



Mysticism and Science in the Pythagorean Tradition

F. M. Cornford

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Die Lehre des Pythagoras selbst enthielt monistische und dualistische Elemente. Gegen diese mystische Verschmelzung richtete sich die Kritik des Parmenides. Sie hatte in der pythagoreischen Schule eine Spaltung zur Folge, indem die μαθηματικοί, der Kritik Rechnung tragend, einen primitiven Atomismus schufen, für den die Dinge als Systeme von Monaden Zahlen sind, während sie für Pythagoras solche nur repräsentiert hatten. Gegen diesen Zahlatomismus richtete sich Zenons Kritik, auf die übrigens nicht näher eingegangen wird.



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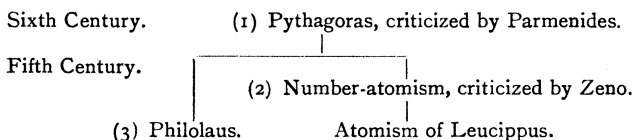
MYSTICISM AND SCIENCE IN THE PYTHAGOREAN TRADITION.

THE object of this paper is to show that, in the sixth and fifth centuries B.C., two different and radically opposed systems of thought were elaborated within the Pythagorean school. They may be called respectively the mystical system and the scientific. All current accounts of Pythagoreanism known to me attempt to combine the traits of both systems in one composite picture, which naturally fails to hold together. The confusion goes back to Aristotle, who usually speaks indiscriminately of 'the Pythagoreans,' though now and then the phrase 'some Pythagoreans' indicates that he was aware of different currents within the school.

I shall try to show that the criterion enabling us to distinguish the two systems is furnished by the Eleatic criticism of Pythagoreanism, which can be used as one might use a mirror to see what was happening on the other side of a screen. The history of presocratic philosophy is divided, *circa* 500-490 B.C., into two chapters by Parmenides' polemic against any system which derives a manifold world from an original unity. The first chapter contains the two great sixth-century systems of the Milesians and of Pythagoras, both of which fall under Parmenides' condemnation. Parmenides, bred in the Pythagorean tradition, was primarily a critic of the school from which he was seceding. Thus we have a clue to what sixth-century Pythagoreanism must have been, if we ask what is the radical fault found by Parmenides in the system he is criticizing. It will appear that this fault is the attempt to combine a monistic inspiration with a dualistic system of Nature. Parmenides declared for uncompromising monism, and in consequence denied plurality and becoming, including change and motion. The second chapter contains the fifth-century pluralist systems of Empedocles, Anaxagoras, and the Atomists, who sought in various ways to restore plurality, change, and motion without infringing the canons Parmenides was believed to have established. It is antecedently probable that some section of the Pythagorean school would attempt a similar answer. Now, in the generation after Parmenides, we find his pupil Zeno attacking a system which appears to be that answer. It is an inchoate form of Atomism—a doctrine that the real consists of an indefinite plurality of units or monads (indivisible points having position and magnitude), which can move in space and of which bodies can be built up. Of this doctrine there is no trace in Parmenides; it belongs to the early fifth century. Zeno's criticisms, on the other hand, point to this doctrine, and to nothing else. It is not the later developed Atomism of Leucippus and Democritus, from which it differs in

various respects. The monads, for instance, do not differ, like the atoms, in shape, but are all alike. I infer that the system in question is another pluralist system, the immediate ancestor of Atomism proper, constructed by the scientific wing of the Pythagorean school as a reply to Parmenides' critique.

Aristotle, when he speaks of 'the Pythagoreans,' refers sometimes to the original sixth-century system, sometimes to this later doctrine, and probably in his own mind did not clearly distinguish the two. Hence his testimonies, if taken all together, are inconsistent. Here we are told that sensible things 'represent' or 'embody' (*μιμεῖσθαι*) numbers; there, that sensible things or bodies actually *are* numbers, built up of indivisible monads. And so on. But, with the guidance of the Eleatic criticism and our knowledge of the religious antecedents of Pythagoras, we can sort out the testimonies and refer them to the two systems I have mentioned. We can, in a word, distinguish between (1) the original sixth-century system of Pythagoras, criticized by Parmenides—the mystical system, and (2) the fifth-century pluralism constructed to meet Parmenides' objections, and criticized in turn by Zeno—the scientific system, which may be called 'Number-atomism.' There is also (3) the system of Philolaus, which belongs to the mystical side of the tradition, and seeks to accommodate the Empedoclean theory of elements. This may, for our present purpose, be neglected. The following diagram illustrates the development :



NOTE.—Windelband (*Gesch. d. alten Philos.*², 1894) notes (p. 42) that there is no trace in Parmenides of the so-called Number-theory, and, following Strümpell, he regards this theory as an attempt, like those of Empedocles, Anaxagoras, and the Atomists, to mediate between Eleaticism and Heracleiteanism (p. 47). He thus treats the 'Number-theory' as a single system, later than Pythagoras himself, whom he regards as merely a religious founder with ethico-political interests (p. 21). This conclusion (disproved by Heracleitus, *Frag.* 17, Byw.) can be avoided by recognizing two forms of the 'Number-theory.'

I. THE MYSTICAL SYSTEM OF PYTHAGORAS.

Any attempt to reconstruct the original system of the founder must, I would urge, be based on the presupposition that his philosophy and cosmology were not openly inconsistent with his religion. It is obvious that the Italian tradition in philosophy differs radically from the Ionian in respect of its relation to religious belief. Unlike the Ionian, it begins, not with the elimination of factors that had once had a religious significance, but actually with a reconstruction of the religious life. To Pythagoras, as all admit, the love of wisdom, philosophy, was a way of life. Pythagoras was both a great religious reformer, the prophet of a society united by reverence for his memory and the

observance of a monastic rule, and also a man of commanding intellectual powers, eminent among the founders of mathematical science. In a man of this temper, presenting an extremely rare combination of the highest spiritual and intellectual force, the religious motive, by its very nature, must be stronger than scientific curiosity; it must determine the direction of philosophic speculation, because it demands that thought shall satisfy spiritual aspirations. The world must have a certain character if it is to respond to the needs of the soul. The philosophy is prejudiced by faith; there are preconceptions dictating the axioms from which it must proceed. But faith was not yet opposed to knowledge. This philosophy seeks the satisfaction of faith and hope in the pursuit of knowledge itself, in the 'love of wisdom.' To suppose that the firstfruits of this pursuit will be a system of Nature flatly contradicting the religious premisses is to suppose an absurdity. The earliest form of Pythagoreanism must have been a construction of the 'seen order' (*ὁρατὸς κόσμος*) capable of providing for the needs of the unseen.

Any reconstruction of Pythagoras' own system must be largely conjectural.¹ For reasons explained above, the surest method is to consider, first, what beliefs about the nature and relations of God, the soul, and the universe are implied in Pythagoras' known religious doctrines and in the type of society he founded, and then how those beliefs can be connected with his cosmological principles—the theory of 'harmony' and numbers. The two sides of the philosophy—the religious and the scientific—may have begun to drift apart early in the fifth century; it is, indeed, partly the purpose of this paper to show that they did so. Tradition points to a split between the Acousmatics, who may, perhaps, be regarded as the 'old believers' who clung to the religious doctrine, and the Mathematici, an intellectualist or modernist wing,² who, as I believe, developed the number doctrine on rational, scientific lines, and dropped the mysticism. But we cannot admit, in the original sixth-century system, more than a latent undetected inconsistency—not a flagrant contradiction in the central field of interest, the nature and destiny of the soul.

With this proviso, we may start from a consideration of the type of society founded by Pythagoras. The beliefs of a religious community in its earliest stages are externalized in its rule of life, and of the Pythagorean fraternity we know enough to guide us. It was modelled on the mystical cult-society, to which admission was gained by initiation—that is, by purification followed by the revelation of truth. To the Pythagorean 'purification' partly consisted in the observance of ascetic rules of abstinence from certain kinds of food and dress, and partly was reinterpreted intellectually to mean the purification of the soul by *theoria*, the contemplation of the divine order of the world.

¹ Professor Burnet (*Early Greek Philosophy*,³ 1920, p. 92) says 'wholly conjectural'—perhaps too strong an expression. I take this opportunity of acknowledging the debt which, in common

with all students, I owe to Professor Burnet's work.

² For this view of the Acousmatics and Mathematici see A. Delatte, *Études sur la Littérature pythagoricienne*, 1915, p. 29.

'Revelation' consisted in certain truths delivered by the prophet-founder (*αὐτὸς ἔφα*), and progressively elaborated by his followers under his inspiration.¹

The rise of mystical cult-societies or non-social religious groups seems to coincide with the breaking up, in the sixth century, of the old social units based on the theory or fact of blood-kinship. It had also psychological causes: there was a deepening and quickening of religious experience—the revival associated with the name of Orpheus. These two sets of phenomena lead to certain axioms in any philosophy that arises out of them. There is, moreover, among these axioms a latent contradiction: there is a tendency towards monism and a tendency towards dualism.

Take first the monistic tendency. In the old blood group the social bond, the sense of solidarity (*φιλία*), had formerly extended to the limits of the blood-kin (*φίλοι*); beyond were 'strangers,' if not enemies. There had also been a coextensive religious bond in the common worship of some peculiar set of divinities, heroes, or ancestors. The system is naturally polytheistic. The appearance of new religious groups, transcending the limits and ignoring the ties of kinship, is attended by consequences of great importance. On the social side, at least the seed is sown of the doctrine that all men are brothers; the sense of solidarity, set free from the old limits, can spread to include all mankind, and even beyond that to embrace all living things. *φιλία* ceases to mean kinship in the ordinary sense, and begins to mean love. At the same time the social basis of polytheism is undermined. Either monotheism, in some form, must take its place, or at least the belief (essentially true) that the mystery gods worshipped by different groups, whether called Dionysus or Adonis or Attis, are really the same god—one form with many names. There emerges the axiom of Monism: *All life is one and God is one.*²

On the other hand, there is a no less significant change in the psychology of the individual.³ The old solidarity of the blood group had entailed that diffusion of responsibility for the actions of any one member among all the other members which still survives in the vendetta. When collective responsibility goes, individual responsibility is left. The guilt of any action must now attach personally to its author. It cannot be expiated by another, or by the blood group as a whole. The punishment must fall upon the individual, if not in this life, then in the next, or perhaps in a series of lives in this world. When the Pythagoreans reduced justice to the *lex talionis*, the effect was that

¹ The pious attribution of all discoveries to the Founder may be illustrated by a penetrating observation made in another connexion by Bouché-Leclercq (*Astrologie grecque*, Paris, 1899, p. 51). He speaks of 'un fait psychologique, largement démontré par l'histoire de la littérature apocryphe: c'est que toute doctrine qui fait appel à la foi à intérêt à se vieillir, et que les individus qui la développent se gardent bien de donner leurs inventions particulières pour les opinions de leur propre génie. Ils échappent à la discussion en se couvrant d'un amas, aussi

énorme que possible, d'expériences ou de révélations invérifiables.'

² Sext. Emp. *Math.* IX. 127. *οἱ μὲν οὖν περὶ τὸν Πυθαγόραν καὶ τὸν Ἐμπεδοκλέα καὶ τῶν Ἰταλῶν πλῆθος φασὶ μὴ μόνον ἡμῖν πρὸς ἀλλήλους καὶ πρὸς τοὺς θεοὺς εἶναι τινα κοινωνίαν, ἀλλὰ καὶ πρὸς τὰ ἄλογα τῶν ζῴων. Ἐν γὰρ ὑπάρχειν πνεῦμα τὸ διὰ παντὸς τοῦ κόσμου διήκον ψυχῆς τρέπον, τὸ καὶ ἐνοῦν ἡμῶς πρὸς ἐκεῖνα.* The last sentence, though later terms are used, is, I believe, true in substance. Iamb. *V.P.* 108.

³ Cf. G. Glotz, *Solidarité de la Famille*, 1904, p. 587.

it applied to the guilty person only, not to his family. The doctrine of transmigration completes the scheme of justice for the individual soul. The mere idea of reincarnation was no novelty. What is new in transmigration is the moral view that reincarnation expiates some original sin and that the individual soul persists, bearing its load of inalienable responsibility, through a round of lives, till, purified by suffering, it escapes for ever.

Thus, while God becomes one in the inclusive sense of monotheism—in religious terms, the Father,¹ not of this household, clan, or city, but of all mankind and of all living things—and his children become, on their side, one all-inclusive group, conversely the soul acquires a unity in the exclusive sense. The individual becomes a unit, an isolated atom, with a personal sense of sin and a need of personal salvation, compensated, however, by a new consciousness of the soul's dignity and value, expressed in the doctrine that by origin and nature it is divine. From God it came, and to God it will return.

But only on condition of becoming pure. So long as it is imprisoned in the bodily tomb, it is impure, tainted by the evil substance of the body. Psychologically—in terms of actual experience—this means that the soul is profoundly conscious of an internal conflict of good and evil, the war in the members. This conflict dominates religious experience. In philosophical expression, it gives rise to the axiom of Dualism: *In the world, as in the soul, there is a real conflict of two opposite powers—good and evil, light and darkness.*

Both the axiom of Monism and the axiom of Dualism are implicit in the doctrine of transmigration, which was certainly taught by Pythagoras. All souls come from one divine source and circulate in a continuous series of all the forms of life. Each soul, involved in the conflict of good and evil, seeks escape from the purgatorial round of lives and deaths into a better world of unity and rest. Any philosophy that arises from a religion of this type is threatened with internal inconsistency. On the one hand, it will set the highest value on the idea of unity, and, at this stage and long afterwards, the notions of value and of reality coincide. Unity is good; reality must be one. On the other hand, Nature will be construed in terms of the inward conflict of good and evil, appearing in the external world as light and darkness. Light is the medium of truth and knowledge; it reveals the knowable aspect of Nature—the forms, surfaces, limits of objects that are confounded in the unlimited darkness of night. But it is hard to deny reality to the antagonistic power of darkness and evil. Hence the tendency to Dualism—to recognize, not the One only, but two opposite principles.

Now, if we bring this preliminary inference to the test of the Eleatic criticism, it seems to be confirmed. The gist of Parmenides' doctrine is that we must choose between Monism and Dualism. If we assert that the real is one, we cannot logically maintain a dualistic system of Nature. And the particular form of Dualism he attacks is the doctrine that in Nature there are

¹ The Pythagorean term was rather *δεσπότης*— (Euxitheos, *Athen.* IV. 157c).
the father and master of the household, or κύριος

two opposite 'forms'—light and darkness—equally real. So far, then, it appears (1) that the religious experience which underlies the doctrine of transmigration would naturally give rise to a philosophy combining a monistic tendency with a dualistic; and (2) that the latent conflict of these two tendencies is the radical fault found by Parmenides in the Pythagoreanism of his time.

The reconstruction of Pythagoras' system may be approached through the analysis of certain pivotal conceptions which all admit to be characteristic of the Italian tradition. These are: the ideal of 'becoming like God' and the notion of *mimesis*; the correspondence of macrocosm and microcosm; the conception of *harmony*; the doctrine of numbers; the symbol known as the *tetractys*.

Aristoxenus¹ says of Pythagoras and his followers: 'Every distinction they lay down as to what should be done or not done aims at communion (or converse, *ὁμιλία*) with the divine. This is their starting-point; their whole life is ordered with a view to following God (*πρὸς τὸ ἀκολουθεῖν τῷ θεῷ*), and it is the governing principle of their philosophy.' This 'following' or imitation of God was to end in a purification of the soul from the taint of its bodily prison-house so complete that there should be no need of any further reincarnation. Pythagoras was believed to have reached this threshold of divinity²; Empedocles later made the same claim for himself: *ἐγὼ δ' ἑμὶν θεὸς ἄμβροτος, οὐκέτι θνητός*,³ echoed in the Orphic grave tablets, where the dead soul is addressed: 'From a man thou hast become a god.'

The means of rising to this condition was 'philosophy,' the contemplation of the cosmos in which God was contained or embodied. It was assumed, moreover, in sharp contradiction to orthodox Olympian religion, that there was no insuperable gulf between God and the soul, but a fundamental community of nature. The same order (*cosmos*) or structural principle is found on a large scale in the universe and on a small scale in individuals, i.e. those parts of the universe which are themselves wholes, namely living things. The living creature (soul and body) is the individual unit or microcosm; the world, or macrocosm, is likewise a living creature with a body and soul.⁴ Individuals reproduce the whole in miniature; they are not mere fractions, but *analogous parts* of the whole which includes them.

¹ Iambl. *V.P.* 137. Diels, *Vors.* 3. 45 D2. Arius Didymus (?) ap. Stob. *Eth.* VI. 3 Σωκράτης Πλάτων ταῦτὰ τῷ Πυθαγόρᾳ, τέλος ὁμοίωσιν θεοῦ.

² Aristotle, *Frag.* 192 τὸ λογικὸν ζῆν τὸ μὲν ἐστὶ θεός, τὸ δὲ ἄνθρωπος, τὸ δὲ ὅλον Πυθαγόρας.

³ *Frag.* 112. 4. Cf. *Frag.* 146, 147. 'At the last they appear among mortal men as seers, singers, physicians, and leaders of men' (Empedocles was all these), 'and then they spring up as gods highest in honour, sharing the hearth of the other immortals, free from human sorrows, from destiny, and from all harm.'

⁴ The expression 'microcosm' first occurs in

Democritus, *Frag.* 34 ἐν τῷ ἀνθρώπῳ μικρὸν κόσμον ὄντι, but the conception is much older and akin to the astrological premiss of a 'sympathy' between the heavenly bodies and earthly life. See Lobeck, *Aglaophamus*, 1829, Bk. II. chap. ix., p. 908 sqq. Zeller *l.c.*, 1892, p. 419 denies to the Pythagoreans the doctrine of a 'world-soul'; but by that he means 'die Annahme einer Weltseele, als eines besondern, unkörperlich gedachten Wesens.' He admits that the world was 'compared' to a living creature which breathed. His denial that this thought 'influenced' the system (p. 441) is arbitrary.

This relation of the many analogous parts to the including whole is very important. It is implied in the term *μίμησις*, by which, as Aristotle remarks, the Pythagoreans meant the same relation that Plato called 'participation' (*μέθεξις*).¹ In Plato it is the relation of a number of similar individual things to the supersensible Idea whose nature is communicated to them. The things 'participate' in that Idea, but in such a way that the whole Idea is represented in each, and yet not used up by any one. This meaning of *μίμησις* goes back to the original sense of the word. *Μῖμος* means an actor. A whole succession of actors may embody or reproduce a character, say Hamlet; but none of them is identical with Hamlet. Each represents the character, which yet is not used up by any one impersonator. The actor was, in the earliest times, the occasional vehicle of a divine or legendary spirit. In Dionysiac religion this relation subsists between the *thiasos* or group of worshippers and the god who takes possession of them (*κατέχειν*). 'Blessed,' say the chorus in the *Bacchae*,² 'is he whose soul *θιασέυεται*'—is merged in his group, when the whole group is possessed by one spirit, which, not being a fully developed, atomic personality, can alike penetrate the whole group and dwell in each of its members. At that stage 'likeness to God' amounts to temporary identification. Induced by orgiastic means, by Bacchic ecstasy or Orphic sacramental feast, it is a foretaste of the final reunion. In Pythagoreanism the conception is toned down, Apollinized. The means is no longer ecstasy or sacrament, but *theoria*, intellectual contemplation of the universal order, whereby the microcosm comes to reproduce (*μιμείσθαι*) that order more perfectly and becomes *κόσμος*, attuned to the celestial *harmony*.

From the analogy of macrocosm and microcosm certain cosmological premisses follow. The One or All must be perfect (*τέλειον*) and limited. The Unlimited, the *ἄπειρον* which Anaximander had called divine, cannot be reproduced in a miniature whole. To the Pythagorean it is an evil principle of disorder, the opposite of the good principle of Limit. Again, the derivation of the many from the One cannot be merely a splitting of the One into fragmentary parts. It must be such that the nature of the whole can be reproduced in each subordinate whole or analogous part.

The formula of that identical structure which is repeated in the universe and in its analogous parts is *harmony*. This word meant, first, the 'fitting together' or 'adjustment' of parts in a complex whole; then, specially, the 'tuning' of an instrument; and hence the 'musical scale' which results there-

¹ *Met.* A 6. 987b 10 τὴν δὲ μέθεξιν τοῦτομα μόνον μετέβαλεν· οἱ μὲν γὰρ Πυθαγόρειοι μιμήσει τὰ ὅντα φασὶν εἶναι τῶν ἀριθμῶν, Πλάτων δὲ μετέξει. O. Gilbert (*Arch. Gesch. Phil.* XXII. 40 sqq.) rightly urges that *μίμησις*, *ὁμοίωμα*, *ὁμοιοῦν*, etc., imply a relation between two different things, and holds that Pythagoras and his school (I should say, the Pythagoreans other than the 'mathematicians' or number-atomists) did not identify numbers with things in *ihrer stofflichen Grundlage*. At *Met.* 1020b 3 Aristotle uses *μίμημα* for the

plane or solid figure, which is the graphic 'representation' of a number. In this case any number of similar figures can 'represent' the same number.

² Eurip. *Bacch.* 72 ὦ μάκαρ ὅστις εὐδαίμων | τελετὰς θεῶν εἰδὼς | βιοτὰν ἀγιστεύει καὶ | θιασέυεται ψυχὰν | ἐν θρεσσι βακχεύων | ὅσοις καθαρμοῖσι. Cf. A. W. Verrall, *The Bacchantes of Euripides*, 1910 p. 30, who translates, 'whose soul is congregationalized.'

from. There was, from the first, the implication of a *right*, or tune-ful adjustment.

This conception adds to the notion of the mixture of opposites as it occurs in Ionian science, the notions of order, proportion, measure. Each mixture, resulting in a thing, conforms (or ought to conform) to a definite law which characterizes it and distinguishes it from another mixture of the same ingredients. The proportion comes to be regarded as the determining essence of the compound, in which its goodness and reality lie.

This doctrine that the goodness of a compound depends on exact numerical proportions is thus referred to by Aristotle: 'One might raise the question what the virtue ($\tau\acute{o} \epsilon\upsilon$) is that things get from numbers because their composition can be expressed by a number, either by a simple proportion ($\epsilon\upsilon\lambda\omicron\gamma\iota\sigma\tau\omicron\varphi$) or by an odd number. For in fact honey-water is no more wholesome if it is mixed in the proportion of three times three, but it would do more good if it were in no particular proportion but well diluted than if it were numerically expressible but strong.'¹ Though Aristotle's common sense rejects this theory in the case of the wholesomeness of honey-water, he suggests elsewhere a similar view in the case of colours. The multiplicity of colours, over and above black and white, may, he says, be due to differences in the proportion of their composition. The combination of black and white in the intermediate colours may be in the proportion 3 : 2 or 3 : 4 or according to other ratios. Other colours may be compounded in no commensurate proportion, and 'colours may be analogous to concords ($\sigma\upsilon\mu\phi\omega\nu\iota\alpha\iota\varsigma$). Thus, the colours compounded according to the simplest proportions ($\tau\acute{\alpha} \epsilon\nu \acute{\alpha}\rho\iota\theta\mu\omicron\iota\varsigma \epsilon\upsilon\lambda\omicron\gamma\iota\sigma\tau\omicron\iota\varsigma \chi\rho\acute{\omega}\mu\alpha\tau\alpha$), exactly as in the case of concords, will appear to be the most pleasant colours, e.g. purple, crimson, and a few similar species. It is an exactly parallel reason that causes concords to be few in number' (i.e. the 'simplest proportions' are few).²

Aristotle here applies to the explanation of the agreeableness of certain colours the Pythagorean doctrine that the virtue of a compound lies in the exact and simple numerical proportion of the ingredients. The analogy with concords points clearly to the original source of the theory, Pythagoras' discovery that the concordant intervals of the musical scale or *harmony* could be expressed exactly in the terms of the 'simple' ratios, 1 : 2 (octave), 3 : 2 (fifth), and 4 : 3 (fourth), and that, if the smallest whole numbers having these ratios to one another (viz. 6 : 8 : 9 : 12) are taken, the internal terms are the

¹ *Met. N. 6. init.* [Alexander] (*ad loc.*) explains, 'Some Pythagoreans did not hesitate to say that the virtue or good ($\tau\acute{o} \epsilon\upsilon$ *καὶ* $\tau\acute{o} \acute{\alpha}\gamma\alpha\theta\acute{\omicron}\nu$) in everything in this world results from numbers, when the mixture of ingredients is expressed by an even or an odd number, and most of all when the result is perfect and similar ($\tau\epsilon\lambda\epsilon\iota\omicron\nu$ *καὶ* $\theta\upsilon\mu\iota\omicron\nu$) and obtained by multiplication, e.g. 3×3 , not $3 + 3$.' [Alexander] wrongly interprets $\epsilon\upsilon\lambda\omicron\gamma\iota\sigma\tau\omicron\varphi$ to mean *ἀριθμ.* The true meaning is clear from

Ar. *de sens.* 439b 34. $\epsilon\upsilon\lambda\omicron\gamma\iota\sigma\tau\omicron\iota \acute{\alpha}\rho\iota\theta\mu\omicron\iota$ = 'proportions where the division of one term by the other takes very little trouble' (Ross, *ad loc.*), i.e. the simplest proportions.

² *de sensu*, 439b 21. Cf. *Problems* XIX. 35 (920a 27 sqq.): The octave is the most beautiful concord because the terms of the ratio (1 : 2) are whole numbers, and the division leaves no remainder.

means (arithmetic and harmonic) between the extremes. Thus was the principle of *harmony* revealed as an unseen and unheard principle of order and concord, identical with a system of numbers bound together by interlocking ratios. The system, moreover, is limited, both externally by the octave (for the scale ends, as we say, 'on the same note' and begins again in endless recurrence), and internally by the means. The introduction of this system marks out the whole unlimited field of sound, which ranges indefinitely in opposite directions (high and low). The infinite variety of quality in sound is reduced to order by the exact and simple law of ratio in quantity. The system so defined still contains the unlimited element in the blank intervals between the notes; but the unlimited is no longer an orderless continuum; it is confined within an order, a *cosmos*, by the imposition of Limit or Measure.

The mathematical genius of Pythagoras was capable of abstracting this complex of conceptions from the particular case of sound. It must have been by a flash of inspired insight that he saw in it a formula of universal application—the union of the two opposite principles of Limit and the Unlimited to form the Limited. To the microcosm it was immediately applied in the doctrine that the good state of the body (health, strength, beauty) is the proportioned mixture or temperament of the physical opposites, hot and cold, wet and dry, etc. This conception, stated by Alcmaeon,¹ a junior fellow-citizen of Pythagoras at Croton, persists throughout ancient medical theory.

There is no reason to doubt that the application to virtue, the health or good condition of the soul, is equally old. The distinction between soul and body was not so sharply drawn as to prevent the Pythagoreans from practising psychotherapy. As they used charms for physical ailments, so they cured the sick soul by music and the recitation of poetry.² Protagoras in Plato's dialogue treats as a commonplace of educational theory the effect of music in producing *εὐαρμοστία* and *εὐρυθμία* in the soul, and its result, virtuous conduct.³ This was not invented by Plato. The doctrine, indeed, only gave an exact and abstract expression to the popular notion that self-control (*σωφροσύνη*, *κοσμιότης*) is moderation, the imposition of limit or measure upon turbulent passion that runs to excess—a notion that lay at the centre of Greek morality. To say that virtue is *εὐαρμοστία* is only to restate this in terms suggested by the musical discovery of Pythagoras.

Does the doctrine that the soul itself is a *harmony* go back to Pythagoras himself? This is commonly denied on the ground that, if the soul is an *harmony* or *crasis* of the bodily opposites, it cannot survive the dissolution

¹ Alcmaeon, *Frag.* 4 *τὴν δὲ ὕλην τὴν σύμμετρον τῶν ποιῶν κρᾶσιν.* Plato, *Symp.* 186 D.

² Iambli. *V.P.* 164.

³ *Protag.* 326 A *πρὸς δὲ τούτοις, ἐπειδὴν κιθαρίζειν μάθωσιν (οἱ νέοι), ἄλλων αὖ ποιητῶν ἀγαθῶν ποιήματα διδάσκουσι μελοποιῶν, εἰς τὰ κιθαρίσματα ἐντείνοντες, καὶ τοὺς ῥυθμούς τε καὶ ἁρμονίας ἀναγκάζουσιν οἰκεῖσθαι ταῖς ψυχαῖς τῶν παίδων, ἵνα ἡμερώτεροί τε ᾖσι*

καὶ εὐρυθμότεροι καὶ εὐαρμοστώτεροι γιγνόμενοι χρήσιμοι ᾧσιν εἰς τὸ λέγειν τε καὶ πράττειν· πᾶς γὰρ ὁ βίος τοῦ ἀνθρώπου εὐρυθμίας τε καὶ εὐαρμοστίας δεῖται. Cf. Eryximachus in *Sympos.* 187 D. *ἀλλ' ἐπειδὴν δὲ πρὸς τοὺς ἀνθρώπους καταχρῆσθαι ῥυθμῷ τε καὶ ἁρμονίᾳ . . . χρώμενον ὀρθῶς τοῖς πεποιημένοις μέλεσι τε καὶ μέτροις, ὃ δὴ παιδεία ἐκλήθη . . .*

of the body: the doctrine is inconsistent with transmigration or any form of survival.¹ This is, of course, the argument urged by Simmias in the *Phaedo* (85E and 92); but the inconsistency does not seem to have been perceived by Philolaus, whom the young Simmias had heard at Thebes. There is no doubt that Philolaus held both that the soul is, in some sense, a *harmony* and that it is immortal.² If Philolaus felt no inconsistency, it is still less likely that the earliest Pythagoreans would have been aware of any. It is probable that the objection was first raised by Plato; and his argument apparently was not accepted as conclusive, for Aristotle speaks of $\psi\upsilon\chi\eta\ \acute{\alpha}\rho\mu\omicron\nu\acute{\iota}\alpha$ as an opinion that has been 'handed down' ($\pi\alpha\rho\alpha\delta\acute{\epsilon}\delta\omicron\tau\alpha\iota$) and that 'commends itself to many minds as readily as any of those previously mentioned.'³

I believe that this is precisely one of those cases where, as concepts come to be more clearly defined, inconsistencies, real or apparent, are brought to light. If, like Simmias, we think of the soul as strictly analogous to the $\acute{\alpha}\rho\mu\omicron\nu\acute{\iota}\alpha$ (tuning) of a lyre, the last thing that is added after the framework of the lyre has been put together, it will be the first thing to perish when the lyre is broken.⁴ But did the Pythagoreans think of it so? A *harmony*, as we have seen, is a system of numbers linked by ratios, and numbers are the ultimate reality of things that embody them. Numbers themselves were not, according to our conception, immaterial. The system of numbers which is the soul-*harmony* could be conceived as an organizing principle, which would, in Anaximenes' phrase, 'hold together' ($\sigma\upsilon\gamma\kappa\rho\alpha\tau\acute{\epsilon}\omega$) the body. A system of numbers and ratios would not cease to exist when the body was dissolved, any more than a musical scale perishes when a lyre is broken. This 'invisible and bodiless thing, altogether lovely and divine,' as Simmias calls it, 'of the same nature as the divine and immortal,' could be imagined (vaguely, it is true) as a principle that would survive the destruction of any particular instrument or body, and perhaps organize a series of bodies, consistently with transmigration.

But, as Zeller points out,⁵ it is only Plato (in the *Phaedo*) and Aristotle (who, at *de anim.* a iv., is clearly thinking of the *Phaedo* and is moreover assuming his own doctrine of the $\sigma\acute{\iota}\nu\theta\epsilon\sigma\iota\varsigma$ of simple bodies in compounds, Hicks *ad loc.*) who speak of the soul-*harmony* as a *harmony of the bodily opposites*. We are nowhere told that the Pythagoreans so defined it, and it is this definition that entails the inconsistency with immortality. Zeller accordingly infers that Philolaus cannot have meant a *harmony* of bodily opposites, but more probably held the view attributed to him by Claudianus Mamertus, that the soul is *connected* with the body by means of number and *harmony*.⁶ Add to

¹ Professor Burnet, who uses this argument, is hardly entitled to do so, since he regards inconsistency between religious and scientific beliefs as normal in the presocratic philosophers. *Early Greek Philosophy*³, 295. Cf. p. 250 'All through this period there seems to have been a gulf between men's religious beliefs, if they had any, and their cosmological views.'

² Cf. Rohde, *Psyché*² II, 169.

³ *de anim.* a 4, init.

⁴ *Phaedo*, 92b.

⁵ *Phil. d. Gr.* I⁵, 445.

⁶ Claud. Mam. II. 7 (*Vors.* I. 320): anima inditur corpori per numerum et immortalem eandemque incorporealem conuenientiam.

this Aristotle's own observation that the notion of *harmony* as a mixture or blending of bodily opposites is 'more suitably applied to health and the bodily excellences generally¹ than it is to the soul' (*de anim.* i iv, 4). The notion had in fact been so applied by Alcmaeon. This obvious truth leads to the inference that for Philolaus the proper terms composing the soul-harmony were not the bodily opposites. What, then, were they?

Plato himself, in another context saturated with Pythagorean conceptions, answers this question clearly. In his peroration on the nature of justice at *Rep.* 443c, Socrates says that justice is not a matter of outward, but of inward behaviour. It is attained when a man does not allow the three 'kinds in his soul' to interfere with one another, but has in the fullest sense put his own house in order, become master of himself, *καὶ κοσμήσαντα καὶ φίλον γενόμενον ἑαυτῷ καὶ συναρμόσαντα τρία ὄντα (τὰ ἐν τῇ ψυχῇ γένη), ὥσπερ ὄρους τρεῖς ἀρμονίας ἀτεχνῶς,² νεάτης τε καὶ ὑπάτης καὶ μέσης, καὶ εἰ ἄλλα ἅττα μεταξὺ τυγχάνει ὄντα, πάντα ταῦτα συνδήσαντα καὶ παντάπασιν ἓνα γενόμενον ἐκ πολλῶν, σῶφρονα καὶ ἡρμოსμένον*, then proceeds to act accordingly. Here the three terms of the soul harmony are the three 'kinds' or parts of the soul, *λογιστικόν, θυμοειδές, ἐπιθυμητικόν*. When these are rightly tuned in consonance, the man is *ἡρμოსμένος* or virtuous. He has *σωφροσύνη*, that inward *ὁμόνοια* or *χείρονος καὶ ἀμείνονος κατὰ φύσιν συμφωνία* ὅποτερον δεῖ ἄρχειν, the virtue which in the State δι' ὅλης ἀτεχνῶς τέταται διὰ πασῶν παρεχόμενη συνδόντας τοὺς τε ἀσθενε-στατούς ταυτὸν καὶ τοὺς ἰσχυροτάτους καὶ τοὺς μέσους (432A).³

That the doctrine of the three parts of the soul goes back to Pythagoras himself we are told on the authority of Poseidonius, who, as Professor Burnet says, was 'not likely to have been mistaken on such a point.'⁴ Pythagoras must, indeed, have thought of the soul as in some sense divided into at least two parts. This follows from the central religious experience of the divided self, the internal warfare between good and evil, the Orphic double nature of man, the sense of sin combined with the consciousness of inward good and light taking part against inward evil and darkness. And with this must go also the possibility of internal reconciliation and concord, when the man, as Plato says, becomes *φίλος ἑαυτῷ* and *εἰς ἐκ πολλῶν*. If virtue is this concord

¹ The Pythagoreans regularly grouped *ισχύς* and *κάλος* with *ὕγεια*.

² *ἀτεχνῶς*, as elsewhere, implies that Plato is taking a current phrase and justifying it 'in the literal sense.' So *Soph.* 246a ταῖς χερσὶν ἀτεχνῶς πέτρας καὶ ὄρου περιλαμβάνοντες (of the materialists).

³ Plutarch (*Plat. Qu.* 9) debates whether τὸ λογιστικόν or τὸ θυμοειδές is the middle term of the three. On the latter view, αἰτὴ ἡ τάξις καὶ τὴν τῶν συμφωνιῶν ἀναλογίαν φυλάσσει, τοῦ μὲν θυμοειδοῦς πρὸς τὸ λογιστικόν ὡς ὑπάτην τὸ διὰ τεσσάρων, πρὸς δὲ τὸ ἐπιθυμητικόν ὡς νῆτην τὸ διὰ πέντε, τοῦ δὲ λογιστικοῦ πρὸς τὸ ἐπιθυμητικόν ὡς ὑπάτη πρὸς νῆτην τὸ διὰ πασῶν. On the former, ἡ τοῦ λόγου δύναμις ἀντιλαμβανόμενη κινουμένων ἀλόγως τῶν παθῶν καὶ

συναρμόττονσα περὶ αὐτὴν εἰς τὸ μέτρον ἐλλείψους καὶ ὑπερβολῆς μεσότητα καθίσταται. Proclus (*in rep.* I. 212 Kroll) gives *θυμός*, as middle term, the ratios διὰ πέντε to λόγος and διὰ τεσσάρων to ἐπιθυμία. As the διὰ πέντε is, according to the Pythagoreans, 'more of a συμφωνία' than the διὰ τεσσάρων, so there is a better concord between *θυμός* and λόγος than between *θυμός* and ἐπιθυμία.

⁴ Burnet, *Phaedo*, 1911, note on 68c, where the passages cited by Zeller (I⁵, 447) are quoted. Professor Burnet also points out that the doctrine of the tripartite soul agrees with the Pythagorean apologue of the Three Lives, compared to the three classes of men who go to Olympia (1) *θέας ἕνεκα*, (2) to compete (*δῆξα*), (3) to buy and sell (*κέρδος*). Iambl. *V.P.* 58.

(*συμφωνία*) or peace of the soul gained by the mastery of passion and animal desire, what could be more natural to the Pythagorean mathematico-musical mode of thought than to conceive the soul itself as the *ἁρμονία*, and the parts of the soul as the terms to be harmonized and brought into concord?

The apologue of the Three Lives implies three parts of the soul, not merely two. The main division into rational and irrational is ascribed by Plutarch to Pythagoras (*Plac.* iv. 7, 5; *Dox.* 393). But besides this, there are clear indications in Plato and Aristotle that the three parts of the human soul correspond to the three orders of living beings: *θεοί, ἄνθρωποι, τὰ ἄλογα τῶν ζώων*. Man is the intermediate nature between the gods above him and the beasts below,¹ the meeting-point of both. This doctrine manifestly underlies the popular psychology which Aristotle adopts for the purposes of ethical discussion, though it is not his own (*Ethics* a xiii). He has already mentioned the Three Lives: (1) the *θεωρητικός*, which is finally found to be *κρείττων ἢ κατ' ἄνθρωπον* and to be led by man not *ἢ ἄνθρωπος*, ἀλλ' *ἢ θεῖόν τι ἐν αὐτῷ ὑπάρχει*, for *νοῦς* is *θεῖον* (κ vii, 8); (2) the *πολιτικός* which gives scope for the strictly *ἀνθρωπικαὶ ἀρεταί* (κ viii, 1); and (3) the *ἀπολαυστικός*, which is *βοσκημάτων βίος* (α v, 3), and belongs to *τὸ ἄλογον* or *τὸ φυτικόν*, whose excellence is *κοινή τις καὶ οὐκ ἀνθρωπική* (α xiii, 12). Thus between the divine part and the bestial (*τὸ θηριώδες*, *Rep.* 571c) lies the 'composite' nature (*τὸ σύνθετον*, *Ethics* κ vii, 8), that distinctively human part which 'is irrational, but has some part in reason,' and, in the divided self, struggles against reason, yet is capable of obeying the divine ruling part. In the *σώφρων καὶ ἀνδρεῖος* it is docile, so that *πάντα ὁμοφωνεῖ τῷ λόγῳ* (*Ethics* a xiii, 17). In all this, of course, Aristotle is for the moment following Plato, and Plato, if Poseidonius is right, was following Pythagoras. The fact that the correspondence of the three parts of the soul to the three orders of living beings is constantly alluded to by Plato and Aristotle, without being explicitly laid down, points to its being an earlier doctrine.²

I conclude, then, that there is good reason to regard *ψυχὴ ἁρμονία*, thus interpreted, as an original Pythagorean doctrine. Indeed, if virtue is a *συμφωνία*, I do not see how the soul can be anything but the *ἁρμονία* which contains it. It was, moreover, because the human soul contained both the divine and the irrational parts that it could, if purified, become wholly divine, or, if still impure, sink into the lower forms of life. So far from contradicting transmigration, the doctrine of the tripartite soul, under the image of the charioteer and his horses, is seen in the *Phaedrus* as part of the scheme of transmigration. The sense given to *ψυχὴ ἁρμονία* by Simmias in the *Phaedo* is quite different. Not that it is necessarily incompatible with the other. It is possible to regard the soul both as the vital principle which, during earthly life, maintains a healthy balance of the opposite elements in the body, and

¹ Cf. *Ar. Pol.* a i, 12. The unsocial man is *ἢ θηρίον ἢ θεός*.

² See, e.g. Plato, *Rep.* 589c. It passes on into

later literature, e.g. Hermes (*Stob. Eccl.* I. 323 W) *ἰδέαι δὲ ψυχῶν· θεία, ἀνθρωπίνη, ἄλογα*.

also, in its other aspect, as a *harmony* of its own three parts, with its own peculiar concord, virtue. When disembodied, it would temporarily lose the former function, but would remain a *harmony* in the second sense, more or less well tuned according as it departs this life more or less 'pure.'¹

The fact is that in dealing with the doctrine of the soul in philosophies of the religious type, we are dealing with a thing that exists, as it were, upon two different planes—the spiritual plane and the natural. On the natural plane the soul acts as a vital principle, distinguishing organic living things from mere casual inorganic masses of matter. In that aspect it is conceived in Pythagorean mathematico-musical terms as a *harmony* or ratio, expressible in numbers. It is the element of proportion in an ordered compound. But on the spiritual plane, it is itself a compound of good and evil parts—of the element of limit, order, proportion, reason, and the disorderly unlimited element of irrational passion. So considered, it is a permanent immortal thing. The question how exactly this spiritual thing is related to the vital principle which distinguishes a living from a dead body is a question that might be put to any modern believer in immortality without the expectation of any very clear and precise answer.

The other argument urged in the *Phaedo* against *ψυχὴ ἁρμονία* seems to be fallacious. It is that, if you say that the soul is a *harmony*, you must not also say that virtue is a *harmony*, for then, in the virtuous soul, you would have a *harmony* of a *harmony*. The answer is simple: *harmony* is ambiguous.² It may mean merely an adjustment, or a tuneful adjustment. A lyre that is out of tune (*ἄναρμωστῆι*)³ is still adjusted, though wrongly. Virtue is not so much *ἁρμονία* as *εὐαρμωστία*; vice is *ἄναρμωστία*. The virtuous soul is the well-tuned adjustment; the vicious, the ill-tuned. No doubt, a strictly logical and literal consideration will discover what seem to us to be obscurities and even contradictions in the conception. But the greater, in that case, the

¹ Professor Burnet, in his valuable lecture, *The Socratic Doctrine of the Soul* (Proc. Brit. Acad. 1915-16, p. 252), dismisses the Pythagoreans in two sentences as having been led by their musical and medical studies to regard the soul as 'a "blend" (*κρᾶσις*) or "attunement" (*ἁρμονία*) of the elements which compose the body, of which, therefore, it is merely a function.' The fallacy of Professor Burnet's method of examining the usages of *ψυχή* in sixth and fifth century literature in order to show that the notion of 'caring for one's soul' originated with Socrates, lies in ignoring the fact that the Pythagoreans have left us no literature before Philolaus. If they had left writings of a religious or moral character, it may safely be affirmed that they would have contained this notion, and probably the appropriate use of *ψυχή*. The notion is manifestly implied in the whole way of life or *φιλοσοφία* of a religious fraternity which teaches the achievement of immortality by means of purification, and practises asceticism, daily

self-examination, and so forth. I cannot follow Professor Burnet's view that the Orphic or Empedoclean migrating fallen soul was dissociated from the 'rest of the personality' or 'what we call "I."' When Empedocles said of the fallen *δαίμονες* 'τῶν καὶ ἐγὼ νῦν εἰμι' (115, 13), when he said 'ἦδη γὰρ ποτ' ἐγὼ γενέσθην κοῦρός τε κόρη τε θάμνος τε, κ.τ.λ. (117), did he dissociate this *ἐγὼ* from the rest of his 'personality' (whatever the Greek for that may be) or from 'what we call "I"'? The value of Professor Burnet's paper lies in his proof that Socrates introduced the 'care of the soul' to his contemporaries at Athens. But that he originated the notion is not proved.

² Hence the doctrine vacillated: πολλοὶ φασὶ τῶν σοφῶν οὐ μὲν ἁρμονίαν εἶναι τὴν ψυχὴν, οὐ δὲ ἔχειν ἁρμονίαν, *Ar. Pol.* 1340b 17.

³ Plato, *Gorg.* 482b. καὶ τὴν λύραν μοι κρείττον εἶναι ἄναρμωστῆιν τε καὶ διαφωνεῖν . . . μᾶλλον ἢ ἔνα δντα ἐμὲ ἑμαυτῷ ἀσύμφωνον εἶναι καὶ ἐναντία λέγειν.

likelihood that it did not date from the end of the fifth century, when men were thinking much more clearly than they had a hundred years earlier.¹

The reason for supposing that the doctrine $\psi\upsilon\chi\eta\grave{\alpha}\ \acute{\alpha}\rho\mu\omicron\nu\acute{\iota}\alpha$ goes back to Pythagoras is that it seems to follow from the correspondence of macrocosm and microcosm and to be required by the fundamental conception of the imitation of God, considered as the tuning of the soul into consonance with the celestial *harmony*, which alone will manifest $\epsilon\upsilon\alpha\rho\mu\omicron\sigma\tau\acute{\iota}\alpha$ in perfection. 'The whole Heaven is *harmony* and number.' The macrocosm is a living creature with a soul, or principle of life, and a body. It is an easy inference that the soul of the world is a *harmony* or system of numbers (as it is described by the Pythagorean Timaeus in Plato)—that very *harmony* which is manifest to sense in the order of the heavenly bodies and is to be reproduced in the attunement of the individual soul.

F. M. CORNFORD.

TRINITY COLLEGE, CAMBRIDGE.

¹ There is the same confusion and obscurity about the $\lambda\omicron\gamma\omicron\varsigma\ \tau\eta\varsigma\ \mu\acute{\iota}\xi\epsilon\omega\varsigma$ of Empedocles, which Aristotle suggests that he identified with $\acute{\alpha}\rho\mu\omicron\nu\acute{\iota}\alpha$ καὶ $\psi\upsilon\chi\eta$ (*de anim.* a 4, 408a 13 sqq.). I believe that Empedocles' physical doctrine of the nature of soul was consistent (to his mind) with trans-

migration. See *From Religion to Philosophy*, 1912, p. 239. Since the peculiar features of Empedocles' physical system can only be explained by the desire to accommodate his religious doctrines, the common view that the religion and science are incompatible must be rejected.

(To be continued.)