

Aristotle's Mixture in its Medical and Philo- sophical Background: The Hippocratic *De victu* and the Aristote- lian *De generatione et corruptione**

DOI: 10.14746/PEA.2021.1.8

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1. Introduction

In the proem to *Meteorologica* (*Mete.* 338a20–39a10), Aristotle describes the programme of his study of nature by enumerating a series of works already written or yet to be written, beginning with a reference to his *Physics* and concluding with a mention of his zoological and botanical treatises.¹ This programmatic catalogue refers, remarkably, to

* I wish to thank Sabrina Grimaudo for comments, suggestions, and improvements on a previous version of this article. I also wish to thank Marion Bourbon for stimulating discussions on the topic of mixture. Finally, I am grateful to the journal's anonymous referee and the Editor-in-Chief Mikolaj Domaradzki for their useful remarks.

a discussion on corporeal elements (their number, kinds, and mutual transformation), and on generation and corruption in general. Traditionally, these two latter topics have been understood as covered by *De caelo* III–IV and *De generatione et corruptione*, in the form in which we read them today.² If *De caelo* III arrives at the conclusion that the primary elements are reciprocally transmutable, and *De caelo* IV is wholly dedicated to expounding the theory of the natural places of the primary elements, neither of the two books delves deeper into the question of what really happens when the primary elements transform into one another or mix together – processes whose basic principles are laid down in *De generatione et corruptione*. As our goal is to make a contribution which can shed new light on the historical roots of Aristotle’s theory of mixture as ruled by the mechanism of the reciprocal interaction of the elements, our focus here will be Aristotle’s essay *De generatione et corruptione*, which provides us with the best insight into this topic.

2. Aristotle’s elementary physics in *De generatione et corruptione*

Before proceeding to the enquiry, I shall present a brief review of Aristotle’s elementary physics of *De generatione et corruptione*, which will then lead us to outlining the basic principle underlying the theory of mixture contained in this treatise.³ Aristotle posits four sublunary primary elements: fire, air, water, earth, and, as it is clearly spelt out in *De generatione et corruptione* 330b3–5, every element is coupled with two primary qualities. Fire is hot and dry, air is moist and hot, water is cold and moist, earth is dry and cold.⁴

¹ “We have already dealt with the first causes of nature and with all natural motion (*Phys.*); we have dealt also with the ordered movements of the stars in the heavens (*Cael.* I–II) and with the number, kinds, and mutual transformations of the four elements, and growth and decay in general (*Cael.* III–IV, *GC*). It remains to consider a subdivision of the present inquiry which all predecessors have called Meteorology (...). After we have dealt with all these subjects let us then see if we can give some account, on the lines we have laid down, of animals (the zoological *corpus*) and plants (reference to a lost work *On Plants*, cf. Bonitz *Index* 104b38), both in general and in particular (...)” (transl. and references by Lee).

² For the problematic relationship between *Cael.* III–IV and *GC*, cf. Migliori (2013: 20–30), on this cf. also Brunschwig (2004: 28–31). In contrast to the majority of ancient commentators and modern scholars, who are inclined to hypothesise that *Cael.* I–II (which is dedicated to the heavenly motions) should be kept apart from *Cael.* III–IV (which focus on the sublunary world and should be brought instead closer to *GC*, representing its logical continuation), according to Brunschwig, in the abovementioned passage from *Meteorologica*, once mentioned *Physics* (where Aristotle deals with more abstract and general topics), the philosopher would refer to a larger unit whose subject matter is the whole set of physical bodies and processes, both supralunar and sublunar. This larger unit, in Brunschwig’s view, would be composed of three subunits “put exactly on the same level in an ordered but non-hierarchical sequence”, i.e., *Cael.* I–II, III–IV, and *GC*, cf. Brunschwig (2004: 30) and also Giardina (2008a: 11–19).

³ A brief terminological observation: Aristotle has two technical terms to define mixture: *μίξις* and *κρᾶσις*. The first term indicates a mixture of both solids and liquids (insofar as it is the *genus*), whereas *κρᾶσις*, as it is the *species*, designates a mere mixture of liquids (cf. *Top.* 122b30–31, οὔτε γὰρ ἡ *μίξις* ἅπαντα κρᾶσις (ἢ γὰρ τῶν ξηρῶν *μίξις* οὐκ ἔστι κρᾶσις), for a discussion of Aristotle’s and Peripatetic terminology with further bibliographical references, cf. Mirrione (2017: 255–257).

⁴ It should be noted that in *GC*, however, the term στοιχεῖον, namely ‘element’, does not, in general, indicate the simple bodies (ἀπλᾶ σώματα, i.e., fire, air, water, and earth) of which all the mixed bodies are composed (cf.

Moreover, every element is principally associated with one primary quality: fire is hot, air moist, water cold, and earth dry (*GC* 331a4–6).⁵

The mutual transformations of the elements into one another and their mixture account for all ongoing processes in the sublunary region, but they are not the same thing. For it must be pointed out that according to Aristotle, there is an important difference between generation and mixture, as the second has to be more precisely ascribed to a peculiar type of alteration, or *alloiōsis*. As opposed to generation, there is ‘alteration’ when “the substratum is perceptible and persists, but changes in its own properties, the properties in question being opposed to one another either as contraries or as intermediates” (*GC* I.4, 319b11–12, transl. Joachim). This happens – as Aristotle declares – when a body, for example, is healthy and then sick again. In any case, it continues being in the same body. Mixture has to be thought of as a specific kind of alteration, where the constituents, which have been altered (cf. *GC* I.10, 328b1: ἡ δὲ μίξις τῶν μικτῶν ἀλλοιωθέντων ἔνωσις), become something else at the end of the process (so as to be interpreted from the word ἔνωσις), but are still recoverable. It is relevant to underline this difference, as Aristotle dedicates most of his speculation in *GC* to distinguishing generation from alteration (and therefore from mixture), in order to take a position against some of his Presocratic predecessors who called generation mixture, and identified the latter with a merely mechanical mixture.

Reciprocal elemental transmutation takes place when an exchange of one or two basic qualities occurs: for example, air (hot and moist) changes into water (cold and moist) when the hot is completely replaced by its opposite, the cold (as air and water have in common the moist), and so on. As is evident in this case, the hot *qua* patient has

GC II.8, 334b31–335a9), but rather their basic qualities, as for example in *GC* II.3, 330a30 ff. Ἐπεὶ δὲ τέτταρα τὰ στοιχεῖα, τῶν δὲ τεττάρων ἕξ αἱ συζεύξεις, τὰ δ' ἐναντία οὐ πέφυκε συνδυάζεσθαι (θερμὸν γὰρ καὶ ψυχρὸν εἶναι τὸ αὐτὸ καὶ πάλιν ξηρὸν καὶ ὑγρὸν ἀδύνατον), φανερόν ὅτι τέτταρες ἔσονται αἱ τῶν στοιχείων συζεύξεις, θερμοῦ καὶ ξηροῦ, καὶ θερμοῦ καὶ ὑγροῦ, καὶ πάλιν ψυχροῦ καὶ ὑγροῦ, καὶ ψυχροῦ καὶ ξηροῦ, cf. Joachim (1922: 213), Williams (1982:160), Frede (2004: 303), and Giardina (2008a: 63). Less convincingly, given the clarity of the passage from a philological point of view, Crowley has interpreted the text as if Aristotle had referred not to the pairings of hot, cold, dry, and moist as the στοιχεῖα, but to the pairings of hot/cold and dry/moist interpreted as the contrary properties distinguishing the στοιχεῖα (which – in the scholar's view – would coincide with fire, air, water, and earth), cf. Crowley (2013: 169). However, apart from the ongoing discussion concerning the qualitative or corporeal nature of the term στοιχεῖον in Aristotle's *GC*, what matters here is ascertaining the historical model which Aristotle may have looked to, in the elaboration of his theory of mixture, as ruled by the mechanism of qualitative interaction of hot/cold and dry/moist, namely primary/basic contrary qualities distinguishing fire, air, water, and earth, which are traditionally understood as the primary elements. It is this understanding of the term which we have used in this essay. Sometimes, in fact, the Stagirite refers to the simple bodies as the so-called ‘elements’ (cf. *GC* I.1 329a24–26) possibly referring to the previous medical and philosophical tradition (cf. the observations by Rashed 2005: 129, n. 4); on the expression ‘so-called elements’ used by Aristotle in several passages, cf. Crowley (2008), who explains it as a neutral report of contemporary understanding according to which the elements of bodies are fire, air, water, and earth).

⁵ As Giardina highlights, this statement contradicts some other textual *loci*, e.g., *Mete.* IV.4, 382a3–4 where water is principally associated with the moist (in place of the cold). According to the scholar, Aristotle would privilege the association of water and cold in *GC* because, when in *GC* II.4 he deals with the mutual transmutation of the elements, in the passage from air (moist and hot) to water (cold and moist), it is the transformation from hot to cold which plays the major role, cf. Giardina (2008b: 201–202).

been completely assimilated by the cold *qua* agent.⁶ The elementary transformation is essential to explain physical phenomena such as the formation of rain, when, for example, air turns into water (*GC* 338b6 ff.). The elemental mixture is, instead, brought about by a process of reciprocal qualitative assimilation, and accounts for the formation of the so-called homoeomerous part.⁷ In the case of mixture, by acting and being acted upon by one another, hot and cold reach a common midpoint (μεταξύ), and – at the same time and by the same process – dry and moist also reach a common midpoint, because none of them succeeds in assimilating the other completely.⁸ In Aristotle’s own words:

the actually-hot is potentially-cold and the actually-cold potentially-hot; so that hot and cold, unless they are equally balanced, are transformed into one another (and all the other contraries behave in a similar way). It is thus, then, that in the first place the ‘elements’ are transformed; and that (in the second place) out of the ‘elements’ there come-to-be flesh and bones and the like—the hot becoming cold and the cold becoming hot when they have been brought to the ‘mean’. For at the ‘mean’ is neither hot nor cold. The ‘mean’, however, is of considerable extent and not indivisible. Similarly, it is *qua* reduced to a ‘mean’ condition that the dry and the moist, as well as the contraries we have used as examples, produce flesh and bone and the remaining compounds (*GC* II.7, 334b22–30 transl. by Joachim).⁹

⁶ This is the first option, and is the case of two elements that are consecutive according to the natural order (fire-air-water-earth) transforming into one another through one qualitative change. Aristotle describes two other possible solutions: (ii) the element changes into another that is not consecutive, for example from fire to water (this process entails two qualitative changes), and (iii) two non-consecutive elements can give rise to a third element when each of the two elements loses one of its properties, namely “when the hot of the fire and the moist of the water have passed-away, there will be earth, owing to the survival of the dry of the fire and the cold of the water” (transl. by Joachim). On this cf. *GC* II.4 (with parallels in *Cael.* III.6, 304b23 ff.) and cf. Joachim (1922: 219–223), Gill (1989: 67–77), Giardina (2008a: 71–73), Giardina (2008b: 202–223), Migliori (2013: 331–334), Krizan (2013).

⁷ Aristotle’s theory of mixture (whose general concept is presented in *GC* I.10) provides a rationale for the formation of the so-called homoeomerous parts (whose composition from the mixture of elements is analyzed in great detail in the complementary chapters, II.7 and II.8). The notion of the homoeomerous part is largely applied by Aristotle to his biological theories, as it is one of the levels of structure in living being. In *PA* II.1, 646a12–24, he describes the three *synthesis* of living beings’ organisms; the first from elemental powers to simple compounds, the second from simple compounds to homoeomerous parts (that is, organic tissues like flesh, bone, etc.), and the third from homoeomerous to anhomoeomerous or organic parts (face, hand, etc.), cf. Lennox (2001: 180–181, comments *ad* 646a12–24). For, even though the main concern of *De generatione et corruptione* is that of providing an exhaustive account of the μεταβολαί of the substance (substantial generation, alteration, growth, and diminution), and to give a clear description of elemental theory and elements’ reciprocal qualitative transformations, it can also be seen as a prelude to the Aristotelian biological works, cf. Rashed (2005: CXL–CLXXXVI).

⁸ Arist. *GC* II.7, 334b22–30, the passage is quoted in full immediately after. Traditionally, Aristotle’s mixture has been conceived of as the reciprocal qualitative assimilation of hot and cold, and of moist and dry, cf. various studies especially Joachim (1904), Joachim (1922: 194–297, 241–244), Frede (2004), Giardina (2008a: 64–65), Giardina (2008b: 182–183), Groisard (2016: 30–31), and Zarifian (2018). Cf. especially Frede (2004: 301): “In *mixis* there is a two-way rather than just a one-way change: both constituents in a mixture act as agent in one sense and as patient in another, for each actively modifies the opposite quality in the other without eradicating it. Otherwise the change in question will be generation and destruction instead of mixture.”

⁹ Arist. *GC* II.7, 334b22–30: ἔστι γὰρ τὸ ἐνεργεῖα θερμὸν δυνάμει ψυχρὸν καὶ τὸ ἐνεργεῖα ψυχρὸν δυνάμει θερμὸν, ὥστε ἐὰν μὴ ἰσάζῃ, μεταβάλλει εἰς ἄλληλα· ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων ἐναντίων. Καὶ πρῶτον οὕτω τὰ

As Bogen has underlined, hot and cold (contraries within the higher genus of ‘temperature’), and dry and moist (contraries within the higher genus of ‘density’) have to be envisioned as extreme limits of continua of intermediates between one extreme and its contrary.¹⁰ Also, how far the qualitative interaction or assimilation will progress, thus leading either to a complete elementary transformation or to a homoeomerous compound, “depends on the degree of activity of the agent and of susceptibility of the patient”,¹¹ in other words the degree to which the patient “changes into the agent” (*GC* 324a11–13) or the agent “makes the patient similar to itself” (*GC* 324a10–11). The key aspect of such a formulation that we have so far summarised is that Aristotle’s natural primary bodies, namely fire, air, water, and earth, are constituted by two pairs of contrary qualities (hot and cold, dry and moist). Thus, they are thought of as the extreme limits of a continuum which ranges from a maximum (for instance the maximum degree of hotness coinciding with the minimum degree of coldness) to a minimum (the minimum degree of hotness coinciding with the maximum degree of coldness), and vice-versa. In between there is a considerable μέσον of intermediary combinations, specifically the field of mixture (which brings about the homoeomerous compounds).

Now, is this formulation, which represents a milestone in Aristotle’s theory of nature, totally ascribable to Aristotle, or should it be regarded more historically as a theoretical development built upon previous elemental theories?

3. Two Hippocratic models of mixture: *De natura hominis* and *De victu*

In the introductory essay preceding the last and most authoritative critical edition of *De generatione et corruptione* (2005), Rashed denounces the lack of attention devoted to the relations between Aristotle’s elementary theory and the Hippocratic elemental (and qualitative) reductionism mainly displayed in *De natura hominis* and in *De victu*.¹² Rashed’s historical underlining, however, does not seem to have been further developed by scholars who today investigate different aspects of Aristotle’s theory of mixture as formulated in *De generatione et corruptione*.¹³ Thus, it seems to us to be worth the effort to explore in depth these similarities in order to find out, *mutatis mutandis*, the model of the basic physical contrarieties (hot/cold and dry/moist) envisioned as the extreme

στοιχεῖα μεταβάλλει, ἐκ δὲ τούτων σάρκες καὶ ὀστᾶ καὶ τὰ τοιαῦτα, τοῦ μὲν θερμοῦ γινομένου ψυχροῦ, τοῦ δὲ ψυχροῦ θερμοῦ, ὅταν πρὸς τὸ μέσον ἔλθῃ· ἐνταῦθα γὰρ οὐδέτερον, τὸ δὲ μέσον πολὺ καὶ οὐκ ἀδιαίρετον. Ὀμοίως δὲ καὶ τὸ ξηρὸν καὶ ὑγρὸν καὶ τὰ τοιαῦτα κατὰ μεσότητα ποιοῦσι σάρκα καὶ ὀστοῦν καὶ τᾶλλα.

¹⁰ Bogen (1992: 13 ff.)

¹¹ Mourelatos (1984: 6).

¹² Rashed (2005: XXV with n. 1 and XXVI). cf. also Vizgin (1980), Althoff (1992: 12–13 with n. 8 and 9), cf. Longrigg (1993: 220–226).

¹³ Notably in the last few years: Groisard (2016: 1–73), Krizan (2018a and 2018b), Zarifian (2018).

limits of a continuum of intermediaries ranging from a maximum to a minimum. This is an essential precondition to understanding Aristotle's mixture in the way it has been formulated throughout *De generatione et corruptione*.

Within the varied and heterogeneous Hippocratic Corpus, *De victu* and *De natura hominis*, although contemporaneous (they both originate from the end of the fifth or to the beginning of the fourth century BCE),¹⁴ belong to two different poles of writing. *De victu*, also called *De diaeta* or, in English, *On Regimen* (together with such treatises as *De carnibus*), is a medical treatise which displays a philosophical bent, the author being profoundly convinced that the knowledge of the ultimate constitutive elements of human nature (that according to the author of this treatise are fire and water) is necessary for the development of medical reflection. On the other hand, *De natura hominis* (together with *De veteri medicina*), although exhibiting remarkable philosophical influences (notably Empedocles'), intends to posit the basis for a science – medicine – that has to be regarded as autonomous from philosophical doctrines (especially the Ionic and the Eleatic monisms).¹⁵ Both treatises, however, show great interest in, and investigate, the question relating to the basic building blocks of nature, while providing two different answers. Let us look at this more closely.

De natura hominis dedicates the first seven chapters to delineating a theory of human nature and, as Lloyd has remarked, preserves the first extant text where the hot and the cold, and the dry and the moist are envisioned as the ultimate components of other things.¹⁶ However, when it comes more specifically to human bodies, the humoralistic perspective, which makes this Hippocratic writing notorious, becomes overtly dominant.¹⁷ Thus, the four humours are conceived of as the peculiar constituents of human nature, and each of them is associated with a pair of basic contraries (each of them prevails during one of the four seasons – from spring to winter – and during one stage of human life, from childhood to old age). Hence, blood is hot and moist, yellow bile is

¹⁴ Hp. *Nat.Hom.* has to be dated back to the time between 420 and 400, cf. Jouanna (2002: 59–61), whereas according to Byl *Vict.* belongs to the end of the fifth or to the beginning of the fourth century, cf. Byl (2003: 44–47).

¹⁵ For an overview on the Hippocratic Corpus and its set of writings, cf. Jouanna (1999: 56–71). On the various and intertwined interrelations between Presocratic philosophy and *De natura hominis* (especially on the criticism by the Hippocratic author against the Ionic and Eleatic monisms and Empedocles' influences on the writing), cf. Longrigg (1993: 85–92).

¹⁶ Lloyd (1964: 92–93); cf. Hp. *Nat.Hom.* 3, CMG I.1.3, 170–172 Jouanna. The ultimate qualitative constituents, hot and cold, dry and moist, do not have to be ὁμόφυλα, and do not have to possess the same δύναμις (on the sense and significance of the term, cf. footnote n. 18). They are paired in couples, and either can be proportionally mixed with one another (in this case they contribute to generate something else; the expression used is συμβάλλειν ἐς τὴν γένεσιν), or can prevail over the other (in this case no generation is possible) (cf. Hp. *Nat.Hom.* 3, CMG I.1.3, 170.11–14 Jouanna: καὶ πάλιν, εἰ μὴ τὸ θερμὸν τῷ ψυχρῷ καὶ τὸ ξηρὸν τῷ ὑγρῷ μετρίως πρὸς ἀλλήλα ἔξει καὶ ἴσως, ἀλλὰ τὸ ἕτερον τοῦ ἑτέρου πολλὸν προέξει καὶ τὸ ἰσχυρότερον τοῦ ἀσθενεστέρου, ἢ γένεσις οὐκ ἂν γένοιτο).

¹⁷ The humoralistic nature of the human being is clearly spelt out in Hp. *Nat.Hom.* 4, CMG I.1.3, 172.13–174.10 Jouanna.

dry and hot, black bile is dry and cold, and phlegm is moist and cold.¹⁸ As is clear from the rest of the tract, they are essential for understanding the physiopathology of human beings, as their health and pathological states depend respectively on a balanced and imbalanced mixture of these four bodily fluids. The human body is mainly considered from a hydromechanic point of view, which is understandably derived from accurate clinical observations of the Hippocratic doctor working on his patients: the aetiology of disease is principally explained on the grounds of excessive, or excessively scarce, quantities of humours that could be evacuated by the body, or that could be extracted from the organism by means of specific hydragogue drugs.¹⁹

According to Longrigg, who has written an important contribution on the role of the basic contrary qualities in pre-Aristotelian physics, more than in *De victu*, it is in *De natura hominis* that closer parallels to Aristotle's ascription of hot, cold, dry, and moist to the elements can be found, as this Hippocratic writing employs the same binary combinations (hot and moist, hot and dry, cold and moist, and cold and dry).²⁰ However, such a statement, of course, cannot be exempt from objections. Firstly and most obviously, Aristotle's contrary qualities are not associated with the four humours of the Hippocratic tradition, which Aristotle knows but does not assign such a pivotal role to in his account of living beings.²¹ More importantly, although in *De natura hominis*, hot and cold, and dry and moist are conceived of as reciprocally interacting and balancing contraries (but this is not – of course – an innovation introduced into Greek thought, since the idea of various couples of reciprocally interacting contraries can be traced back to Anaximander, as Lloyd has highlighted),²² they are not integrated into a coherent model of elementary mixture where hot/cold and dry/moist are thought of as the extreme limits encompassing a μέσον, in which an interaction takes place (as it occurs in Aristotle's *De generatione et corruptione*). No explanation is given regarding *how* the two pairs of contraries act in order bring about the four humours within the organism (such a detail remains indeed

¹⁸ The correspondence between qualities and humours is explicitly observed at Hp. *Nat.Hom.* 7, CMG I.1.3, 182.4–187.12 Jouanna. In order to guarantee a healthy state, the mixture of blood, phlegm, and yellow and black bile have to be proportionate according to quantity and δύναμις (*Nat.Hom.* 4, CMG I.1.3, 172.15–174.1 Jouanna), and, as it is stated in Ch. 5, the four corporeal fluids differ considerably with regard to external aspect and δύναμις (τοσοῦτον διήλλακται ἀλλήλων τὴν ἰδέην τε καὶ τὴν δύναμιν, *Nat.Hom.* 5, CMG I.1.3, 176.8–9 Jouanna), whereby δύναμις, the Hippocratic author would define the qualitative composition of the fluid and its power, which can be grasped by sense perception, cf. Plamböck (1964: 4–15 with footnote n. 7).

¹⁹ On Hippocratic humoralism, cf. also Moreno Rodríguez (1991: 92–95) and Jouanna (2002: 39–55, 2012) on the relationship between *Nat.Hom.* and the different humoral systems of the Hippocratic Corpus.

²⁰ Longrigg (1993: 224–225).

²¹ Aristotle is certainly familiar with the Hippocratic four humours (in *HA* 550b9–10, he lists phlegm and yellow and black bile as residues together with faeces), but he considers phlegm and the two biles as useless residues – *perittōmata* – which do not exert an influence on health and the pathological states of living beings (the notion of *perittōma* was not even known in the Hippocratic Corpus, and was introduced into Greek medicine only after the second half of the fourth century BCE, possibly by Aristotle himself). On this, cf. van der Eijk (2005:152–155, esp. 153).

²² Lloyd (1964: 98 and ff.).

obscure). Let us examine, instead, the model of mixture which the author of *De victu* puts forward.

De victu consists of four books (it is one of the longest writings of the Hippocratic Corpus) and is presented as a medical treatise principally containing dietary prescriptions based on an equilibrium between food and physical exercise, and above all, for our purposes, on a philosophically grounded understanding of human nature. For in the second of the two introductory chapters, the Hippocratic author declares that whoever desires to work out a theory on human regimen “must first acquire knowledge and discernment of the nature of man in general”, that is, “knowledge of its primary constituents and discernment of the components by which it is controlled” (γινῶναι μὲν ἀπὸ τίνων συνέστηκεν ἐξ ἀρχῆς, διαγινῶναι δὲ ὑπὸ τίνων μερῶν κεκράτηται).²³ These primary constituents are, as we have observed, fire and water; these two elements are always mixed with each other. Let us see how this happens by considering the model of mixture reported in Chapter 3:

Now all animals, including man, are composed of two things, different in power but working together in their use, namely, fire and water. Both together these are sufficient for one another and for everything else, but each by itself suffices neither for itself nor for anything else. Now the power that each of them possesses is this. Fire can move all things always, while water can nourish all things always; but in turn each masters or is mastered to the greatest maximum or the least minimum possible. Neither of them can gain complete mastery for the following reason. The fire, as it advances to the limit of the water, lacks nourishment, and so turns to where it is likely to be nourished; the water, as it advances to the limit of the fire, finds its motion fail, and so stops at this point. When it stops its force ceases, and hereafter is consumed to nourish the fire which assails it (Hp. *Vict.* I.3, CMG I.2.4, 176.5–15 Joly-Byl, transl. Jones).²⁴

First of all, we note that the Hippocratic author narrows the scope of his investigation to animals and, more specifically, to man. As he declares, they are composed of two elements, these being fire and water (afterwards he further clarifies, however, that the mixture of fire and water “suffice for all things throughout the universe” – πῦρ καὶ τὸ ὕδωρ, ὥσπερ εἰρηταί μοι, αὐτάρκεα ἐστὶ πᾶσι διὰ παντὸς, cf. Hp. *Vict.* 3, CMG I.2.4, 126.18 Joly-Byl).

Secondly, fire and water are described as “different in power, but working together in their use” (διαφόροι μὲν τὴν δύναμιν, συμφόροι δὲ τὴν χρῆσιν): the dichotomy

²³ Hp. *Vict.* I.2, CMG I.2.4, 122.22–23 Joly-Byl (transl. Jones).

²⁴ Συνίσταται μὲν οὖν τὰ ζῶα τὰ τε ἄλλα πάντα καὶ ὁ ἄνθρωπος ἀπὸ δυοῖν, διαφόροι μὲν τὴν δύναμιν, συμφόροι δὲ τὴν χρῆσιν, πῦρ καὶ ὕδατος. Ταῦτα δὲ συναμφοτέρα αὐτάρκεα ἐστὶ τοῖσι τε ἄλλοισι πᾶσι καὶ ἀλλήλοισιν, ἐκάτερον δὲ χωρὶς οὔτε αὐτὸ ἑωυτῷ οὔτε ἄλλῳ οὐδενί. Τὴν μὲν οὖν δύναμιν αὐτῶν ἐκάτερον ἔχει τοιήνδε· τὸ μὲν γὰρ πῦρ δύναται πάντα διὰ παντὸς κινήσαι, τὸ δὲ ὕδωρ πάντα διὰ παντὸς θρέψαι· ἐν μέρει δὲ ἐκάτερον κρατεῖ καὶ κρατεῖται ἐς τὸ μῆκιστον καὶ τὸ ἐλάχιστον ὡς ἀνυστόν. Οὐδέτερον γὰρ κρατῆσαι παντελῶς δύναται διὰ τὸδε· τὸ μὲν πῦρ ἐπεξιὸν ἐπὶ τὸ ἔσχατον τοῦ ὕδατος, ἐπιλείπει ἢ τροφή, ἀποτρέπεται οὖν, ὅθεν μέλλει

διαφόροιν-συμφόροιν helps to express a concept which underpins the whole treatise, namely the mutual interdependence of two different elements. By employing the essentially Heraclitean idea of the unity of opposites, but in accordance with the medical principle of the plurality of physiopathological causes, the Hippocratic author breaks free of the monistic ties, and develops a binary elemental theory.²⁵ Therefore, fire and water work together to guarantee the functioning (τὴν χρῆσιν) of the human constitution (which, as we have seen, constitutes the privileged focus of *De victu*), but they can do this insofar as they possess complementary δυνάμεις. The meaning and significance of the concept of δύναμις in *De victu* appears more complex than what we have found in *De natura hominis*. On the one hand, it refers to the qualitative composition of each single element. As explicitly stated in Chapter 4 (and here we can see the correspondence between elements and qualities), fire is hot and dry, whereas water is cold and moist, the active properties in turn being those of heating, drying, cooling, and moistening (in this aspect, not so dissimilar from the meaning of the term we have encountered in *Nat.Hom.*). On the other hand, the primary and essential δυνάμεις, as we see from the textual passage we quoted, is the one of moving all things always, which is attributed to fire, and the one of nourishing all things always, which is attributed to water (Τὴν μὲν οὖν δύναμιν αὐτῶν ἐκάτερον ἔχει τοιήνδε: τὸ μὲν γὰρ πῦρ δύναται πάντα διὰ παντὸς κινῆσαι, τὸ δὲ ὕδωρ πάντα διὰ παντὸς θρέψαι). As we can glean from the text, one active property (such as the one of moving which pertains to fire, for instance) allows the element to master the other, while the other is mastered (ἐν μέρει δὲ ἐκάτερον κρατεῖ καὶ κρατεῖται): while one advances, the other recedes. In other words, and with full respect to the most probable original meaning of δύναμις in early Greek medical and philosophical thought, while one element is active, the other is passive, and vice-versa.²⁶

Finally, as stated explicitly in the text quoted, this active-passive interplay takes place between two extreme limits: “in turn each masters or is mastered to the greatest maximum or the least minimum possible (ἐς τὸ μήκιστον καὶ τὸ ἐλάχιστον). Neither of them

τρέφεται: τὸ δὲ ὕδωρ ἐπεὶ ἐπὶ τὸ ἔσχατον τοῦ πυρός, ἐπιλείπει ἢ κίνησις, ἴσταιται οὖν ἐν τούτῳ, ὅταν δὲ στῆ, οὐκ ἔτι ἐγκρατέες ἐστίν, ἀλλ’ ἦδη τῷ ἐμπύττοντι πυρὶ ἐς τὴν τροφήν καταναλίσκεται.

²⁵ In chapter two of his monograph dedicated to *De victu*, Bartoš reconstructs the philosophical background of Hippocratic writing (he principally discusses the presence in the treatise of the teachings of the Pythagoreans, Heraclitus, Empedocles, and Anaxagoras), and clarifies how the Hippocratic author of *De victu* upholds the Heraclitean principle of the unity of the opposites (which is illustrated in Heraclitus’ fragments DK 22 B 8, B 10, B 48, B 50, B 51, B 57, B 67, and B 88). However, by recognizing the unsuitability of monistic conceptions within the medical field (cf. the attack by the Hippocratic author of *De natura hominis* on Ionic and Eleatic monisms) and by drawing on this assumption, the Hippocratic author develops, from the Heraclitean monistic theory based on fire as an all-embracing cosmic principle, a dualistic elementary theory which provides a more appropriate explanation for natural, and more precisely, biological and micro-cosmic processes (Bartoš, 2015: 117–127).

²⁶ On the concept of δύναμις in *De victu*, cf. Miller (1959: 147–164) together with some observations in Plamböck (1964: 32–41). Miller quotes a passage from Plato’s *Phaedrus*, which, according to him, conveys the essential meaning of the term within the early Greek medical and philosophical field, and where, with reference to the Hippocratic medicine and its enquiry into nature, δύναμις is properly designated as “power of acting (...), or of being acted upon” (σκοπεῖν τὴν δύναμιν αὐτοῦ, τίνα πρὸς τί πέφυκεν εἰς τὸ δρᾶν ἔχον ἢ τίνα εἰς τὸ παθεῖν ὑπὸ τοῦ, cf. Pl. *Phdr.* 270d), cf. Miller (1959: 148 with footnote n. 6).

can gain complete mastery for the following reason. The fire, as it advances to the limit of the water, lacks nourishment, and so turns to where it is likely to be nourished; the water, as it advances to the limit of the fire, finds its motion fail, and so stops at this point.” The maximum of fire (and of its constitutive qualities, i.e., hot and dry) coincides with the minimum of water (as is clarified in Chapter 4, fire retains the moist from water, ἔχει δὲ ἀπὸ ἀλλήλων τὸ μὲν πῦρ ἀπὸ τοῦ ὕδατος τὸ ὑγρὸν· ἔνι γὰρ ἐν πυρὶ ὑγρότης, cf. Hp. *De victu* I.4, CMG I.2.4, 126.21–22 Joly-Byl), and, vice-versa, the maximum of water coincides with the minimum of fire (as, conversely, the water retains the dry from fire, τὸ δὲ ὕδωρ ἀπὸ τοῦ πυρὸς τὸ ξηρὸν· ἔνι γὰρ ἐν ὕδατι ξηρὸν, cf. Hp. *De victu* I.4, CMG I.2.4, 176.22–23 Joly-Byl). As we see, by feeding on it, fire advances to the limit of water (τὸ μὲν πῦρ ἐπεξίον ἐπὶ τὸ ἔσχατον τοῦ ὕδατος), and then comes back when it lacks nourishment (ἐπιλείπει ἢ τροφῆ, ἀποτρέπεται οὖν, ὅθεν μέλλει τρέφεσθαι),²⁷ whereas, by moving because of fire, water advances to the limit of fire (τὸ δὲ ὕδωρ ἐπεξίον ἐπὶ τὸ ἔσχατον τοῦ πυρὸς) and then it comes back when it lacks motion.²⁸ the Hippocratic author uses two key terms, which are the verb ἐπέξειμι and the adjective ἔσχατος. The verb ἐπέξειμι is a verb of motion and indicates the action of ‘attacking’, ‘going out against’, or ‘proceeding against’ (when used in military or legal contexts, cf. *LSJ ad loc.*). In this case it designates the action of one element (fire or water) which advances against the other element so as to tend to reach its opposite limit. The extremities of such a middle area, where this active-passive interplay between fire and water takes place, are described by employing the adjective ἔσχατος (‘farthest’, ‘uttermost’, ‘extreme’, cf. *LSJ ad loc.*), which turns out to be quite suitable for indicating such limits.

This discourse on the physical basics of every being which exists in nature, however, including man, principally, functions to prepare the reader to face the main portion of the dietetic treatise which concerns the study of the unchangeable variables of a regimen (such as seasons, individual constitution, sex differences, age, winds, districts, state, or constitution of the year), and of its changeable variables (food, physical exercises, and inferences from dreams) which, at the most fundamental level, ultimately depend on the balance found by the interaction of fire and water and their distinctive qualities (hot and cold, dry and moist). In this article, however, we cannot exhaustively discuss *De victu*’s dietetical ramblings which, although representing the main theme of the writing, go far beyond our present aim. Now, it is time to turn again to the Aristotelian model of mixture from *De generatione et corruptione*, in which we discover both similarities and difference with *De victu*’s model of mixture (Section 4). This will then allow us to draw some conclusions (Section 5).

²⁷ As Bartoš observes, the idea that fire is fed by water is shared both by the Hippocratic author of *De victu* and by Aristotle (cf. *de An.* 416a25–27, *Met.* 355a5, *Long.* 465a13–16). However, although there are no such parallels in the pre-Aristotelian evidence, the scholar concludes that it is plausible that the concept was relatively common before Aristotle, cf. Bartoš (2015: 255–257 with footnotes).

²⁸ Jones explains the interaction between fire and water in this way: “fire advances, sets water in motion and turns it to steam; then it retires and the steam condenses to water”, cf. Jones (1959: XLIV).

4. The models of mixture in *De generatione et corruptione* and *De victu*

Before proceeding to the comparison between the two models of mixture sketched so far, it is necessary to widen the perspective a little in order to comprehend the extent to which Aristotle was familiar with ancient medical treatises of his time, and remained influenced by them in the elaboration of his own theories.

Aristotle, the son of an elite Macedonian doctor who was himself a reader of contemporary medical treatises, seems to show a certain degree of acquaintance with both the Hippocratic *De natura hominis* and also *De victu*. As for *De natura hominis*, in his *De partibus animalium* (PA III.3, 512b–513a) Aristotle quotes an account of blood vessels and ascribes it to Polybus, a pupil of Hippocrates. Almost verbatim quotations of this account can be found in *De natura hominis* (11)²⁹ and this physician is also credited with the work³⁰ (whose consistent unity has been persuasively demonstrated by Jouanna).³¹ It is therefore plausible to assume that Aristotle knew the treatise authored by Polybus. As far as *De victu* is concerned, some scholars in the past have suggested that in his work Aristotle could be referring to the account of *De victu*,³² but recently the question has been taken up again by Bartoš. When examining a series of Aristotelian textual *loci* in *Parva naturalia*, *De anima*, and *De partibus animalium*, the scholar has gathered much greater evidence confirming Aristotle's acquaintance with *De victu*.³³ Now, if we assume

²⁹ Jouanna (2002: 59), Bartoš (2015: 241 with footnote n. 65).

³⁰ Jouanna (2002: 55–59).

³¹ Jouanna (2002: 22–38).

³² Bartoš refers, more precisely, to a famous passage in Aristotle's *De divinatione per somnum* (*Div. Somn.* 463a3–7: “At any rate even accomplished physicians – τῶν ἰατρῶν οἱ χαρίεντες – say that close attention should be paid to dreams; and it is natural for those to suppose so, who are not skilled, but who are inquirers and lovers of truth”, transl. by Hett), where Aristotle reports that his own theories relating to the diagnostic value of dreams can be strengthened by the views of some previous distinguished doctors. As Bartoš affirms, “it is obvious that Aristotle has in mind specific authors and their doctrines, which actually provide a rare example of opinions which met with Aristotle's sympathy. Focusing on the Hippocratic authors, a number of them recognized the prognostic value of dreams but the only extant theoretical account of dream diagnosis is to be found in the fourth book of *On Regimen*, which is wholly devoted to the topic and which opens with the claim that »he who has gained a correct understanding about the signs that come in sleep, will find that they have an important influence upon all things«. So it is not surprising that a number of scholars have (...) considered the possibility that Aristotle refers here directly to *On Regimen*”, cf. Bartoš (2015: 243 with references at footnotes 73–76), cf. also, more specifically, van der Eijk's analysis of the Aristotelian passage mentioned above; according to the scholar, the author of *De victu* “certainly meets Aristotle's requirements for being a *charieis iatros*”, cf. van der Eijk (2005: 198).

³³ We will try to summarise here the main elements of Bartoš' more detailed analysis. In *de An.* 416a9–18, when Aristotle discusses his concept of vegetative life (which coincides with the nutritive and reproductive faculties of the soul shared by both animals and plants), he declares: “To some the nature of fire seems by itself to be the cause of nutrition and growth; for it alone of all bodies and elements seems to be nourished and grow of itself. Hence one might suppose that it is the operating principle in both plants and animals. It is in a sense a contributory cause, but not absolutely the cause, which is much more properly the soul; for the growth of fire is without limit, so long as there is something to be burned, but of all things naturally composed there is a limit or proportion of size and growth; this is due to the soul, not to fire, and to the essential formula rather than to matter.” According to Bartoš' reasoning, one of these unnamed thinkers to whom Aristotle refers here might be the Hippocratic author of *De victu*. For in Ch. 9 of *De victu*, the Hippocratic author assigns ‘the hottest and strongest fire’ a leading role in physiological processes, and indeed holds that in fire there are “soul, reason, thought,

that Aristotle knew the content of this treatise, and that it represented a tacit but all-important point of reference for the formulation of key concepts of his natural philosophy, then it is also reasonable to think that he could have drawn on it to work out some features that mark out his introductory, but fundamental, theory of mixture, which – as we have previously said – lies at the very foundation of his understanding of natural and biological facts and processes. And indeed, we find some striking parallels between the two models of mixture.

First of all, they have in common the basic structure of the model of mixture. With the due differences (which we will analyse below), *De victu* exhibits a real elemental contrariety, which resembles Aristotle's way of envisioning the basic physical contraries of hot/cold and of dry/moist, as being composed of two extremities between which we find a middle area where the interaction occurs. As we have seen, an oscillation takes place between one dominant element (the hot/dry one) and the other (the cold/moist one) but, and this is what differentiates it from the previous philosophical tradition, within certain limits which cannot be exceeded (let us recall that the Hippocratic author uses the neuter of the adjective ἕσχατος to label such limits). This is quite remarkable, because, when in *Physics* I (especially in *Ph.* I.5), and in other contexts, Aristotle strives to demonstrate that all his predecessors held the contraries as principles, it has been noted by scholars that ultimately none of them thought of hot/cold and dry/moist as limits (with intermediates) between which an interaction takes place; this has traditionally been considered Aristotle's original contribution to the debate.³⁴ However, here we have, as we have shown in detail, an emergent elemental contrariety from a text which Aristotle seems to have known.

Secondly, what occurs in the μέσον, namely the central area between τὰ ἕσχατα? As we have noticed, Aristotle's hot/cold or moist/dry can be both active and passive (for example, the hot acts on cold which is then itself acted upon or vice-versa), or, in the case of mixture, they can be both active and passive to some extent (by reciprocal assimilation, i.e., by reciprocally acting and being acted upon, hot and cold – or moist and dry – reach an equilibrium point). In *De victu* a similar elemental interplay takes place. When one element (the moving hot and dry fire) advances or dominates, that is, when it

growth, motion, decrease, mutation, sleep, walking.” However, as we saw, this vital fire has to be counterbalanced by a second principle, this being the water on which it is fed. Also, it is clear, in the context of *De anima* mentioned above, that Aristotle speaks of fire and of its counterbalancing and limiting principle, but he provides instead a different answer from the previous thinkers, for according to him, the counterbalancing principle is the soul itself which provides this fire with a limit and proportion of size and growth. Second, Bartoš proposes that several passages from Aristotle's biological treatises exhibit a close resemblance to some doctrines of *De victu* (i.e., the role of fire in the digestion process, and the related concept of innate heat, which in *De victu*, as well as in Aristotle, is implied in the vegetative functions of the organism), and even with its terminology, as Aristotle, in analogous contexts (*PA* 670a22–26, *Iuv.* 469b6–20, *Resp.* 474b10–13) makes use of the same verb ζωπυρέω (‘kindle into flame’), used also by the Hippocratic author of *De victu* to describe a kind of kindling of the soul during its embryonic evolution. This is metaphorically illustrated by the image of heated coals, cf. Bartoš (2015: 245–266 for the complete analysis and further references).

³⁴ Lloyd (1964: 94 and ff. for further references).

is active, the other (the nourishing moist and cold water) recedes or is dominated; thus it is passive (this is also clarified by the alternating use of active and passive verbal forms). Now, this action can be total when one element is present to its extreme degree (while the other is passive and present to the least degree), or partial when the two opposite forces encounter each other and each exerts its action over the other to some extent (and to some extent each is subject to the other element's action). In other words, the μέσον between the extremes is the field where two opposite forces, fire and water, advance, meet, collide, and, finally, find a balance or equilibrium point (we saw that this is what happens in Aristotle's mixture when, by reciprocal assimilation, the hot and the cold reach an equilibrium point between extreme hotness and extreme coldness, and the same thing happens in the case of the moist and the dry). Furthermore, in Aristotle's mixture this interaction between hot and cold, and between moist and dry brings about intermediate elemental degrees accounting for the extreme varieties of homeomerous parts present in the sublunary organic and inorganic realms. In the very same fashion, in *De victu* also, this elemental interaction of fire and water – within fixed limits – yielding different equilibrium points (or we may also call them 'attunements') seems to be responsible for the variety of existing forms of beings in nature. Here is how Jones poses the question with reference to *De victu*:

In general terms, what is it that causes specific differences, separating forever blood from marrow, horse from man, and rose from daisy? (...) Water and fire, if they attain one attunement, become one thing, if another attunement, another thing. As a modern chemist might say, one attunement of oxygen and hydrogen produces water, another attunement hydrogen peroxide. Exact proportions in favorable conditions produce, not mechanical mixture, but chemical change.³⁵

Now, having singled out the similarities between the two models of mixture, we will pass on to review the points of disentanglement and detachment which make Aristotle's own formulation unique.

First and foremost, we cannot overlook two essential points: (a) while the author of *De victu* describes an interaction between two *elemental* forces (though endowed with

³⁵ Jones (1959: XLV). As Jones observes, by quoting Peck's view (a scholar who devoted an unpublished essay to *De victu*), a crucial passage is the first part of Ch. 6 where it is affirmed that 'parts of parts' and 'wholes of wholes' contain a mixture of fire and water (μέρεα μερέων, ὅλα ὄλων, ἔχοντα σύγκρησιν πυρὸς καὶ ὕδατος, cf. Hp. Vict. 6, CMG I.2.4, 128.25–130.1 Joly-Byl), where ὅλα ὄλων may refer to the 'chemical attunements' bringing about the difference from species to species, while μέρεα μερέων refers to those attunements differentiating a part of the body from another, cf. Jones (1959: XLV with n. 2). That the elemental interaction between fire and water gives rise to very different results is implied in a recent study on *De victu* by Popa, who has recognised in the text various forms of dry water (i.e., water contaminated by fire) and forms of moist fire (i.e., fire contaminated by water) yielding different outcomes in terms of human constitution. As Popa confirms, while summarising his views, "References to varieties of water and fire begin to crop up in Chaps 7, 9 and 10. Chapter 10, for example, mentions fine (or light) water (*hudatos leptou*), air-like ('ethereal' in Jones, 1931, 'aérien' in Joly, 1984) fire, and the hottest and strongest fire (*thermotaton kai ischurotaton pur*). Such elemental varieties become instrumental

a different qualitative composition, fire is hot and dry, water is cold and moist), Aristotle speaks of an interaction (action and passion) between *qualities*: hot and cold, and moist and dry; (b) Aristotle's system of the elemental presents, in addition to fire and water, also air and earth – his elemental system is clearly *quadripartite* and not *bipartite*. This probably has to be considered as another historical development, namely his attempt to consider, yet at the same time go beyond, both the Empedoclean quadripartite elemental theory (which creates a compact system by referring to the elements coming from the earlier Ionian monistic traditions, but which was amply criticised by Aristotle for not having explained elemental transformation and mixture in terms of qualitative interaction), and the theories of the neo-Empedocleans. Among these, Philistion of Locris was the first who drew an apparently problematic connection, between the four non-intertransmutable Empedoclean primary elements and the four qualitative δυνάμεις of hot, cold, dry, and moist. We only have fragmentary evidence of Philistion's theories, but Aristotle gives the impression of being acquainted with them.³⁶ Aristotle's doctrines of primary elements and mixture have to be considered not as an unparalleled and unprecedented formulation arising *ex nihilo*, but more historically – and more accurately – as a clearly original formulation which incorporates different influences from the past. Our point is that it seems plausible that in the development of Aristotelian thinking about elemental and qualitative dynamics, the Hippocratic *De victu* may have contributed to suggesting to Aristotle a way of envisioning the structure of his basic physical contrarieties. In fact, if we replace *De victu*'s (hot and dry) fire, and (cold and moist) water with Aristotle's hot/cold and dry/moist contrarieties, we arrive at a very telling similarity: two (be they either elemental or qualitative) extremes, and between them a central area with an ample range of attunements or equilibrium points. Aristotle's system is certainly more complex because it bases itself on a double pair of contrarieties and on binary qualitative combinations (hot and dry, hot and moist, cold and moist, cold and dry) each corresponding to one of the four elements (fire, air, water, earth), and accounting for mixture

in the division of types of human natures or constitutions in Chap. 32 and in our writer's discussion of *phronēsis* in Chap. 35. Joly believes that the *Regimen*'s reliance on the notion of elemental varieties (dry water and so on) betrays Anaxagoras' influence. It is in principle possible that we have a simplified version of the 'everything in everything' principle. If so, however, we might expect to read in *Regimen I* about watery fire or fiery water or to find some other nomenclature which indicates that every amount of water contains some fire and the other way around. It is not clear, however, that *Regimen I*, in invoking such stuffs as moist fire, refers to mixtures. It is more likely, I think, that these are still elementary stuffs – *forms of water and fire – each displaying different degrees of contamination, so to speak, by a quality normally belonging to the other element (moist or dry)*", cf. Popa (2014: 892–893 with n. 16, emphasis mine). I would add just two points, here: (a) the reference to Anaxagoras seems to me to be misleading, since in Anaxagoras' seeds we find, as noted, everything in everything. This principle asserts the omnipresence of *all* possible ingredients in a mixture where just one predominates, and does not presuppose a *dualistic* elemental theory where only one or the other one prevails over the other; (b) I am not sure that, as Popa maintains, these degrees of contamination between fire and water cannot be called mixtures: in Ch. 4 of *De victu I*, when the Hippocratic author indicates the technical terminology by which to refer to the fire–water dynamic, he calls it more appropriately 'mixture' and 'separation' (of the elemental mixt) cf. Ch. 4, CMG I.2.4, 128.7 Joly-Byl, and to this process he indeed attributes the variety of forms of seeds and animals (πολλὰς καὶ παντοδαπὰς ἰδέας (...) σπερμάτων καὶ ζώων), cf. Hp. *Vict.* 4, CMG I.2.4, 126.23–24 Joly-Byl, emphasis mine).

³⁶ cf. fr. 4 Wellmann with Rashed (2005: XXXV–XLVIII).

and elemental transmutations. But upon more attentive reflection, we find the very same logic in the mind of the Hippocratic author.

Secondly, as we have clarified several times in this paper, in Aristotle the qualitative interaction between hot and cold, and dry and moist is a mechanism which answers for both mixture and elemental transformation (we have mixture when the extremes find an intermediate equilibrium point, and we have elemental generation when in each contrariety, hot/cold and dry/moist, one contrary quality dominates over the other and then is present in the contrariety at the extreme degree). Contrary to Aristotle, for whom this is fundamental in explaining sublunary phenomena such as the formation of rain, for instance (i.e., air that turns into water), the author of *De victu* does not specifically deal with these topics. However, this is no surprise, because *De victu* bases its doctrine on the knowledge of human nature, and remains a treatise relating to dietetics which does not have the ambition, as Aristotle clearly does, to provide an all-encompassing explanation of the world and of its physical processes: *De victu's* privileged and principal focus being man *qua* living being, a category which includes also animals and plants.³⁷ But if the Hippocratic author of *De victu* develops a nascent structure of a contrariety (though it applies especially to man among the living beings), and if the very same structure, although more complex and articulate (because endowed with a double couple of qualitative contraries), is afterwards used by Aristotle to explain mixture, then this structure also anticipates Aristotle's way of thinking about elemental transformation because, as we have seen, elemental transformation and mixture are ruled by the same mechanism. Whereas in *De victu* we have a maximum degree of fire (which is hot and dry), which coincides with the minimum degree of the contrary element, water (which is cold and moist), and whereas the Hippocratic author of *De victu* states that the elements dominate one another to the greatest maximum or the least minimum possible (ἐς τὸ μῆκιστον καὶ τὸ ἐλάχιστον), in Aristotle we have a maximum degree of a quality, let us say hot, which coincides with the least degree possible of the contrary quality, cold. Aristotle, however, does not use this vague and loose terminology but, as he usually does in order to bring the ontological structure of nature to light, he refers to his own ontological distinction: while the hot is in actuality, the cold remains in the contrariety only in potentiality.

4. Conclusions

It is known that Aristotle's notion of qualitative interaction ruling both the process of mixture and the process of reciprocal elemental transmutation is based upon the idea of a physical contrariety. This is endowed with two extremes and a wide central area where

³⁷ This seems to be confirmed by the abovementioned passage where the Hippocratic author speaks of the variety of living beings generated by the fire-water interplay. Here he expressly refers to "many forms of many kinds, both of seeds and of living creatures" (πολλὰς καὶ παντοδαπὰς ιδέας (...) σπερμάτων καὶ ζώων), cf. *Hr. Vict.* 4, CMG I.2.4, 126.23–24 Joly-Byl (emphasis mine).

the opposite forces reach different equilibrium points (in this case we have a mixture), or can be present to the fullest degree (in this case we do not have a mixture, but an element).

However, in contrast to previous scholarship which attributes this notion specifically to Aristotle, we have found in a text which Aristotle seems to have been acquainted with – the Hippocratic *De victu* – an incipient structure of a contrariety endowed with extremes, and a central area where opposite forces meet and yield respective equilibrium points (i.e., a mixture). Moreover, the aim and justification of this Hippocratic model of mixture seems to be the same as Aristotle's, namely an explanation of the variety of beings which exist in the world.

De victu does not tackle the issue of elemental transformation, but we did not expect it to do so, because it is a treatise devoted to human nature and dietetics, and it does not deal with physical processes which require the application of an elemental theory on a higher scale (that which Aristotle did indeed feel was necessary). In any case, in *De victu*'s emergent contrariety, which we have singled out in detail, the opposite forces can be present to their extreme or least degree, and this would have allowed Aristotle to make use of this notion to explain reciprocal elemental transmutation in the terms we have described: a process where one quality, or two qualities of the contraries, acts on the other, prevails over it, and reaches its maximum degree.

This, however, does not mean that the two models of mixture can be simply superimposed over one another. There are differences insofar as Aristotle's theory of mixture involves qualitative contraries (more precisely two qualitative contraries, hot/cold and dry/moist), and not an elemental contrariety (fire/water endowed, however, with contrary qualities, hot and dry/cold and moist), as does the Hippocratic *De victu*, and insofar as Aristotle's elemental system is quadripartite and not bipartite. We have explained these differences by observing that Aristotle's doctrines have to be understood more historically as taking into consideration certain philosophical quadripartite elemental theories (i.e., Empedocles' quadripartite elemental system and Philistion's first correspondence between the four elements and the four basic contraries hot, cold, dry, moist), and then surpassing them.

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**Aristotle's Mixture in its Medical and Philosophical Background:
The Hippocratic *De victu* and the Aristotelian *De generatione et
corruptione***

Aristotle's notion of qualitative interaction ruling both the process of mixture and the process of reciprocal elemental transmutation is based upon the idea of a physical contrariety endowed with two extremes and a wide central area where the opposite forces reach different equilibrium points (i.e., the so-called mixtures) or can be present to the fullest degree (in this case we do not have a mixture, but an element). Differently from previous scholarship which attributes this notion specifically to Aristotle, we have found, in a text which Aristotle seems to have been acquainted with, the Hippocratic *De victu*, an incipient structure of a contrariety endowed with extremes and a central area where opposite forces meet and yield respective equilibrium points, mixtures, which, as in Aristotle, give an account of the variety of beings existing in the world. In this article, we suggest the possibility that in the development of the Aristotelian thinking about elemental and qualitative dynamics, the Hippocratic *De victu* may have contributed to suggesting to Aristotle a way of envisioning the structure of his basic physical contrarities.

KEY WORDS

Aristotle, mixture, elemental theory, Hippocratic Corpus, *De victu*, *De generatione et corruptione*

