegetti-Lanza 1971, p. 506.

oriented capacities»³⁷¹ whose aim is self-preservation and self-realization³⁷². With the words of Gill:

«The core idea [of Aristotle's natural teleology] is that for any given living entity (pig, human being, daisy), to express its potential as an entity of that kind is to fulfill its natural purpose»³⁷³.

The *telos* animals must reach as their proper essence, is therefore *inner* in the Aristotelian biology, and it amounts to the “good” of the individual, which can ultimately explain *why* it possesses a given set of physiological features and *why* it behaves in a certain way.

Not only so. There are also important implications for the material components of individuals, i.e. the efficient causes of the biological processes. Aristotle's point is that the material bodily parts of an organism with a given nature, which depends by conditional necessity on the formal-final component, will necessarily acquire a given *configuration* to perform the functions they must fulfill.

According to Mayr, it is very difficult to eradicate from biology a theory as rooted as teleology³⁷⁴. Here there is the reason:

«Final causes, however, are far more plausible and pleasing to a layperson than the seemingly so haphazard and opportunistic process of natural selection. For this reason, a belief in final causes had a far greater hold outside of biology than within»³⁷⁵.

Mayr is here referring to a finalist conception far from the real Aristotelian thinking, The conception pointed by Mayr as totally wrong, is a consequence of three different ways—paramount until the XX Century—of answering the question as to *why* things change and evolve in such-and-such way:

³⁷¹ Lennox 2000, p. 128.

³⁷² *Gen. an.*, B 2, 731b31-5.

³⁷³ Gill 2011, p. 14.

³⁷⁴ See Mayr 1974, Mayr 1988 and Mayr 1992.

³⁷⁵ See Mayr 2004, p. 43.

- A. the theistic explanation;
- B. the orthogenetic explanation;
- C. the cosmic teleology³⁷⁶

The supporters of a), roughly, maintain that change is due to an “Unmoved Mover”, while the supporters of b) say that «variation in nature is directed toward fixed goals and that species evolve in a predetermined direction irrespective of selection [namely, irrespective of efficient causes]»³⁷⁷. The supporters of c), instead, claim that perfection and progress are the aim of evolution, hence they include axiological conjecture in the natural order. The favor these theses enjoyed for decades got recently lost because of the introduction of new and more scientifically-appealing theories. But the Aristotelian final causality has nothing to do with a), b) and c). These three conceptions share the belief in an extrinsic *telos*, which individuals and species should reach. The assumption that Aristotle might have supported a similar position goes hand in hand with the attribution of typological essentialism and also with a Platonic-inspired reading of the Aristotelian species-forms.

Indeed, Mayr writes:

«Some of the difficulties of the philosophers are due to their misinterpretation of the writings of the great philosophers of the past. Aristotle, for instance, has often been recorded as a finalist, and cosmic teleology has been called an Aristotelian view. Grene is entirely correct when pointing out that Aristotle’s *telos* has nothing to do with purpose “either Man’s or God’s. It was the Judaeo-Christian God who (with the help of neo-Platonism) imposed the dominance of cosmic teleology upon Aristotelian nature. Such sweeping purpose is the very opposite of Aristotelian [philosophy]” (Grene 1972:395–424). Modern Aristotle specialists (Balme, Gotthelf, Lennox, and Nussbaum) are

³⁷⁶ Brilliantly challenged by Dawkins 1986.

³⁷⁷ See Encyclopedia Britannica under the heading “orthogenesis”.

unanimous in showing that Aristotle's seeming teleology deals with problems of ontogeny and adaptation in living organisms, where his views are remarkably modern»³⁷⁸.

Mayr realizes that the word "telos" was used according to a plurality of meanings³⁷⁹, but, if interpreted according to the Aristotelian usage, it can be today reused, as the metaphysical idea that a living phenomenon:

«is guided by "a program" and it depends on the existence of some endpoint, goal, or terminus that is "foreseen" in the program that regulates the behavior or process. This endpoint might be a structure (in development), a physiological function, the attainment of a geographic position (in migration), or a "consummatory act" in behavior. Each particular program is the result of natural selection, constantly adjusted by the selective value of the achieved endpoint»³⁸⁰.

What the Aristotelian teleology envisages is an intrinsic and essential "plan", which the living being is forced to follow (external conditions-permitting) and it is inevitable because it is within its nature.

The keyword to compare the Aristotelian teleology to contemporary biology is "genetic program"³⁸¹—only applicable to the living world. The basic idea is that a living being owns an intrinsic organization that establishes the way it develops: this is a very empirical matter, whose associated concept is as old as Aristotle's reflection. Take the example of the egg, also cited by Aristotle: we can effectively observe the development and the material constitution of it, and we assume that something intrinsic must direct the process, maybe a principle, to use an Aristotelian vocabulary, or simply information

³⁷⁸ See Mayr 2004, p. 44. Balme suggests, moreover, that Aristotle was providing, by teleology, an explanation of the animals' functions determined by their intrinsic nature, their environment and their lifestyle and «Whereas in the GA his problem is the growth of the individual animal towards the inherited form, in the PA his problem is the differences between the existing forms of animals. In an evolutionary context (which is of course inconsistent with these though) he would be asking why animals evolved into their present forms» (Balme 1987, p. 300).

³⁷⁹ Nagel lists ten different uses. See Nagel 1961.

³⁸⁰ Mayr 2004, p. 52; also Mayr 1988.

³⁸¹ The biological essentialism of Devitt works perfectly in this framework. See Devitt 2008.

encoded in the DNA. This does not imply that the process is fixed or that it necessarily will come to the completeness: plenty of extrinsic factors actually condition the final result. I can boil the egg thus interrupting the process³⁸². With the words of Mayr:

«the truly characteristic aspect of goal-seeking behavior is not that mechanisms exist which improve the precision with which a goal is reached, but rather that mechanisms exist which initiate, i.e., ‘cause’ this goal-seeking behavior»³⁸³.

The lesson we learn from delving deeper into the Aristotelian biological works together with his metaphysical commitments, is that the clichés about him are often due to the carelessness of contemporary philosophers of biology or simply depend on historical contaminations. Aristotle was a precise observer and theorist, whose metaphysical attitude toward the living world is still convincing.

³⁸² The Aristotelian examples are less ironic. He usually deals with the age and bodily constitution of the mother, weather conditions like temperature, wind, rain.

³⁸³ Cf. Mayr 1988, p. 46.

CONCLUSION

In this thesis I have dealt with Aristotle's philosophy of biology and metaphysics, especially focusing on the metaphysical commitments involved in his biology.

The core of my interpretation of Aristotle is that his metaphysical investigation develops from a 'What' to 'Why'-level of knowledge. With respect to biological individuals and phenomena, in particular, Aristotle's first intention is to identify *what* can be explained: this is the organism together with its essential way of being, that is, its species. This is a very commonsensical level of understanding, but the purpose of Aristotle consists in assuming the objects of commonsensical experience as the starting-point for the metaphysical investigation. Then, Aristotle deepens into the reasons *why* ordinary things and phenomena are such-and-such. Thus, he reaches a metaphysical deeper level of investigation, assuming that things are composed of a formal and a material component. The form, as a principle, determines the functions that the material parts of the composite perform, and it is the cause in virtue of which a composite is exactly such-and-such.

In particular, I have emphasized the role played by the form or essence of a biological thing. Essentialism has turned out to be the key for interpreting both the metaphysics and the biology of Aristotle: in both cases, the essence or form is the explanatory element in virtue of which something is a member of a species. Essentialism, however, acquires two distinct forms in Aristotle. The first is based on what we have called species-attribution and it has to do with the identity conditions that must be attributed to an individual in order to answer the 'What is it'-question. The second is instead based on what we called form-attribution and it is involved in the explanation of why something is *what it is*; it is therefore dependent on the 'Why is it'-question. We have seen that, both in the metaphysical and in the biological investigation, the form-attribution explains why something is *what it is*, namely, a member of a given species.

Form and species must be understood as distinct. In the *Metaphysics* as well as in the biological works, where the ‘Why is it’-question is at stake, Aristotle searches for the reasons why organisms are such-and-such and why natural phenomena occur. Among these phenomena, we can also include the specific makeup. The reason why natural things are such-and-such consists in the activity of the formal principle that guides natural things toward their good. The form is the metaphysical constituent of the hylomorphic composites (individual and specific) and the good, for an individual organism, is to perform a set of living and form-dependent functions. Among these functions, Aristotle puts reproduction: thanks to the reproduction, the form is transmitted from father to son. This transmission explains why many individuals share the same form or essence.

The form or essence, therefore, is what makes individuals *what they are*, i.e. members of a certain species. The species is the result of a formal principle’s act upon a parcel of matter. The form alone, although insufficient for the species-attribution—since material factors are involved in the species’ constitution as well—determines the most important traits on which we base for defining a species: the formal capacities. For instance, the species “man” can be described through a given set of capacities instantiated in flesh and bones; among these, “rationality” is the most important for humankind, and it is its distinguishing formal trait.

I have also argued that this Aristotelian method of investigation, developing from the ‘What is it’-question to the ‘Why is it’-one, is a good theoretical manner of understanding the question as to *why* something belongs to the species *it actually belongs*. I have shown, in particular, that the attempt at answering this important question matches biology and metaphysics. This question is usually associated with an essentialist attitude. Essentialism seems committed to the idea that the actual identity of something—as species member—relies on some of its features, and something is *what it is* in virtue of something else. Hence, essences in Aristotle play exactly this role, that is, they ground the organisms’ identity.

Over the last years, essentialism has been greatly discredited in the scientific practice, mainly because of several misinterpretations of the concept of “essence”. I

have made it clear, though, that an essence, according to an Aristotle-based interpretation, is not a separate metaphysical thing over and above organisms, but an intrinsic factor that makes possible the species-membership. Generally speaking, some contemporary philosophers of biology are skeptical about the utility of philosophical, above all metaphysical, commitments in the science. Instead, my point is that the analysis of the living world is inevitably tied to metaphysics. Even the biological systematics acknowledges that the discussions concerning the status of the species and their definition may be labelled as “metaphysical issues”. Now, more than even, to give a very significant example, the philosophical concept of “final causality” that lies at the heart of the Aristotelian teleology is arousing biologists’ curiosity. It seems that the idea of a genetic program, which explains the goal-seeking behavior performed by living organisms, may be related to the normativity implied by the concept of self-preservation of the Aristotelian form or essence. An Aristotelian approach, which links together biology and metaphysics, is not inappropriate, after all. On the contrary, it can still be a source of biological interest and inspiration.

BIBLIOGRAPHY

Primary Sources

Ali Khalidi, M., 2013, *Natural Categories and Human Kinds*, Cambridge University Press, New York.

Angioni, L., 2012, “Things are the Same as their Essence? Notes on Aristotle’s *Metaphysics Z6*”, in *Analytica*, 16: pp. 37-66.

_____, 2014, Definition and Essence in Aristotle’s *Metaphysics VII 4*, in *Ancient Philosophy*, 34: pp. 75-100.

Balme, D, 1962, “Γένοϛ and Εἶδοϛ in Aristotle’s Biology”, in *The Classical Quarterly*, Vol. 12, No. 1: pp. 81-98, Cambridge University Press, Cambridge: UK.

_____, 1972, *De Partibus Animalium I and De Generatione Animalium I*, Clarendon Press: Oxford.

_____, 1987, “Aristotle’s Biology was not Essentialist”, in *Philosophical issues in Aristotle’s biology*, pp. 291–312.

Barnes, B., 2002, *Aristotle’s Posterior Analytics*, Clarendon Press: Oxford.

_____, 2011, “Essentialism in the Sciences”, in *Critical Quarterly*, vol. 53: no. 4, John Wiley and Sons edition.

Berti, E., 2009, “Aporiai 6-7”, in *Aristotle’s Metaphysics Beta. Symposium Aristotelicum*, pp. 105-35.

Boylan, M., “Aristotle’s Biology”, URL: <http://www.iep.utm.edu/aris-bio/>.

Bostock, S., 2003, *Metaphysics Books Z and H*, Clarendon Press.

Boulter, S., 2012, "Can Evolutionary Biology do Without Aristotelian Essentialism?", in *Royal Institute of Philosophy Supplement*, 70: pp 83-103.

_____, 2013, *Metaphysics from a Biological point of View*, Palgrave Macmillan: UK.

Bronstein, D., 2016, *Aristotle on Knowledge and Learning: The Posterior Analytics*, The Oxford Aristotle Studies, Oxford: UK.

Charles, D., 2000, *Aristotle on Meaning and Essence*, Oxford University Press: New York.

Devitt, M., 2008, "Resurrecting Biological Essentialism", in *Philosophy of Science*, 75: pp. 344-382.

_____, forthcoming, "Defending Intrinsic Biological Essentialism".

Ereshefsky, M. (edited by), 1992, *The Units of Evolution. Essays on the Nature of Species*, A Bradford Book, The MIT Press: USA.

_____, 2001, *The Poverty of the Linnaean Hierarchy: A Philosophical Study of Biological Taxonomy*, Cambridge University Press.

_____, 2010, "Species", in *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/sum2016/entries/species/>>.

Ferejohn, M., 2009, "Empiricism and the First Principles of Aristotelian Science", in *A Companion to Aristotle*, edited by Anagnostopoulos, Io G., Blackwell Publishing Ltd.

_____, 2013, *Formal Causes: Definition, Explanation, and Primacy in Socratic and Aristotelian Thought*, Oxford University Press.

Frede, M., 1987a, "Categories in Aristotle", in *Essays in Ancient Philosophy*, Minnesota University Press: Minneapolis.

_____ b, "Individuals in Aristotle", in *Essays in Ancient Philosophy*, Minnesota University Press: Minneapolis.

_____ c, "The Original Notion of Cause," in *Essays in Ancient Philosophy*, Minnesota University Press: Minneapolis.

Furth, M., 1988, *Substance, Form and Psyche: an Aristotelian Metaphysics*, Cambridge University Press: Cambridge, U.K.

Galluzzo, G., 2001, "Il problema dell'oggetto della definizione nel commento di Tommaso d'Aquino a *Metafisica Z* 10–11", in *Documenti E Studi Sulla Tradizione Filosofica Medievale* 12:417-465.

Galluzzo, G., Mariani, M., 2006, *Aristotle's Metaphysics Book Z: the Contemporary Debate*, Edizioni della Normale: Pisa.

Grandy, R.E., 2016, "Sortals", in *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/fall2016/entries/sortals/>>.

Ghiselin, M.T., 1974, "A radical solution to the species problem", in *Systematic Zoology*, 23: pp. 536–44.

_____, 1997, *Metaphysics and the Origin of Species*, State University of New York Press: USA.

_____, 2005a, "Taxonomy as the Organization of Knowledge", in *Proceedings of the California Academy of Sciences*, 56 (15): pp. 161-9.

_____, 2005b, "The Darwinian Revolution as Viewed by a Philosophical Biologist", in *Journal of the History of Biology* 38 (1): pp. 123 - 136.

Gill, C., 2011, "Essentialism in Aristotle's biology", in *Critical Quarterly*, vol. 53: no. 4, John Wiley and Sons edition.

Gotthelf, A., Lennox, J.G. (edited by), 1987, *Philosophical Issues in Aristotle's Biology*, Cambridge University Press: New York.

Granger, H., 1981, "The Differentia and the Per Se Accident in Aristotle", in *Archiv für Geschichte der Philosophie*, 63: pp. 118–129.

_____, 1984, "Aristotle on Genus and Differentia", in *Journal of the History of Philosophy*, 22: pp 1-23.

Hull, D. 1965, "The Effect of Essentialism on Taxonomy: Two Thousand Years of Stasis," *British Journal for the Philosophy of Science*, 15: 314–326, 16: 1–18.

_____, 1969, "What Philosophy of Biology is Not", in *Synthese*, 20 (2): pp. 157 - 184.

_____, 1978, "A Matter of Individuality", in *Philosophy of Science*, 45 (3):pp. 335-360.

Lennox, J.G., 2000, *Aristotle's Philosophy of Biology: Studies in the Origin of Life Science*, Cambridge University Press.

_____, 2004, *Aristotle on the Parts of Animals*, Clarendon University Press: Oxford.

_____, 2015, "Darwinism", in *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/sum2015/entries/darwinism/>>.

Loux, M.J., 1991, *Primary Ousia. An Essay on Aristotle's Metaphysics Z and H*, Cornell University Press: New York.

Lowe, J.E., 1998, *The Possibility of Metaphysics: Substance, Identity, and Time*, Oxford University Press.

_____, 2008, “Essentialism, Metaphysical Realism, and the Errors of Conceptualism”, in *Philosophia Scientiae* [En ligne], 12-1, mis en ligne le 01 avril 2011, consulté le 11 octobre 2012. URL = <http://philosophiascientiae.revues.org/222> ; DOI : 10.4000/philosophiascientiae.222.

Mayr, E., 1953, *Methods and Principles of Systematic Zoology*, Mc-Grow Hill Book Company: USA.

_____, 1982, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*, 2011 Ed., The Belknap Press of Harvard University Press : USA.

_____, 2002, *What Evolution is*, Weidenfeld & Nicolson: UK.

_____, 2004, *What Makes Biology Unique? Considerations on the autonomy of a scientific discipline*, Cambridge University Press, Cambridge: UK.

Pasnau, R., 2012, *Metaphysical Themes 1274-1671*, Oxford University Press: Oxford, U.K.

Platt, A., 2015, *On the Generation of Animals*, University of Adelaide Press, online version URL:<https://ebooks.adelaide.edu.au/a/aristotle/generation/index.html>

Popper, K., 1945, *The Open Society and its Enemies*, 2011 Ed, Routledge Classic, RN.

Ross, W.D., 1936, *Aristotle's Physics*, Clarendon Press: Oxford.

_____, 1949, *Aristotle's Prior and Posterior Analytics*, Clarendon Press: Oxford.

Salmon, W., 1999, “Scientific Explanation”, in *Introduction to the Philosophy of Science*, Hackett Publishing Company: Indianapolis.

Spedini, G., 1997, *Antropologia Evoluzionistica*, Piccin Ed.

Tipton, J.A., 2014, *Philosophical Biology in Aristotle's Parts of Animals*, Springer Ed.

Thompson, D'A., *The History of Animals by Aristotle*, URL:http://classics.mit.edu/Aristotle/history_anim.html.

Vegetti, M., Lanza, D., 1971, *Opere Biologiche di Aristotele*, Utet.

Witt, C., 1985, "Form, Reproduction, and Inherited Characteristics in Aristotle's "Generation of Animals"", in *Phronesis*, 30 (1): pp. 46-57.

_____, 1989, *Substance and Essence in Aristotle. An Interpretation of Metaphysics VII-IX*, Cornell University Press, NY: USA.

Secondary Sources

Ackrill, J.L., 1981, *Aristotle the Philosopher*, Oxford University Press

Ayala, F., 1968, "Biology as an Autonomous Science", in *American Scientist*, 56: pp. 207– 221.

Bäck, A., 2000, *Aristotle's Theory of Predication*, Brill NV, Leiden: Netherlands.

Bechler, Z., 1995, *Aristotle's Theory of Actuality*, State University of New York Press.

Bohr, N., 1958, *Atomic Physics and Human Knowledge*, Wiley, New York.

Bourgey, L., 1955, *Observation et expérience chez Aristote*, Paris.

Buffon, G., 1988, 1789, *Les Époques de la nature*, ed. J. Roger, reissue of 1962 edition, Paris: Muséum national d'histoire naturelle press.

Dobzhansky, T., 1937, *Genetics and the origin of species*, New York: Columbia University Press.

_____, 1983, “Nothing in Biology Makes Sense except in the Light of Evolution”, in *The American Biology Teacher*, Vol. 35, No. 3: pp. 125-129.

Cherniss, H., 1944, *Aristotle's Criticism of Plato and the Academy*, Johns Hopkins Press, Baltimore.

Code, A., 1984. “The Aporematic Approach to Primary Being in *Metaphysics Z*”, in *Canadian Journal of Philosophy*, 14: pp 1-20.

Cohen, M.S., 1978, “Individual and Essence in Aristotle's *Metaphysics*”, in *Paideia*, Special Aristotle Edition:75-85.

_____, 1984, “Aristotle and Individuation”, in *Canadian Journal of Philosophy*, 10: pp. 41-65.

_____, 2009, “Substances”, in Anagnostopoulos, G. (edited by), *A Companion to Aristotle*, Wiley-Blackwell, UK.

Connell, S., 2016, *Aristotle on Female Animals*, Cambridge University Press.

Dawkins, R., 1986, *The blind Watchmaker*, Norton & Company, Inc.

Driscoll, J., 1981, “Êide in Aristotle's Earlier and Later Theories of Substance”, in O'Meara (ed.), *Studies in Aristotle*, Catholic University Press, Washington: USA, pp. 129-159.

Duprè, J., 1981, “Natural Kinds and Biological Taxa”, in *Philosophical Review*, 90: pp. 66-90.

_____, 1993, *The Disorder of Things: Metaphysical Foundation of the Disunity of Science*, Harvard University Press.

Frede, M., 1990. "The Definition of Sensible Substances in *Metaphysics Z.*", in Devereux & Pellegrin (eds.), pp. 113-29.

Frede M., Patzing, G., 1988, *Aristoteles "Metaphysik Z". Text, Übersetzung und Kommentar*, C.H. Beck: Munich.

Frede, M., Striker, G. (edited by), 2002, *Rationality in Greek Thought*, Clarendon University Press: Oxford.

Gill, M.L., 1989, *Aristotle on Substance: The Paradox of Unity*, Princeton: Princeton University Press.

Grandy, R., 2007, "Sortals", in *The Stanford Encyclopedia of Philosophy* (Spring 2014 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/spr2014/entries/sortals/>>.

Irwin, T., 1988, *Aristotle's First Principles*, Clarendon Press: Oxford.

Kitcher, 1984, "Species", in *Philosophy of Science*, 51 (2):pp. 308-333.

Leszl, W., 1972, "Knowledge of the Universal and Knowledge of the Particular in Aristotle", in *The Review of Metaphysics, Philosophy Education Society Inc.*, vol.26, n. 2, pp. 278-313, URL: <http://www.jstor.org/stable/20126209>.

Mayr, E., 1942, *Systematics and the Origin of Species From the Viewpoint of a Zoologist*, Columbia University Press.

_____, 1963, *Animal, Species and Evolution*, Belknap of Harvard University Press.

_____, 1970, *Populations, Species and Evolution: An Abridgment of Animal Species and Evolution*, Belknap Press of Harvard.

Mayr, E., Provine, W., 1998, *The Evolutionary Synthesis: Perspectives on the Unification of Biology*, new edition, Cambridge, MA: Harvard University Press.

Millikan, R., 1999, "Historical Kinds and the "Special Science"", in *Philosophical Studies*, 95: pp. 45-65.

Owens, G.E.L., 1975, "The platonism of Aristotle", in *Articles on Aristotle*, vol.1: pp. 14-34, Duckworth: London.

_____, 1978, *Doctrine of Being in the Aristotelian "Metaphysics"*, Pontifical Institute of Mediaeval Studies.

Putnam, H., 1975, "The Meaning of 'Meaning'", in *Minnesota Studies in the Philosophy of Science*, 7: pp. 131-193.

Riondato E., 1961, *Storia e metafisica nel pensiero di Aristotele*, Antenore Ed., Padova.

Randall J.H. Jr, 1960, *Aristotle*, New York.

Scaltsas, T., 1994, *Substance and Universal in Aristotle's Metaphysics*, Cornell University Press.

Sellars, W., 1967, "Aristotle's Metaphysics. An Interpretation", in *Philosophical Perspectives*, Charles Thomas, Springfield: Illinois.

Simpson, G.G., 1961, *Principles of Animal Taxonomy*, New York: Columbia University Press.

Sloan, P.R., 2014, “The Essence of Race: Kant and Late Enlightenment Reflections”, in *Studies in History and Philosophy of Science. Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 47: pp. 191-195.

Smart, J.J.C., 1968, *Between Science and Philosophy*, New York, Random House.

Smith, J.E.H., 2006, *The Problem of Animal Generation in Early Modern Philosophy*, Cambridge University Press

Sober, E., 1980, “Evolution, Population Thinking and Essentialism”, *Philosophy of Science*, 47: pp. 350–383.

Sorabji, R., 1980, *Necessity, Cause, and Blame: Perspectives on Aristotle's Theory*, University of Chicago Press.

Van Valen, L., 1976, “Ecological Species, Multispecies, and Oaks”, in *Taxon*, 25: pp. 233-239.

Varzi, A., 2008, *Ontologia*, Laterza, Roma.

Wagner, M., 1841, *Reisen in der Regenschaft Algier in den Jahren 1836, 1837 und 1838*, Leipzig.

Walsh, D., 2006, “Evolutionary Essentialism”, in *British Journal for the Philosophy of Science*, 57: pp. 425-48.

Werner, C., 1910, *Aristote et l'Idéalisme Platonicien*, Alcan, Paris.

Wiggins, D., 1980, *Sameness and Substance*, Oxford: Blackwell.

_____, 2001, *Sameness and Substance Renewed*, Cambridge University Press.

Woods, M., "Form, Species, and Predication in Aristotle", in *Synthese*, 96 (3): pp. 399-415.

Zeller, E., 1921, "Die Philosophie der Griechen in ihrer Geschichtlichen Entwicklung" (Eng. Ed., edited by Nestle, W., 1955, *Outlines of the History of Greek Philosophy*, Noontday Press Ed., NY: USA).