



SAPIENZA
UNIVERSITÀ DI ROMA



© Author(s)
E-ISSN 2531-7288
ISSN 0394/9001



MEDICINA NEI SECOLI

Journal of History of Medicine
and Medical Humanities

37/3 (2025) 99-118

Received: 13.10.2025

Accepted: 27.10.2025

DOI: 10.13133/2531-7288/3185

Corresponding author:

antonietta.provenza@unipa.it

From the Polis to the Body Alcmaeon's *ἰσονομία* and the notion of *ἁρμονία* in Philolaus, Archytas, and Aristoxenus

Antonietta Provenza

Department “Cultura e Società”, University of Palermo, Italy

ABSTRACT

The article examines the relationship between Alcmaeon of Croton and the Pythagoreans. The analysis focuses on fragment 24 B 4 DK in which *health* is defined as *ἰσονομία* of the *δυνάμεις*, in opposition to disease (due to *μοναρχία*). Starting from these doctrine attributed to him, and the reference to *τεκμήρια* in fragment 24 B 1 DK, the paper aims to show how, through Philolaus and Archytas, the latter a disciple of the former, those aspects of Alcmaeon's reflection connected with *αἴσθησις* may have influenced the Pythagorean-Peripatetic Aristoxenus of Tarentum, the earliest music theorist whose some writings survive, who regarded *αἴσθησις* as the most important vehicle for understanding music.

Keywords: Alcmaeon of Croton - Philolaus of Croton - Archytas of Tarentum - Aristoxenus of Tarentum - *Isonomia* - *Aisthēsis* - Politics - Health

Introduction

During the period of greatest prosperity and vitality of the Pythagorean sects an important medical tradition¹ developed in Magna Graecia, whose most prominent representative was Alcmaeon of Croton. Persistent uncertainties surround his complex figure as *physiologos*², physician and scholar, leaving open the possibility of an inquiry on several fronts—medical, political, historical—in relation to pre-Socratic reflection on φύσις and to the political and social context of archaic Croton. Both aspects indeed characterize Alcmaeon’s personality, as they emerge from the few fragments that have come down to us, showing the close connection between philosophy and politics that must have marked his activity, in a manner not unlike that of other *sophoi* in the archaic age. The political role of the Pythagorean *hetaireiai* represents, in Magna Graecia, the most evident manifestation of this connection and seems the most appropriate frame of reference for attempting to define Alcmaeon’s personality, which nonetheless shows notable peculiarities: one of the most relevant—so far as our evidence allows—is his distance from the mystic sphere that instead characterizes other pre-Socratic figures. Far from being περιώσια ειδώς (“a man whose wisdom was beyond measure”) as Pythagoras appeared to Empedocles, and from claiming to be able to abolish the boundaries between the living and the dead by resurrecting the latter through his knowledge, as Empedocles himself boasted, Alcmaeon does not seem to aspire to that “secular sanctity” that tradition—above all the Neoplatonic—later constructed around Pythagoras. His knowledge appears rather to be at the service of the community with explicitly political aims: as is clear in his best-known fragment (24 B 4 DK = Aët. 5, 30, 1 [Diels p. 442])³, Alcmaeon makes medicine a fully political art, under a notion of care founded on equity (ἰσονομία) of the distribution of δυνάμεις that secures a beneficial condition for both the individual and the community.

With the limits of this premise in mind, the present essay, starting from these doctrines attributed to him, proposes to illustrate the relationship between *isonomia* and *harmonia*, showing how, through Philolaus and Archytas, some aspects of Alcmaeon’s speculation concerning *aisthēsis* may have influenced the Pythagorean-Peripatetic Aristoxenus, who considered *aisthēsis* as the most important means for understanding music.

Moreover, Alcmaeon’s notion of *isonomia* appears to be connected to a notion of τέχνη πολιτική intended as care of the community, in the light of which he takes a stance on Croton’s political events and the role played in them by the Pythagoreans. In this way one would obtain a tentative definition of Alcmaeon’s stance with regard to the Pythagorean milieu of Croton and, regarding the implications of his scientific thought, it might be possible to find further confirmation of the important Southern-Italian influence in the development of Aristoxenian doctrines.

Ἴσωνομία and Ἀρμονία

In the best-known fragment that has come down to us (24 B 4 DK = Aët. 5, 30, 1 [Diels p. 442]), Alcmaeon conceives health in terms of equilibrium, as the fair distribution of qualities that are different in their effects and manifestations (τῆς μὲν ὑγείας εἶναι συνεκτικὴν <τὴν>⁴ ἰσωνομίαν τῶν δυνάμεων)⁵. The qualities (δυνάμεις) mentioned as examples are the opposing pairs *moist/dry*, *cold/hot*, and *bitter/sweet*; and it is stated that the predominance of any single one of them—allowing it to emerge over the others and “rule” the organism—causes disease (τὴν δ’ ἐν αὐτοῖς μοναρχίαν νόσου ποιητικὴν), for the predominance of one opposite over the other is destructive (φθοροποιὸν γὰρ ἑκατέρου μοναρχίαν).

With regard to diseases, Alcmaeon distinguishes *quantity*—that is, the excess of a faculty—which represents the triggering factor; *origin*—that is, the source, the cause determining the conditions favorable to the continued operation of such factors—and, further, the *place* where the disease manifests itself. Among the external causes that may determine its occurrence (ἐγγίνεσθαι δὲ τούτοις ποτὲ κακὰ τῶν ἔξωθεν αἰτιῶν), Alcmaeon lists waters, environments, harsh conditions, fatigue, and exertion, thus establishing a fundamental precedent for the Hippocratic writings.

Health, therefore, is defined as the “equality of shares of the powers” (τὴν δὲ ὑγείαν τὴν σύμμετρον τῶν ποιῶν κρᾶσιν)⁶, according to a criterion of measure and commensurability (τὸ σύμμετρον) resuming and explicating the notion of ἰσωνομία, which concerns not only single components in relation to their corresponding opposites but—as it seems—pairs of elements held in equilibrium with each other.

In the connection between ἰσωνομία and κρᾶσις⁷, a close relationship with the Hippocratic *Airs, Waters, Places* (12) is evident: with respect to the differences between Asia and Europe, the Hippocratic author maintains that the “temperament of the seasons” (ἡ κρησις τῶν ὥρέων) grants the former greater calmness (ἡ τε χώρη τῆς χώρας ἡμερωτέρη), that is, a condition of stable tranquillity that allows its civilization to flourish; and the character of its inhabitants is “gentler and calmer” (τὰ ἥθηα τῶν ἀνθρώπων ἡπιώτερα καὶ εὐοργητότερα), free from sudden outbursts of anger. Indeed, the “equal share” (ἰσομοιρίη) that prevails when no element violently dominates favors growth and serenity more than anywhere else (τὴν δὲ αὖξησιν καὶ ἡμερότητα παρέχει πλεῖστον ἀπάντων, ὁκόταν μηδὲν ἢ ἐπικρατέον βιαίως, ἀλλὰ παντὸς ἰσομοιρίη δυναστεύη).

The fragment is widely known and discussed; for a comprehensive interpretation, the contribution of S. Kouloumentas (ref. 6) remains indispensable, both for the completeness of his inquiry and for the clarity with which he delineates Alcmaeon’s thought and his work in medical and political terms. It seems nonetheless important to highlight certain aspects that link Alcmaeon with the Crotoniate environment in which he worked, focusing especially on his interpretation—through the notion of ἰσωνομία—of that principle of ἀρμονία which, by means of the Pythagoreans, became the rule to which all conduct and the very interpretation of reality were to be inspired.

It is appropriate, in the first instance, to note that this fragment contains the earliest attestation of the notions of health and disease in ancient Greek thought. Alcmaeon is indeed already described as a physician by Diogenes Laertius (8.83) in the 3rd century CE; yet it is also true that he was not primarily perceived as a medical theorist, as his exclusion from the preserved part of the doxography on the aetiology of diseases in the *Anonymus Londiniensis* (4.18–21.9) and from the Galenic list of physicians from Magna Graecia (Philistion, Empedocles, Pausanias, and their disciples, opposed to the groups of Cos and Cnidus)⁸ suggests.

Alcmaeon is instead mentioned in the Theophrastean doxography, datable to the mid-2nd century CE (24 A 4–10, 13–14, 17 DK), and is also counted by Aristotle among the first philosophers, in the exposition of his doctrines in *Metaphysics* (986a29–b8 = 24 A 3 DK) and in *De anima* (2. 405a29 = 24 A 12 DK)⁹. Beyond medical questions, Alcmaeon dealt in a broader sense with *physis*, even devoting himself to inquiry into first principles (ἀρχαί), in an investigative path between philosophy and medicine well connected to the statement attributed to him:

“The gods have clear knowledge of things invisible, whereas for men it is possible only to infer by signs.” (περὶ τῶν ἀφανέων σαφήνειαν μὲν θεοὶ ἔχοντι, ὡς δὲ ἄνθρωποις τεκμαίρεσθαι, Diog. Laert. 8.83 = 24 B 1 DK = Alk. 42 Wöhrle).

The signs (τεκμήρια) observed in the investigation of *physis* induce the scholar to conjecture causes and developments, in a complex process that also includes human-kind in relation to the context in which those signs appear and to which they are connected—namely, the environment in which one lives—according to a principle later expressed effectively in the Hippocratic writings¹⁰.

The relation to a context and its influence establishes a principle of evaluation and discernment distinct from the clarity of knowledge proper only to the gods¹¹. Such a principle proceeds through “signs” (τεκμήρια) capable of demonstrating knowledge of phenomena: it is thus appropriate to devote oneself to investigation of reality and to trace models suitable for comprehension of *physis*.

If, therefore, it can be observed in the *polis* that *monarchia* produces a lack of balance manifest in disorder and in the degeneration of political processes toward forms in which *stasis* threatens the very existence of the *polis*, while *isonomia* expresses equilibrium among powers and guarantees the common good, then it becomes necessary to observe and evaluate the signs that manifest themselves in the political and intellectual spheres of life in order to cultivate forms of knowledge.

In *tekmairesthai* (“to infer by signs”), politics and inquiry into *physis* seem to share the same premise; and since it is necessary to start from what is visible to infer knowledge of what does not appear, politics becomes the model for investigation of *physis*. The latter represents the higher aim just as, for Heraclitus, since “nature loves to hide” (φύσις κρύπτεσθαι φιλεῖ, 22 B 123 DK), “the unmanifest ἀρμονία is better than the manifest one” (ἀρμονία ἀφανῆς φανερῆς κρείττων, 22 B 54 DK). Inquiry into *physis*,

therefore, opens onto a reflection upon society, considering the latter as a metaphor for approaching the understanding of *kosmos* and of “what is unseen.”

This aspect seems essentially connected with Alcmaeon’s position within archaic Croton, in ways reminiscent of other pre-Socratics. Given the authority he must have enjoyed—to which tradition bears witness, though fragmentarily—it is hard not to think, for instance, of Empedocles, who was revered within his own and neighboring communities as a *sophos*, dispensing remedies for civic troubles through his εὐηκῆς βάζις (“healing word”), able to calm anxieties and bring hope to those oppressed by daily life (31 B 112 D.-K.).

The reference reported by Diogenes Laertius (8.83) to the incipit of Alcmaeon’s *On Nature* (Περὶ Φύσεως), where he calls himself the son of *Peirithoos* and dedicates the work to *Brotinos*, *Leôn*, and *Bathyllos*, may likewise attest to his standing within his community. All three seem to have belonged to Pythagorean circles (respectively of either Croton or Metapontum, Metapontum, and Poseidonia) according to Iamblichus’ catalogue (VP 267), and *Brotinos* may in fact have been the alleged father-in-law of Pythagoras, husband of his daughter *Theano* (Diog. Laert. 8.42)¹². Such self-references suggest not only that Alcmaeon addressed a broad public¹³, but also that he regarded himself as fully part of a community to which he directed his intellectual activity. It is well known that Alcmaeon is sometimes considered a Pythagorean¹⁴; yet Aristotle (*Metaph.* 986a 27–b 3) distinguishes him from the Pythagoreans on the basis of the enumeration and classification of opposites—less precise than that of the Pythagoreans—and, though acknowledging certain affinities, does not count Alcmaeon among them. Even if we have no evidence that the Crotoniate physician shared the Pythagorean *bios*, this is not decisive regarding his relation to the Pythagoreans, since the Crotoniate milieu in which he lived and worked¹⁵—dominated by the most ancient and important Pythagorean *hetaireia*—must surely have oriented his path, allowing him to interact with intellectuals who shared his pursuit of *sophia* and speculative interests as well as social concerns.

Alcmaeon and the Pythagorean Environment: Philolaus, Archytas, and Aristoxenus

In Alcmaeon’s doctrine of *isonomia*, the equilibrium of *dynamis* is expressed through a notion akin to that of *harmonia*, but oriented explicitly in political terms¹⁶. The idea of *isonomia* transcends the dualistic principle that structures the cosmos for other pre-Socratics¹⁷ appearing, in its dynamic dimension of balance, as a principle presupposing both conflict and reciprocal adaptation among the parts of a whole, whether physical or political. The dynamics of *isonomia* resemble the *harmonia* that Heraclitus associates with opposing tensions—exemplified by bow and lyre¹⁸—and express a conception of *physis* close to that of Philolaus’ fr. 6, where *harmonia* explicitly appears.

According to Philolaus¹⁹ (44 B 1 DK = fr. 1 Huffman, ap. Diog. Laert. 8.85), the notion of ἁρμονία (“accord, fitting together”) belongs to “nature in the world-order” (ἄ

φύσις ἐν τῷ κόσμῳ), of which it is said that it “was fitted together both out of things which are unlimited and out of things which are limiting (ἀρμόχθη ἐξ ἀπείρων τε καὶ περαιόντων), both the world-order as a whole (ὅλος ὁ κόσμος) and all the things in it (τὰ ἐν αὐτῷ πάντα)”; trans. Huffman, ref. 9²⁰. Ἀρμονία therefore enables the mutual accord between limiters and unlimited things, the opposed constituents of being. In another fragment (fr. 6 Huffman = 44 B 6 DK) we read: “Since the first principles (ἀρχαί) pre-existed and were neither alike nor of the same kind, it would have been impossible for an order to arise from them had not ἀρμονία intervened, in whatever way it originated. For things similar and of the same kind have no need of ἀρμονία, whereas those unlike and of different kind and of unequal speed (ἴσοταχῆ) require such a harmony if they are to be held together within the cosmos.” ((ἐπεὶ δὲ ταὶ ἀρχαὶ ὑπάρχον οὐχ ὁμοῖαι οὐδ’ ὁμόφυλοι ἔσσαι, ἤδη ἀδύνατον ἦς καὶ αὐταῖς κοσμηθῆναι, εἰ μὴ ἀρμονία ἐπεγένετο ὥτινῶν ἄδε τρόπῳ ἐγένετο. τὰ μὲν ὧν ὁμοῖα καὶ ὁμόφυλα ἀρμονίας οὐδὲν ἐπεδέοντο, τὰ δὲ ἀνόμοια μηδὲ ὁμόφυλα μηδὲ ἴσοταχῆ, ἀνάγκη τῶν τοιαύτων ἀρμονία συγκεκλειῖσθαι, εἰ μέλλοντι ἐν κόσμῳ κατέχεσθαι)²¹.

The premise is that nature embodies divine knowledge, since the things from which cosmic order was constituted—both the limiting and the unlimited—pre-exists human cognition. Human understanding, by contrast, becomes possible only through *harmonia*, a condition of tempering and reciprocal adjustment that arises among the first principles, all differing both in themselves and in their coming-to-be. *Harmonia* thus mediates to humankind the knowledge of realities that pre-exist it, instituting among them relationships and connecting them within a *kosmos*, an ordered whole intelligible to reason.

The principle of relation among things is also expressed in fr. 17 (ap. Stob. Ecl. 1.15.7 [1.148.4 Wachsmuth]), cosmological in content and belonging to a work by Philolaus to which Stobaeus and Proclus attributed the title *Bacchae*²². There it is said that “the world order is one” (ὁ κόσμος εἷς ἐστίν) and depends on the relation between “above” (ἄνω) and “below” (κάτω): “both have the same relation to the middle, except that their positions are reversed” (πρὸς γὰρ τὸ μέσον κατὰ ταῦτά ἐστιν ἑκάτερα, ὅσα μὴ μετενήνεκται). Thus “the things above the middle are symmetrically arranged with those below” (τὰ ἄνω τοῦ μέσου ὑπεναντίως κείμενα τοῖς κάτω). This principle of symmetry reprises the criterion of commensurability and measure (τὸ σύμμετρον) that, in Alcmaeon’s fragment, elaborates the notion of *isonomia* as concerning pairs of elements balanced with one another²³.

Elsewhere too *harmonia* is expressed through the spatial relation ἄνω/κάτω: the same vocabulary appears in the Hippocratic *De Victu* (1.18), which links music and culinary art, associating with both the notion of *harmonia*. Notes sound some “above,” others “below”- that is, some high-pitched, others low pitched- and it is improper either to perform the high as low – namely, lower the high tones- or the low as high. Pleasure arises from the symphony of a well-harmonized tongue (in the right tone), while pain

derives from one that is not harmonized (namely, from a sense of taste that does not find the right balance). The author, placing the various *technai* on the same level, draws analogies among them without prejudice and with an evident didactic purpose: establishing a comparison with a widespread art such as cookery, and with aspects of everyday experience, aids understanding of other phenomena, just as Alcmaeon employs the political notion of *isonomia* to explain physiology and the conditions that determine health and disease.

In Philolaus' fr. 17 the notion of *harmonia* therefore subsists together with that of τάξις ("order"), delineated in spatial terms. Τάξις presupposes the element associated with *harmonia* in the composition of melodies—namely ῥυθμός, which, as Plato states (*Leg.* 664e8–665a3), is the "ordered arrangement of movement" (τῆ δὴ τῆς κινήσεως τάξει ῥυθμός ὄνομα εἶη), while ἁρμονία is the ordered arrangement of voice, "when the high tone blends with the low" (τῆ δὲ αὖ τῆς φωνῆς, τοῦ τε ὀξέος ἅμα καὶ βαρέος συγκεραννυμένων, ἁρμονία ὄνομα προσαγορεύοιτο). Thus within ἁρμονία reside both τάξις ("order," spatial) and κρᾶσις ("blending")²⁴, both connected to Alcmaeon's *isonomia*: if health results from "the proportionate blending of the qualities" (τὴν δὲ ὑγίαν τὴν σύμμετρον τῶν ποιῶν κρᾶσιν), and quantity represents the factor that triggers disease, then *isonomia* constitutes both a quantitative principle, expressing the measure that governs the κρᾶσις in equilibrium, and a spatial principle, related to the "place" where illness originates.

From another perspective, *harmonia* in Archytas of Tarentum—a "Pythagorean, philosopher, and mathematician-king", according to the effective synthesis by Carl Huffman (2005)²⁵—also appears closely connected to Alcmaeon's *isonomia*. In the important discussion on the notion of pitch preserved in Porphyry's *On Ptolemy's Harmonics*²⁶, we read that "of the sounds reaching our perception, those that arrive quickly and strongly from impacts appear high in pitch, whereas those that come slowly and weakly seem low in pitch" (τὰ μὲν οὖν ποτιπίπτοντα ποτὶ τὰν αἴσθησιν, ἃ μὲν ἀπὸ τῶν πλαγῶν ταχὺ παραγίνεταί καὶ <ἰσχυρῶς>, ὀξέα φαίνεται· τὰ δὲ βραδέως καὶ ἀσθενέως, βαρέα δοκοῦντι εἶμεν, trans. Huffman, ref. 25. Archytas thus reinterprets *harmonia* as the connection of things different and of different speeds, echoing Philolaus' fr. 6. The perception of pitch depends on both the speed and the force with which, through the air, the emitted sound reaches hearing: acute and grave tones are exemplified in voice (φωνή), perceived as strong and high when borne by a powerful flow of air, and as soft and low when the flow is weak²⁷. Numerous examples illustrate that "high-pitched sounds move faster, and low-pitched more slowly" (ὅτι μὲν δὴ τοὶ ὀξεῖς φθόγγοι τάχιον κινέονται, οἱ δὲ βαρεῖς βράδιον, φανερόν ἄμιν ἐκ πολλῶν γέγονεν)²⁸.

Alongside the role of *aisthēsis*—which for Aristoxenus was to constitute the first step toward musical understanding—there emerges in Archytas' speculation the notion of *harmonia* as the tempering of diverse speeds in the propagation of sounds,²⁹ and as

a variable connection in the theory of γένη³⁰, itself presupposing a principle of balance among pitches not far from Alcmaeon's conception of *isonomia*. Each interval (διάστημα) has a role that finds expression only in combination with another, for the generation of the structure that forms melody.

Indeed, harmony arises from contraries, as Heraclitus states: “there would be no harmony without high and low, nor living beings without female and male, which are opposites” (οὐ γὰρ ἂν εἶναι <ἁρμονίαν> μὴ ὄντος ὀξέος καὶ βαρέος· οὐδὲ τὰ ζῶα ἄνευ θήλεος καὶ ἄρρενος ἐναντίων ὄντων, 22 A 22 DK)³¹. The Pythagorean Simmias, in Plato's *Phaedo* (85e 3–86d 4), refers to the soul as a “harmonic blending” (κρᾶσιν ... καὶ ἁρμονίαν) of the bodily elements—almost certainly drawing on the physiological theory and the notion of *isonomia* found in Alcmaeon³². Similarly, in the *Symposium* (186d–e), the physician Eryximachus seems to echo Alcmaeon when he defines medicine (ιατρική) as a science (ἐπιστήμη) that “knows how to reconcile and make mutually enamoured those elements in the body most hostile to one another” (τὰ ἐχθίστα ὄντα ἐν τῷ σώματι φίλα οἶόν τ' εἶναι ποιεῖν καὶ ἐρᾶν ἀλλήλων)—cold and hot, bitter and sweet, dry and moist—thus generating ἔρωσ and ὁμόνοια within them.

Between Alcmaeon and Pythagoreanism, represented by Philolaus and Archytas, one can thus discern significant connections that reveal themselves in the speculation on music, where *harmonia* is central. Through Philolaus and Archytas—also linked to him by familial memory³³—the notion of *isonomia* appears to find continuity in Aristoxenus of Tarentum, who knew the last of the Pythagoreans³⁴.

For Aristoxenus, musical knowledge is essentially bound to αἴσθησις, the perception from which cognition begins, just as for Alcmaeon human understanding depends on τεκμήρια, the “signs” through which reality discloses itself to the intellect (Alk. 42 Wöhrle). The Tarentine musicologist regards αἴσθησις, together with μνήμη, as the foundation of σύνεσις (“understanding”) of *mousikē*³⁵: “For the student of music, accuracy of perception (ἢ τῆς αἰσθήσεως ἀκρίβεια) stands almost first in order of importance, since if he perceives badly it is impossible for him to give a good account (εὖ λέγειν) of the things which he does not perceive at all” (*Harm.* 2.33, pp. 42.20–43.2 Da Rios). Just as for Alcmaeon one cannot dispense with the τεκμήρια on which human knowledge is founded, so for Aristoxenus perception and διάνοια must “move together” (ὁμοδρομεῖν) in forming the judgment (κρίσις) regarding the parts composing a musical work (*Ps.-Plut. De Mus.* 34.1143f–1144a)³⁶. Both cooperate in recognizing the quality of οἰκειότης (“appropriateness”)—the sense of propriety or fittingness—or, conversely, of inappropriateness, through the critical faculty (κριτικὴ δύναμις) that enables judgment³⁷. This faculty does not rely on partial or sectorial knowledge of the elements that constitute melody³⁸ but judges diverse compositions by comprehending their specific ἦθος, which results “from a synthesis or a mixture or from both” (1143b) and varies whenever even one element of the mixture changes³⁹. Therefore, for Aristoxenus the true musician must also be a philosopher, since “only philosophy

can judge the measure appropriate to music and its usefulness” (*Ps.-Plut. De Mus.* 32.1142d 1–2: αὕτη γὰρ ἰκανὴ κρῖναι τὸ μουσικῆ πρέπον μέτρον καὶ τὸ χρήσιμον). For every element of musical composition (μελοποιία), the genuine musician recognizes and expresses the most fitting measure, according to a criterion of συμμετρία (reciprocal proportion) that recalls the principle of *isonomia*, also hinted at on the spatial level. In Aristoxenus’ *Harmonika* the term σύστημα replaces ἁρμονία to denote the organization of magnitudes, that is, of the intervals (διαστήματα)⁴⁰ that determine the basic structure of melodies—conceived spatially as the aggregation of intervals fixed upon an imaginary line (διάγραμμα) defining “the entire melodic order” (*Harm.* 1.2, p. 6.15–16 Da Rios, τὴν πᾶσαν τῆς μελωδίας τάξιν). Finally, the necessity that the musician also be a philosopher recalls, for Aristoxenus, the social and moral authority of the intellectual, capable of translating into the life of the community the principle of the *right measure* that must guide every action. The Pythagoreans, at once philosophers and musicians, uniting musical study with practical concern for civic life—after the same model that inspired Alcmaeon in combining political reflection with scientific inquiry, using the former as a τεκμήριον for the latter—may thus have provided for Aristoxenus a paradigm of speculative attitude and community awareness.

Conclusions - Ἴσωνομία as Ἁρμονία in the Crotoniate Context

Isonomia is therefore a principle of balance which, translated from the political sphere—where it takes the form of equity, or equal share, which adjusts mutual quantities to circumstances—expresses and measures proportionality with respect to contingency, context, time and necessity. While monarchy is always a unique, univocally determined expression and does not make use of a reciprocal and changing relationship that can adapt, isonomy takes into account the multiple factors that determine the mixture and changes according to circumstances, expressing a non-static condition that is the result of ever-changing balances according to necessity. As far as the political aspect is concerned, it seems possible to infer a connection between fragment 24 B 4 DK and the Crotonian context between the conquest of Sybaris (c. 510 BC) and the anti-Pythagorean revolt led by Cylon, governor of the Sybarites, who must have been inclined towards demagoguery and therefore hostile to Pythagoras⁴¹—and the expulsion of the Pythagoreans (c. 450 BC): the reference to *isonomia* would constitute a stance against tyranny (*monarchia*) on the one hand, and the emergency expansion of the civic body on the other, causing imbalance. After the defeat inflicted on Sybaris and Pythagoras’ transfer to Metapontum⁴²—the city where he would later die—due to the violent opposition of the Crotonians⁴³ to Pythagoras’ thesis that conquered land should remain undivided and be managed communally⁴⁴, the Pythagoreans did not lose their relationship of interaction and solidarity with the Crotonian elite of the Thousand⁴⁵—of which the associates themselves were part—and increased their collaboration to the point of influencing the city’s decisions. In

Croton, therefore, a new balance had to be created in order to maintain *isotes* within the civic body, that is, among the Thousand, in the name of a conservatism that opposed both tyranny—the monarchy—and, with the distribution of the lands taken from the Sybarites, to a “democratic” expansion of the civic body that would have led to demands from “new” members, with consequent discontent. Alcmaeon’s *isonomia* should therefore be historically linked to an oligarchic political regime, and the application of this political metaphor to the medical field, through the definition of the main constituent elements of the body, would serve to define the civic body by analogy with the human body, and the influences within the human body through correspondence with the model of the civic body, which must remain harmonious on the basis of a consolidated historical path, and as a virtuous alternative model to the disorders that had manifested themselves in other cities with tyranny (Locri) or with the enlargement of the civic body (Rhegium). Promoting themselves as advocates of the general prosperity that can only derive from the absence of conflict⁴⁶, the Pythagoreans would probably have sought to protect their association from annihilation. The harmony that characterised the Pythagorean *hetaireia*⁴⁷, a living representation of *harmonia*, therefore offers itself as a model of cohesion for society as a whole⁴⁸. In other respects, for Alcmaeon, political metaphor and physiology interact in a reflection that distinguishes Alcmaeon for its reference to health, while at the same time revealing a sharing of interests with the Pythagorean sphere, in which the notion of harmony was one of the fundamental principles for the interpretation of reality⁴⁹. There is therefore a link between *isonomia* and *sophia*, which is reflected in politics and can introduce knowledge of *physis* and man, and also seems to inspire the definition of the harmonisation of the three parts of the soul in Plato’s Republic (443d-e) as *dikaiosynē*, which manifests itself in the becoming of the individual ‘from many that he was, temperate and harmonious within himself’, and in inducing him to act with these characteristics for the care of the body and political action, considering wisdom to be the science that presides over such action. If Heraclitus (22 B 45 DK) argued that the *logos* of the soul cannot be reached, due to its deepness, a similar reflection can be made about the multiple forms and manifestations of *isonomia*. Around this principle, a universe of connection develops, properly “harmonious”, which encompasses politics, music and medicine, each of which serves as a model for the other, according to a typically Greek process that moves from the concrete to the abstract, from *aisthēsis* to *synesis*, and which is also exemplified in the few testimonies relating to Alcmaeon, a leading figure in the cultural and political debate of his time, in Magna Graecia, where of *philosophia* was constantly “on stage”.

Bibliography, notes and references

- Barker A, Greek Musical Writings. Vol. 1. The Musician and His Art. Cambridge: Cambridge University Press; 1983.
- Barker A, Greek Musical Writings. Vol. 2. Acoustic and Harmonic Theory. Cambridge: Cambridge University Press; 1989.

- Baron ChA, *Timaeus of Tauromenium and Hellenistic Historiography*. Cambridge: Cambridge University Press; 2013.
- Bélis A, *Aristoxène de Tarente et Aristote: le traité d'harmonique*. Paris: Klincksieck. 1986.
- Burkert W, *Lore and Science in Ancient Pythagoreanism*. Cambridge (Mass.): Harvard University Press; 1972.
- Centrone B, *Vita in comune. Il pitagorismo nel mondo antico*. Roma: Carocci; 2024.
- Da Rios R (ed.), *Aristoxeni Elementa Harmonica*. Roma: Officine Poligrafiche; 1954.
- Diels K, Kranz W (Hrsg.), *Die Fragmente der Vorsokratiker, I-III*. Zurich: Weidmann; 1966-1967¹¹ (repr. 2004-2005).
- Diels K (ed.), *Doxographi Graeci*. Berlin: Reimer; 1879.
- Diller H (ed.), *Hippocratis de aere, aquis locis (CMG I, 1, 2)*. Berlin: Akademie Verlag; 1999².
- Giangiulio M, *Ricerche su Crotone arcaica*. Pisa: Scuola Normale Superiore; 1989.
- Giangiulio M, *Democrazie greche. Atene, Sicilia, Magna Grecia*. Roma: Carocci; 2015.
- Gigante M, *La cultura a Taranto*. In *Taranto nella civiltà della Magna Grecia*, Atti del X Convegno. Napoli: Istituto per la storia e l'archeologia della Magna Grecia; 1970. pp. 67-131.
- Giorgianni F, *The Art of Democedes and Atossa's Oath (Hdt. 3, 133)*. *Med. Secoli* 2023;35(2):9-26.
- Heidel WA, *Notes on Philolaus*. *American Journal of Philology* 1907;28:77-81.
- Huffman CA (ed.), *Philolaus of Croton. Pythagorean and Presocratic*. Cambridge: Cambridge University Press; 1993.
- Huffman CA (ed.), *Archytas of Tarentum. Pythagorean, Philosopher and Mathematician King*. Cambridge: Cambridge University Press; 2005.
- Huffman CA, s.v. Alcmaeon. In: Zalta EN (ed.), *The Stanford Encyclopaedia of Philosophy*. Stanford, CA. (<https://plato.stanford.edu/archives/fall2020/entries/alcmaeon/>).
- Joly R, Byl S (eds), *Hippocratis De diaeta (CMG I 2, 4)*. Berolini: Akademie Verlag; 2003².
- Kouloumentas S, *The Body and the Polis: Alcmaeon on Health and Disease*. *British Journal for the History of Philosophy* 2014;22(5):867-887.
- Kouloumentas S, *Alcmaeon and his Addressees: Revisiting the Incipit*. In: Bouras-Vallianatos P, Xenophontos S (eds), *Greek Medical Literature and Its Readers. From Hippocrates to Islam and Byzantium*. London-New York: Routledge; 2018. pp. 7-29.
- Kouloumentas S, *Aristotle on Alcmaeon in Relation to Pythagoras: an addendum in Metaphysics Alpha?* In: Golitsis P, Ierodiakonou K (eds), *Aristotle and His Commentators: Studies in Memory of Paraskevi Kotzia*. Berlin: de Gruyter; 2019. pp. 49-67.
- Longrigg J, *Greek Rational Medicine. Philosophy and Medicine from Alcmaeon to the Alexandrians*. London-New York: Routledge; 1993.
- Mansfeld J, *The Body Politic: Aëtius on Alcmaeon on isonomia and monarchia*. In: Harte V and Lane M (eds), *Politeia in Greek and Roman Philosophy*. Cambridge: Cambridge University Press; 2013. pp. 78-95.
- Mansfeld J, Runia DT (eds), *Aëtiana: The Method and Intellectual Context of a Doxographer*. Vol. 1. Leiden: Brill; 1997.
- Mansfeld J and Runia DT (eds), *Aëtiana V. An Edition of the Reconstructed Text of the Placita with a Commentary and a Collection of Related Texts*. Part III. Leiden: Brill; 2020.
- Marasco G, *La società crotoniate, i Pitagorici e lo sviluppo delle scienze mediche*. In: De Sensi Sestito G (ed.), *L'arte di Asclepio. Medici e malattie in età antica (Atti della giornata di Studio sulla medicina antica, Università della Calabria 26 ottobre 2005)*. Soveria Mannelli: Rubbettino; 2008. pp. 7-28.
- McKirahan R, *Aristotle on the Pythagoreans: His Sources and his Accounts of Pythagorean*

- Principles. In: Sider D and Obbink D (eds), *Doctrine and Doxography. Studies on Heraclitus and Pythagoras*. Berlin-Boston: de Gruyter; 2013. pp. 53-120.
- Mele A, *Metaponto tra VI e V secolo. Mediterraneo Antico* 2010;13:173-206.
- Meriani A, *Sulla musica greca antica. Studi e ricerche*. Napoli: Guida; 2003.
- Mirhady DC (ed.), *Dicaearchus of Messana. The Sources, Text and Translation*. In: Fortenbaugh WW, Schütrumpf E, *Dicaearchus of Messana. Text, Translation, and Discussion*. New Brunswick (NJ): Transaction Publishers; 2001.
- Musti D, *La nozione di “Megale Hellás” e il pitagorismo*. In: Musti D, *Magna Graecia. Il quadro storico*. Bari: Laterza; 2005. pp. 103-203.
- Philip JA, *Pythagoras and Early Pythagoreanism*. Toronto: University of Toronto Press; 1966.
- Primavesi O, *Aristotle on the “So-Called Pythagoreans”*: from Lore to Principles. In: Huffman CA (ed.), *A History of Pythagoreanism*. Cambridge: Cambridge University Press; 2014. pp. 227-249.
- Provenza A, *The death of Pythagoras and the cults of the Muses and Demeter. Mousiké and eschatology in the Pythagorean communities of Magna Graecia*. *Hormos* 2013;5:53-68.
- Raffa M (ed.), *Porphyrus. Commentarius in Claudii Ptolemaei Harmonica*. Berlin-Boston: De Gruyter; 2016.
- Rocconi E, *Terminologia dello ‘spazio sonoro’ negli Elementa Harmonica di Aristosseno di Taranto*. *Quaderni Urbinati di Cultura Classica* 1999;61(1):93-103.
- Rocconi E, *Le parole delle Muse. La formazione del lessico tecnico musicale nella Grecia antica*. Roma: Quasar; 2003.
- Rowett C, *The Pythagorean Society and Politics*. In: Huffman CA, *A History of Pythagoreanism*. Cambridge: Cambridge University Press; 2014. pp. 112-130.
- Saetta Cottone R, *Soleil et connaissance. Empédocle avant Platon*. Paris: Les Belles Lettres; 2023.
- Schubert Ch, *Isonomia. Entwicklung und Geschichte*. Berlin-Boston: de Gruyter; 2021.
- Thivel A, *Hippocrate et la théorie des humeurs*. *Noesis* 1996;1:85-108.
- Vassallo Ch, *Alcmaeon’s Empirical Side: Unpublished Notes from the Vlastos-Nachlass*. *Rivista di Storia della Filosofia* 2021;1:167-179.
- Vegetti M, *Metafora politica e immagine del corpo nella medicina greca*. In: Lasserre F, Mudry Ph (eds), *Formes de pensée dans la collection hippocratique*. Genève: Droz; 1983. pp. 459-470.
- Wehrli F (ed.), *Die Schule des Aristoteles. Heft 2. Aristoxenos*. Basel: Schwabe; 1967².
- West ML, *Ancient Greek Music*. Oxford: Oxford University Press; 1992.
- Wöhrle G (ed.), (with the collaboration of Tsiampokalos Th and contributions of Lammer A), *Alkmaion von Kroton, Hippon von Metapont und Menestor von Sybaris*. Berlin-Boston: De Gruyter; 2022.
- Zhmd L, *Pythagoras and the Early Pythagoreans*. Oxford: Oxford University Press; 2012 (or. ed. *Wissenschaft, Philosophie und Religion im frühen Pythagoreismus*. Berlin: Akademie; 1997).
- Ziegler K (ed.), *Plutarchus, De Musica*. In: Ziegler K, Pohlenz M (eds), *Plutarchi Moralia*, vol. 6, fasc. 3. Leipzig: Teubner; 1966.
1. From Herodotus (3.131) we can deduce that the Crotonian physicians, in the second half of the 6th century BC, were recognized as the best in the world; among them, the historian dedicates ample space to Democedes (3.125-138), the most remarkable Crotonian physician, who is said to have traveled to Persia, where he cured Queen Atossa from breast cancer (cf. Giorgianni F, *The Art of Democedes and Atossa’s Oath* [Hdt. 3, 133]. *Med. Secoli* 2023;35(2):9-26). Medicine also represented one of the fundamental interests of

the Pythagoreans, who established an important *hetaireia* in Croton in the last thirty years of the 6th and the first half of the 5th century BC. The political importance of this community underwent chequered vicissitudes, with the exile of Pythagoras to Metapontum after the Crotonian conquest of Sybaris in 510, the subsequent return to Croton and the definitive expulsion of the Pythagoreans from Croton in around 450 BC. (cf. Aristox. fr. 18 Wehrli = Iambl. *VP* 249, 265, cf. also *VP* 250, 254-255, 260; Dicaearch. fr. 41a-b Mirhady [= 35a-b Wehrli] = Porph. *VP* 57; Giangiulio M, Ricerche su Crotona arcaica. Pisa: Scuola Normale Superiore; 1989. Giangiulio M, Democrazie greche. Atene, Sicilia, Magna Grecia. Roma: Carocci; 2015. pp. 97-114. On the Pythagoreans and medicine cf. in particular Aristox. *Pyth. Praec.* 9 Huffman = Iambl. *VP* 208; Marasco G, La società crotoniate, i Pitagorici e lo sviluppo delle scienze mediche. In: De Sensi Sestito G (ed.), *L'arte di Asclepio. Medici e malattie in età antica* (Atti della giornata di Studio sulla medicina antica, Università della Calabria 26 ottobre 2005). Soveria Mannelli: Rubbettino; 2008. pp. 7-28. Huffman CA, s.v. Alcmaeon. In: Zalta EN (ed.), *The Stanford Encyclopedia of Philosophy*. Stanford, CA. Available at: <https://plato.stanford.edu/archives/fall2020/entries/alcmaeon/> (Accessed 15 October 2025).

2. Socrates, in *Phaedo* (96a-b = Alc. A11 DK = 2 Wöhrle), already includes Alcmaeon among the wise men to whose doctrines he turned as a young man, when he had a deep interest in the investigation of *physis*.
3. Cf. also Ps. Plut. *De Plac. Philos.* 911a1-9 = Alk. 28 Wöhrle, the source on which Aëtius seems to depend, and *infra*, n. 7.
4. I report the integration by Diels H (ed.), *Doxographi Graeci*. Berlin: Weidmann; 1879. p. 442 of the text of Pseudo-Plutarch (*De Plac. Philos.* 911a1).
5. An exhaustive discussion of *isonomia* can be found in Schubert Ch, *Isonomia. Entwicklung und Geschichte*. Berlin-Boston: de Gruyter; 2021, in particular on Alcmaeon cf. pp. 152-174, 246-248, 259-274.
6. On the reconstruction and interpretation of the text of this very important fragment of Alcmaeon cf. Kouloumentas S, *The Body and the Polis: Alcmaeon on Health and Disease*. *British Journal for the History of Philosophy* 2014;22(5): 867-887; I use his translation (p. 869).
7. The resumption of ἰσονομία in κρᾶσις in the final part of the testimony shows how the doxographic source expands and elaborates Alcmaeon's notion of health as *isonomia*, perhaps in order to explain Alcmaeon's doctrine in Hippocratic terms, in the light of the interpretation of sense perception and thinking as a proportionate blending of bodily constituents that can be found in Theophrastus (*Sens.* 24-25 = Alk. 11 Wöhrle); cf. also Kouloumentas S, ref. 6, p. 878. Greek testimonies to the *lemma* in Aëtius are Ps. Plut. *De Plac. Philos.* 911a1-9 = Alc. 28 Wöhrle; Stob. 4.36.29 = Alc. 61 Wöhrle (which, compared to Pseudo-Plutarch, lacks the final sentence, τὴν δὲ ὑγίαν τὴν σύμμετρον τῶν ποιῶν κρᾶσιν, cf. also Stob. 4.37.2 = Alc. 62 Wöhrle); Psell. *Solut. Divers. Quaest.* 66 = Alc. 99 Wöhrle. There is also an Arabic testimony, in the translation into Arabic of the Pseudo-Plutarchian treatise *De placita philosophorum* by Qūsta Ibn Lūqa (cf. Alc. 86 Wöhrle), which appears very interesting as it differs from the extant Greek text; cf. on this point Mansfeld J, Runia DT (eds), *Aëtiana: The Method and Intellectual Context of a Doxographer*. Vol. 1. Leiden: Brill; 1997. p. 157. For references in this regard, see Kouloumentas S, Ref. 6, pp. 877-881; Mansfeld J, *The Body Politic: Aëtius on Alcmaeon on isonomia and monarchia*. In: Harte V and Lane M (eds), *Politeia in Greek and Roman Philosophy*. Cambridge: Cambridge University Press; 2013. pp. 78-95. Mansfeld J and

- Runia DT (eds), *Aëtiana V. An Edition of the Reconstructed Text of the Placita with a Commentary and a Collection of Related Texts. Part III*. Leiden: Brill; 2020. pp. 2043-2057. Cf. also Thivel A, Hippocrate et la théorie des humeurs. *Noesis* 1996;1:85-108 on the influence exerted by Alcmaeon's doctrine on the doctrine of the humors on the Hippocratic treatises, particularly on *De Vetere Medicina*.
8. Cf. Galen. *De methodo medendi*, 1.1, Kühn 10.6, 3-4.
 9. Particular attention has been paid to Aristotle as a source on the ancient Pythagoreans starting from Philip JA, Pythagoras and Early Pythagoreanism. Toronto: University of Toronto Press; 1966), that (p. 19) considers the Stagirite "almost alone in having non-Pythagorean axe to grind." Among the studies on Aristotle as a source on the Pythagoreans see McKirahan R, Aristotle on the Pythagoreans: His Sources and his Accounts of Pythagorean Principles. In: Sider D and Obbink D (eds), *Doctrine and Doxography. Studies on Heraclitus and Pythagoras*. Berlin-Boston: de Gruyter; 2013. pp. 53-120; Primavesi O, Aristotle on the "So-Called Pythagoreans": from Lore to Principles. In: Huffman CA (ed.), *A History of Pythagoreanism*. Cambridge: Cambridge University Press; 2014. pp. 227-249. Aristotle speaks of the Pythagoreans (οἱ καλούμενοι Πυθαγόρειοι) in *Metaph.* 1.5-6 (985b23-987a31, and the Pythagorean theory of number, which he claims was also followed by Plato); 8 (1090a20-1092b25). His collective reference to the "Pythagoreans" in connection with scientific speculation is interesting, probably motivated by the fact that, in his time, Pythagoras must already have been surrounded by such a legendary aura as to induce caution in attributing specific notions to him. Aristotle was also the author of a work *Against the Pythagoreans* and a monograph *On the Pythagoreans* (also attested with the title *On the Opinions of the Pythagoreans*), both of which have been lost. A comparison between Aristotle's testimonies on Pythagoreanism and the fragments of ancient Pythagoreans, in particular of Philolaus, allows us to find points of contact such as to suggest that Philolaus himself was a privileged source (this deep closeness emerges in particular from an examination of the nucleus of authentic fragments of Philolaus (DK 1-7); on these issues cf. Huffman CA (ed.), *Philolaus of Croton. Pythagorean and Presocratic*. Cambridge: Cambridge University Press; 1993. pp. 28-34.
 10. Cf. *supra*, p. 101 on *De aer.* 12. On the connection between medicine and politics in Alcmaeon's notion of *isonomia*, and on the similarities in *Corpus Hippocraticum*, cf. Schubert Ch, Ref. 5. pp. 150-167. In the Hippocratic writings, the relationship between the individual and the environment seems to characterize the aspect of heredity with epigenetic traits: some traits determined by the environment and by interaction with it become stable and are passed down. Consider, for example, the case of the Amazons (CH *De articulis*, 53.1, Li. 4), who represent a specific γένος, perhaps as a result of the fact that among them males were systematically subjected to mutilations aimed at rendering them helpless and subordinate (this aspect is also found in Aristophanes' speech in Plato's *Symposium*, 190d-191b; cf. also Galen. In *Hippocratis librum de articulis et Galeni in eum commentarii* IV, Kühn 18a, p. 603). Such practices end up configuring a society of beings of a single sex, which can therefore be defined – in its paradox – γένος. Instead of genetic mutations occurring in the reproductive process, among the Amazons, the impairments towards males are inflicted voluntarily, becoming a sort of epigenetic factor (the mutilation of the breasts they inflict on themselves can also be seen in this perspective, although the latter is intended to facilitate the use of the bow, and not to cause harm). An important connection between the Hippocratic writings and Alcmaeon is also constituted by the principle according to which the sacred disease, which is located in the brain,

- is hereditary, given that Alcmaeon seems to be a supporter of the encephalic theory of the origin of the semen (cf. 24 A 13 DK = Aët. 5.3.3, the semen is “part of the brain”, ἐγκεφάλου μέρος) and of the existence of the female semen in addition to the male one; the same aspect is also found in Parmenides (28 B 18 DK), Empedocles (31 B 63 DK = Aristot. *De Gen. Anim.* 722b) and Democritus (68 A 142 DK). The theory of the encephalic origin of the semen is also found in the doxography on the Pythagoreans, according to which “semen is a drop of brain” (cf. Alex. Polyhist. *FgrHist* 273 F 93 ap. Diog. Laert. 8, 28: τὸ δὲ σπέρμα εἶναι σταγόνα ἐγκεφάλου), and has its origin in bone marrow (cf. Hippo of Metapontum, 38 A 12 DK = Censorin. V, 2; Plat. *Tim.* 91a-b).
11. The distinction between the clarity of knowledge concerning the gods and the *tekmairesthai* of men defines a principle of limit also found in other pre-Socratics; cf. e.g. Heraclit. 22 B 43 DK, according to which “it is necessary to extinguish arrogance (ὑβρις) even more than a fire.”
 12. Regarding these characters and the fragment as a whole cf. Kouloumentas S, Alcmaeon and his Addressees: Revisiting the Incipit. In: Bouras-Vallianatos P, Xenophontos S (eds), *Greek Medical Literature and Its Readers. From Hippocrates to Islam and Byzantium.* London-New York: Routledge; 2018. pp. 7-29.
 13. Cf. Kouloumentas S, Ref. 12. p. 10.
 14. Cf. in particular Diog. Laert. 8.37 and 83 (in which Alcmaeon is said to have been a “listener” to Pythagoras); Iamb. VP 104, 267 (the name of Alcmaeon is reported in the catalogue of the Pythagoreans, of Aristoxenian derivation). Scholars have made various considerations on this matter: according to Zhmud L, *Pythagoras and the Early Pythagoreans.* Oxford: Oxford University Press; 2012. p. 109 (or. ed. Wissenschaft, Philosophie und Religion im frühen Pythagoreismus. Berlin: Akademie; 1997), one cannot doubt about the Pythagorean placement of Alcmaeon, Philolaus and Archytas for the simple fact that Aristotle does not include them in this context (cf. pp. 109-119 for a general overview on the question of the definition of the Pythagoreans). Centrone B, *Vita in comune. Il pitagorismo nel mondo antico.* Roma: Carocci; 2024. pp. 119-120; maintains instead that, as far as it is possible to reconstruct their characteristics, it is not possible to find anything specifically Pythagorean in Alcmaeon’s doctrines. On Alcmaeon’s relationship with Pythagoreanism cf. also Longrigg J, *Greek Rational Medicine. Philosophy and Medicine from Alcmaeon to the Alexandrians.* London-New York: Routledge; 1993. pp. 47-81.
 15. The only chronological indication we possess regarding Alcmaeon is contained in Aristotle’s *Metaphysics* (1.5, 986a29-31 = Alcmaeon 24 A 3 D.-K.), which places Alcmaeon’s peak at the time when Pythagoras was already old. Considering that Pythagoras would have arrived in Croton around the age of forty (ca. 531 BC; cf. Aristox. fr. 16 Wehrli), the source would therefore refer to a period around 510 BC. (cf. Kouloumentas S, Aristotle on Alcmaeon in Relation to Pythagoras: an addendum in *Metaphysics Alpha?* In: Golitsis P, Ierodiakonou K (eds), *Aristotle and His Commentators: Studies in Memory of Paraskevi Kotzia.* Berlin: de Gruyter; 2019. pp. 49-67). The chronology that emerges from Aristotle is not considered reliable by some scholars, who consider the passage from *Metaphysics* an interpolated gloss (cf. however Vlastos in Vassallo Ch, Alcmaeon’s Empirical Side: Unpublished Notes from the Vlastos-Nachlass. *Rivista di Storia della Filosofia* 2021;1:167-179, (according to whom Aristotle would not have mentioned Alcmaeon among the pre-Socratic *physiologoi* in *Metaphysics*, or even in *Physics*, because he would not have been aware of any cosmological work composed by Alcmaeon) and instead links Alcmaeon to Philolaus, or to the second generation of Pythagoreans (cf.

- e.g. Mansfeld J, ref. 7, who places his peak around 440 BC), or in any case take into consideration a time span of fifty years for his activity (between 500 and 450 BC; cf. e.g. Huffmann CA, Ref. 1. to which refer the reader for a general overview of Alcmaeon).
16. On this subject, see in particular Vegetti M, *Metafora politica e immagine del corpo nella medicina greca*. In: Lasserre F, Mudry Ph (éds), *Formes de pensée dans la collection hippocratique*. Genève: Droz; 1983. pp. 459-470.
 17. Consider for example Empedocles, fr. 17.1-8 D.-K.: *Philotēs* puts all things together in one and *Neikos* separates them; cf. in this regard Saetta Cottone R, *Soleil et connaissance. Empédocle avant Platon*. Paris: Les Belles Lettres; 2023. cap. 1.
 18. 22 B 51 DK, “they do not understand how that which is different agrees with itself; harmony of movements opposed to each other, like that of the bow and the lyre” (παλίντονος ἄρμονίη ὅκωσπερ τόξου καὶ λύρης); cf. also Plat. *Symp.* 187a3-5.
 19. The codification of a truly “scientific” Pythagorean thought seems to emerge from Philolaus, and to assume a decisive importance and consistent developments with Archytas’ theory on acoustics and *symphoniai*. There is a good chance that Philolaus came into contact with Alcmaeon’s doctrines as a young man, and that this may have given impetus to his interest in medicine (cf. Philol. Test. A27 and A28 Huffman and the related commentary; Huffman CA, Ref. 9. pp. 289-306; cf. also pp. 9-11).
 20. Trans. Huffman, ref. 9, as for all quotations from Philolaus; see also pp. 93-101. According to Diogenes Laertius, whose source is Demetrius of Magnesia (1st century BC), this sentence represents the incipit of the work *On Nature* (Περὶ φύσεως) by Philolaus.
 21. Cf. in this regard Huffman CA, Ref. 9. pp. 73-74 and 137-145. The scholar maintains, albeit with the crux, ἰσοταχῆ, the reading of the manuscripts (which, in light of fr. 6a, he considers to be related to the different speed of the movement of the planets or, in reference to music, to the different speeds of vibration of the strings), while Diels and Kranz accept the conjecture of Heidel WA, Notes on Philolaus. *American Journal of Philology* 1907;28:77-81, which supposes ἰσοταχῆ in place of ἰσοταχῆ (cf. Huffman CA, ref. 9. pp. 143-144).
 22. The work has sometimes been considered pseudo-epigraphic, but as Huffman argues, the issue may be more complex: the fragment appears authentic, and perhaps *Bacchae* was the title that later tradition assigned to *Peri Physeos* or, more likely, Stobaeus (or one of his epitomists), who worked with many of Philolaus’s books before him, simply made a mistake in assigning fr. 17 to *Bacchae*.
 23. The notion of symmetry as a just proportion between body and soul is recalled in Plat. *Tim.* 87c-d, in view of the consideration that the soul influences the diseases of the body. (87e6-88a7).
 24. In Empedocl. 31B23.4 DK, the mixing of colors according to mutual proportions by the painter is called ἄρμονία.
 25. A disciple of Philolaus, Archytas (who was born between 435 and 410 BC and died around 350), served for seven consecutive years as *strategos* in Tarentum, his hometown (cf. Archyt. Test. A1 Huffman = Diog. Laert. 8.79), which in the 4th century BC was the most important Pythagorean centre (cf. in this regard Gigante M, *La cultura a Taranto*. In *Taranto nella civiltà della Magna Grecia*, Atti del X Convegno. Napoli: Istituto per la storia e l’archeologia della Magna Grecia; 1970. pp. 67-131). For the chronology, see Huffman CA, *Archytas of Tarentum. Pythagorean, Philosopher and Mathematician King*. Cambridge: Cambridge University Press; 2005. pp. 5-6.
 26. Cf. Archyt. fr. 1A Huffman = Porphy. *In Ptol. Harm.* 1.3, pp. 68.16-71.14 Raffa = 55.27-58.7 Düring.

27. Archyt. fr. 1.27-29 Huffman = Porph. *In Ptol. Harm.* 1.3, p. 70.13-15 Raffa = 57.9-11 Düring, τὸν δὲ καὶ ταῖς φωναῖς συμβήσεται· τᾶ μὲν ὑπὸ τῶ ἰσχυρῶ τῶ πνεύματος φερομένα μεγάλα τε ἤμεν καὶ ὄξεα, τᾶ δ' ὑπ' ἀσθενέος μικρὰ τε καὶ βαρέα.
28. Archyt. fr. 1A Huffman = Porph. *In Ptol. Harm.* 1.3, pp. 68.16-71.14 Raffa = 55.27-58.7 Düring, in part. p. 71.4-5 Raffa = 57.24-25 Düring. This important notation, as Huffman deduces from the context of the passage by Porphyry in which it is contained, could be related to the relative height of the sounds emitted with the *aulos*, in which the greater the distance that the breath must travel inside the instrument up to the hole closed by the player, the deeper the sound emitted will be. (cf. Huffman CA, ref. 27, pp. 146-147).
29. Cf. also Plat. *Symp.* 187b7-c2, “the rhythm is born from the fast and the slow, that is, from elements that are initially discordant and then concordant” (ὁ ῥυθμὸς ἐκ τοῦ ταχέος καὶ βραδέος, ἐκ διενηγεγμένων πρότερον, ὕστερον δὲ ὁμολογησάντων γέγονε).
30. Cf. Archyt. T A16 Huffman = Ptol. *Harm.* 1.13-14, pp. 30-32 Düring; Huffman CA, Ref. 25. pp. 402-428; cf. also Plat. *Phileb.* 17c1-d6, according to whom *harmoniai* (“musical scales”) arise from different combinations of intervals. On scales in the musical system of ancient Greece cf. West ML, *Ancient Greek Music*. Oxford: Oxford University Press; 1992. pp. 160-189.
31. The opposition between masculine and feminine as productive of *harmonia* in generation also appears to be found in Pythagoras, according to whom *kosmos*, in its entirety, consists of masculine and feminine (Aristox. fr. 13 Wehrli, ἐκ δὲ τούτων πάντα τὸν κόσμον συνεστάναι, ἐκ θηλείας καὶ ἄρρενος).
32. Aristotle, in *De anima* (407b30-32), states that, according to some philosophers, “the soul is a sort of accord (ἁρμονία), since accord is a mixture and composition of opposites, and the body is made of opposites (τὴν ἁρμονίαν κράσιν καὶ σύνθεσιν ἐναντίων εἶναι, καὶ τὸ σῶμα συγκεῖσθαι ἐξ ἐναντίων).”
33. Cf. Aristox. fr. 30 (= 49) Wehrli = Iambl. *VP* 197-198, Archyt. test. A 7 Huffman. Cf. also Wehrli F (ed.), *Die Schule des Aristoteles*. Heft 2. Aristoxenos. Basel: Schwabe; 1967. p. 56; Huffman CA, Ref. 25. pp. 287-292.
34. Cf. Aristox. fr. 19 Wehrli = Diog. Laert. 8.46.
35. Cf. *Harm.* 2.38-39, p. 48.11-18; 42, p. 53.6-9; 43, pp. 53.17-54.1 Da Rios. Translations from Aristoxenus are taken from Barker A, *Greek Musical Writings*. Vol. 2. *Acoustic and Harmonic Theory*. Cambridge: Cambridge University Press; 1989.
36. Cf. Meriani A, *Sulla musica greca antica*. Studi e ricerche. Napoli: Guida; 2003. pp. 66-69 on Aristoxenus in this part of the treatise.
37. Cf. *De mus.* 33.1143a, “we always define so-called ‘appropriateness’ taking into account an *ethos*.” Trans. from Barker A 1983, as hereafter.
38. Cf. Ps. Plut. *De mus.* 36.1144c 4-6, “One cannot be a perfect musician and critic simply by knowing those parts that seem to constitute music as a whole.”
39. On the need for the musician to have a complete knowledge of music, cf. also Ps. Plut. *De mus.* 34.1143e-f, “it is clear that (he is able to fully understand the whole field of harmony) who has pursued the knowledge of individual branches of knowledge and, beyond these, of the whole body of music, and of the mixtures and combinations of its parts (ταῖς τῶν μερῶν μίξεσι τε καὶ συνθέσεσιν). Whoever is expert only in the science of harmony is, in a certain sense, limited (ὁ γὰρ μόνον ἁρμονικὸς περιγέγραπται τρόπῳ τινί).”
40. Cf. Aristox. *Harm.* 1.5, pp. 20.20-21.5 Da Rios, “an interval (διάστημα) is that which is bounded by two notes which do not have the same pitch (μὴ τὴν αὐτὴν τάσιν ἐχόντων),

since the interval appears, roughly speaking, to be a difference (διαφορά) between pitches, and a space (τόπος) capable of receiving notes higher than the lower of the pitches which bound it, and lower than the higher of them.” Cf. in this regard, and on the spatial conception of the progression of sounds, Bélis A, *Aristoxène de Tarente et Aristote: le traité d’harmonique*. Paris: Klincksieck; 1986. pp. 133-167; Rocconi E, *Terminologia dello ‘spazio sonoro’ negli Elementa Harmonica di Aristosseno di Taranto*. Quaderni Urbinati di Cultura Classica 1999;61(1):93-103. Rocconi E, *Le parole delle Muse. La formazione del lessico tecnico musicale nella Grecia antica*. Roma: Quasar; 2003. pp. 73-77.

41. Cf. Aristox. fr. 18 Wehrli; Iambl. *VP* 248-252.
42. Cf. Dicaearch. fr. 41 a-b Mirhady = 35a-b Wehrli.
43. This reaction, which was clearly manifested in the fire set in the place where the Pythagoreans were staying, appears to be connected to the fear that Pythagoras, strong in the support of the popular classes, could establish a tyranny (Iamb. *VP* 260). The burning of the Pythagoreans’ house is configured as a fixed modality of the fight against them (cf. in this regard Musti D, *La nozione di “Megale Hellás” e il pitagorismo*. In: Musti D, *Magna Grecia. Il quadro storico*. Bari: Laterza; 2005. pp. 103-203, in part. pp. 155-156).
44. On that occasion it seems to have been the *plethos*, which demanded the distribution of land, that rose up against the Pythagoreans. (cf. Iamb. *VP* 255).
45. On the historical context of Croton in the first half of the 5th century BC and on the oligarchy of the Thousand in relation to the oligarchic political conception of the Pythagoreans cf. Giangiulio M, *Ref. 1*. pp. 97-114.
46. According to a Pythagorean *akousma*, *harmonia* is “the most beautiful thing” (Iamblichus *VP* 82, τί κάλλιστον; ἁρμονία). This aspect is also reflected in the three public speeches that, according to Iamblichus’ account, Pythagoras is said to have delivered in Croton at the city council (συνέδριον), addressed respectively to men (*VP* 46-50), to young people (51-53) and to women (54-57). Porphyry (*VP* 18-19) also mentions Pythagoras’ speeches in Croton. The source of the philosopher from Tyre is Dicaearchus of Messana (Porph. *VP* 18 = Dicaearch. fr. 40 Mirhady = fr. 33 Wehrli. *VP* 19 would also go back to the same source, as was maintained by Burkert W, *Lore and Science in Ancient Pythagoreanism*. Cambridge (Mass.): Harvard University Press; 1972. p. 122 and highlighted by Mirhady DC, *Dicaearchus of Messana. The Sources, Text and Translation*. In: Fortenbaugh WW, Schütrumpf E, *Dicaearchus of Messana. Text, Translation, and Discussion*. New Brunswick (NJ): Transaction Publishers; 2001, who includes it in the Dicaearchus quote). Zhmud L, *Ref. 14*. pp. 93-94, expresses skepticism on this matter, arguing that it is not actually possible to establish whether Dicaearchus had reported the contents of these speeches, while on the other hand, it would be unlikely that Pythagoras had acquired such great consideration among the Crotonian aristocracy so soon after his arrival. Giangiulio M, *Ref. 1*. pp. 4-6, stresses that a testimony of Antisthenes contained in a Homeric scholium dating back to Porphyry’s *Homerika Zetemata* (*Schol. Hom. Od.* 1.1, p. 9.5-7 Ludwig = Antisth. fr. 26 Mullach = 51 Decleva-Caizzi), two generations earlier than the parallel testimony of Dicaearchus, actually represents the oldest source on Pythagoras’ speeches. The tradition on Pythagoras’ speeches to the Crotonians is also found in Timaeus of Tauromenium (regarding the speech to the women, Iamb. *VP* 56 corresponds to Timaeus, *FGrHist* 566 F 17 = Justin. 20.4.1-13; for other correspondences see Burkert W, *ref. 46*, pp. 104-105 note 37; for Timaeus as a source on Pythagoras cf. Baron ChA, *Timaeus of Tauromenium and Hellenistic Historiography*. Cambridge: Cambridge University Press; 2013. pp. 155-164), which would have undergone further processing by the

- source of Iamb. *VP* 37-57 (probably Apollonius, according to Burkert W, Ref. 46. pp. 100 n. 12, 115 n. 38, but cf. also Baron, p. 155, puzzled about this).
47. It appears manifest, at the family level, by endogamy, while on the ethical and political level, after the exile of Pythagoras in Metapontum, the principle of *homonoiia* seems to be expressed in the respect of the *kosmos* represented by the divinities – the Muses and Demeter – honoured in the places where Pythagoras had lived: according to a testimony of Timaeus (FGrHist 566 F 131 = Porph. *VP* 4), in fact, after the death of Pythagoras the Crotoniates made the house in which he had lived a temple (ἱερόν) of Demeter, and called the alley in which it stood “sanctuary of the Muses” (μουσεῖον, cf. in this regard Provenza A, *La morte di Pitagora e i culti delle Muse e di Demetra. Mousiké ed escatologia nelle comunità pitagoriche di Magna Grecia. On isonomy among the Pythagoreans* cf. Schubert Ch, Ref. 5. pp. 149-152.
 48. On the Pythagoreans and politics cf. Rowett C, *The Pythagorean Society and Politics*. In: Huffman CA, *A History of Pythagoreanism*. Cambridge: Cambridge University Press; 2014. pp. 112-130.
 49. The notion of *isonomia* also mirrors that of *harmonia* according to Mele A, *Metaponto tra VI e V secolo*. *Mediterraneo Antico* 2010;13:173-206.

