CHAPTER II., SCIENCE AND RELIGION

32. Ionia and the West

THE spirit of the Ionians in Asia was, as we have seen, thoroughly secular; and, so far as we can judge, the Milesians wholly ignored traditional beliefs. Their use of the term "god" for the primary substance and the innumerable worlds had no religious significance.[1] It was different in the Aegean islands, which had been the home of the Ionians long before the Anatolian coasts were open to colonisation, and where there were many memories of a remote past. These seem to have centred round the sanctuary of Delos, and the fragments of Pherekydes, who belonged to the neighbouring island of Syros, read like belated utterances of an earlier age.[2] No doubt it was also different in the Chalkidian and Ionian colonies of the West, which were founded at a time when Hesiod and his followers still held unchallenged authority.

Now Pythagoras and Xenophanes, the most striking figures of the generation that saw the Greek cities in Asia become subject to Persia, were both Ionians, but both spent the greater part of their lives in the West. There it was no longer possible to ignore religion, especially when reinforced by the revival that now swept over the Greek world. Henceforth the leaders of enlightenment must either seek to reform and deepen traditional religion, like Pythagoras, or oppose it openly, like Xenophanes.

33. The Delian Religion

The revival was not, however, a mere recrudescence of the old Aegean religion, but was profoundly influenced by the diffusion of certain ideas originating in what was then the far North. The temple legend of Delos is certainly ancient, and it connects the worship of Apollo with the Hyperboreans, who were thought of as living on the banks of the Danube.[3] The "holy things wrapped in straw," which were passed on from people to people till they reached Delos by way of the head of the Adriatic, Dodona, and the Malian Gulf,[4] bear witness to a real connexion between the Danubian and Aegean civilisations at an early date, and it is natural to associate this with the coming of the Achaians. The stories of Abaris the Hyperborean[5] and Aristeas of Prokonnesos[6] belong to the same religious movement and prove that it was based on a view of the soul which was new; so far as we can see, in the Aegean. Now the connexion of Pythagoras with Delos is well attested, and it is certain that he founded his society in cities which gloried in the Achaian name. If the Delian religion was really Achaian, we have a clue to certain things in the life of Pythagoras which are otherwise puzzling. We shall come back to these later.[7]

34. Orphicism

It was not, however, in its Delian form that the northern religion had most influence. In Thrace it had attached itself to the wild worship of Dionysos, and was associated with the name of Orpheus. In this religion the new beliefs were mainly based on the phenomenon of "ecstasy" (ἔκστασις, "stepping out"). It was supposed that it was only when "out of the body" that the soul revealed its true nature. It was not merely a feeble double of the self, as in Homer, but a fallen god, which might be restored to its high estate by a system of "purifications" (καθαρμοί) and sacraments (ὄργια). In this form, the new religion made an immediate appeal to all sorts and conditions of men who could not find satisfaction in the worship of the secularised anthropomorphic gods of the poets and the state religions.

The Orphic religion had two features which were new in Greece. It looked to a written revelation as the source of religious authority, and its adherents were organised in communities, based, not on any real or supposed tie of blood, but on voluntary adhesion and initiation. Most of the Orphic literature that has come down to us is of late date and uncertain origin, but the thin gold plates, with Orphic verses inscribed on them, discovered at Thourioi and Petelia take us back to a time when Orphicism was still a living creed.[8] From them we learn that it had some striking resemblances to the beliefs prevalent in India about the same time, though it is really impossible to assume any Indian influence in Greece at this date.[9] In any case, the main purpose of the Orphic observances and rites was to release the soul from the "wheel of birth," that is, from reincarnation in animal or vegetable forms. The soul so released became once more a god and enjoyed everlasting bliss.

35. Philosophy as a Way of Life

The chief reason for taking account of the Orphic communities here is that their organisation seems to have suggested the idea that philosophy is above all a "way of life." In Ionia, as we have seen, φιλοσοφία meant something like "curiosity," and from that use of it the common Athenian sense of "culture," as we find it in Isokrates, seems to have been derived. On the other hand, wherever we can trace the influence of Pythagoras, the word has a far deeper meaning. Philosophy is itself a "purification" and a way of escape from the "wheel." That is the idea so nobly expressed in the *Phaedo*, which is manifestly inspired by Pythagorean doctrine.[10] This way of regarding philosophy is henceforth characteristic of the best Greek thought. Aristotle is as much influenced by it as any one, as we may see from the Tenth Book of the *Ethics*, and as we should see still more clearly if we possessed his Προτρεπτικός in its entirety.[11] There was a danger that this attitude should degenerate into mere quietism and "other-worldliness," a danger Plato saw and sought to avert. It was he that insisted on philosophers taking their turn to descend once more into the Cave to help their former fellow-prisoners.[12] If the other view ultimately prevailed, that was hardly the fault of the philosophers

36. Relation of Religion and Philosophy

Science, then, became a religion, and to that extent it is true that philosophy was influenced by religion. It would be wrong, however, to suppose that even now philosophy took over any particular doctrines from religion. The religious revival implied, we have seen, a new view of the soul, and we might expect to find that it profoundly influenced the teaching of philosophers on that subject. The remarkable thing is that this did not happen. Even the Pythagoreans and Empedokles, who took part in the religious movement themselves, held views about the soul which flatly contradicted the beliefs implied in their religious practices.[13] There is no room for an immortal soul in any philosophy of this period, as we shall see. Sokrates was the first philosopher to assert the doctrine on rational grounds,[14] and it is significant that Plato represents him as only half serious in appealing to the Orphics for confirmation of his own teaching.[15]

The reason is that ancient religion was not a body of doctrine. Nothing was required but that the ritual should be performed correctly and in a proper frame of mind; the worshipper was free to give any explanation of it he pleased. It might be as exalted as that of Pindar and Sophokles or as debased as that of the itinerant mystery-mongers described in Plato's Republic. "The initiated," said Aristotle, "are not supposed to learn anything, but to be affected in a certain way and put into a certain frame of mind."[16] That is why the religious revival could inspire philosophy with a new spirit, but could not at first graft new doctrines on it.

I. PYTHAGORAS OF SAMOS

37. Character of the Tradition

It is not easy to give any account of Pythagoras that can claim to be regarded as historical. The earliest reference to him, indeed, is practically a contemporary one. Some verses are quoted from Xenophanes in which we are told that Pythagoras once heard a dog howling and appealed to its master not to beat it, as he recognised the voice of a departed friend .[17] From this we know that he taught the doctrine of transmigration. Herakleitos, in the next generation, speaks of his having carried scientific investigation (ἱστορίη) further than any one, though he made use of it for purposes of imposture.[18] Later, though still within the century, Herodotos[19] speaks of him as "not the weakest scientific man (σοφιστής) among the Hellenes," and he says he had been told by the Greeks of the Hellespont that the legendary Scythian Salmoxis had been a slave of Pythagoras at Samos. He does not believe that; for he knew Salmoxis lived many years before Pythagoras. The story, however, is evidence that Pythagoras was well known in the fifth century, both as a scientific man and as a preacher of immortality. That takes us some way.

Plato was deeply interested in Pythagoreanism, but he is curiously reserved about Pythagoras. He only mentions him once by name in all his writings, and all we are told then is that he won the affections of his followers in an unusual degree (διαφερόντως ἠγαπήθη) by teaching them a "way of life," which was still called Pythagorean.[20] Even the Pythagoreans are only once mentioned by name, in the passage where Sokrates is made to say that they regard music and astronomy as sister sciences.[21] On the other hand, Plato tells us a good deal about men whom we know from other sources to have been Pythagoreans, but he avoids the name. For all he says, we should only have been able to guess that Echekrates and Philolaos belonged to the school. Usually Pythagorean views are given anonymously, as those of "ingenious persons" (κομψοί τινες) or the like, and we are not even told expressly that Timaios the Lokrian, into whose mouth Plato has placed an unmistakably Pythagorean cosmology, belonged to the society. We are left to infer it from the fact that he comes from Italy. Aristotle imitates his master's reserve in this matter. The name of Pythagoras occurs only twice in the genuine works that have come down, to us. In one place we are told that Alkmaion was a young man in the old age of Pythagoras,[22] and the other is a quotation from Alkidamas to the effect that "the men of Italy honoured Pythagoras."[23] Aristotle is not so shy of the word "Pythagorean" as Plato, but he uses it in a curious way. He says such things as "the men of Italy who are called Pythagoreans,"[24] and he usually refers to particular doctrines as those of "some of the Pythagoreans." It looks as if there was some doubt in the fourth century as to who the genuine Pythagoreans were. We shall see why as we go on.

Aristotle also wrote a special treatise on the Pythagoreans which has not come down to us, but from which quotations are found in later writers. These are of great value, as they have to do with the religious side of Pythagoreanism.

The only other ancient authorities on Pythagoras were Aristoxenos of Taras, Dikaiarchos of Messene, and Timaios of Tauromenion, who all had special opportunities of knowing something about him. The account of the Pythagorean Order in the *Life of Pythagoras* by Iamblichos is based mainly on Timaios,[25] who was no doubt an uncritical historian, but who had access to information about Italy and Sicily which makes his testimony very valuable when it can be recovered. Aristoxenos had been personally acquainted with the last generation of the Pythagorean society at Phleious. It is evident, however, that he wished to represent Pythagoras simply as a man of science, and was anxious to refute the idea that he was a religious teacher. In the same way, Dikaiarchos tried to make out that Pythagoras was simply a statesman and reformer.[26]

When we come to the Lives of Pythagoras, by Porphyry, Iamblichos, and Diogenes Laertios,[27] we find ourselves once more in the region of the miraculous. They are based on authorities of a very suspicious character,[28] and the result is a mass of incredible fiction. It would be quite wrong, however,

to ignore the miraculous elements in the legend of Pythagoras; for some of the most striking miracles are quoted from Aristotle's work on the Pythagoreans[29] and from the *Tripod* of Andron of Ephesos,[30] both of which belong to the fourth century B.C., and cannot have been influenced by Neopythagorean fancies. The fact is that the oldest and the latest accounts agree in representing Pythagoras as a wonder-worker; but, for some reason, an attempt was made in the fourth century to save his memory from that imputation. This helps to account for the cautious references of Plato and Aristotle, but its full significance will only appear later.

38. Life of Pythagoras

We may be said to know for certain that Pythagoras passed his early manhood at Samos, and was the son of Mnesarchos;[31] and he "flourished," we are told, in the reign of Polykrates (532 B.C.).[32] This date cannot be far wrong; for Herakleitos already speaks of him in the past tense.[33]

The extensive travels attributed to Pythagoras by late writers are, of course, apocryphal. Even the statement that he visited Egypt, though far from improbable if we consider the close relations between Polykrates of Samos and Amasis, rests on no sufficient authority.[34] Herodotos, it is true, observes that the Egyptians agreed in certain practices with the rules called Orphic and Bacchic, which are really Egyptian, and with the Pythagoreans;[35] but this does not imply that the Pythagoreans derived these directly from Egypt. He says also that the belief in transmigration came from Egypt, though certain Greeks, both at an earlier and a later date, had passed it off as their own. He refuses, however, to give their names, so he can hardly be referring to Pythagoras.[36] Nor does it matter; for the Egyptians did not believe in transmigration at all, and Herodotos was deceived by the priests or the symbolism of the monuments.

Aristoxenos said that Pythagoras left Samos in order to escape from the tyranny of Polykrates.[37] It was at Kroton, a city which had long been in friendly relations with Samos and was famed for its athletes and its doctors,[38] that he founded his society. Timaios appears to have said that he came to Italy in 529 B.C. and remained at Kroton for twenty years. He died at Metapontion, whither he had retired when the Krotoniates rose in revolt against his authority.[39]

39. The Order

The Pythagorean Order was simply, in its origin, a religious fraternity, and not, as has been maintained, a political league.[40] Nor had it anything whatever to do with the "Dorian aristocratic ideal." Pythagoras was an Ionian, and the Order was originally confined to Achaian states.[41] Moreover the "Dorian aristocratic ideal" is a fiction based on the Sokratic idealisation of Sparta and Crete. Corinth, Argos, and Syracuse are quite forgotten. Nor is there any evidence that the Pythagoreans favoured the

aristocratic party.[42] The main purpose of the Order was the cultivation of holiness. In this respect it resembled an Orphic society, though Apollo, and not Dionysos, was the chief Pythagorean god. That is doubtless due to the connexion of Pythagoras with Delos, and explains why the Krotoniates identified him with Apollo Hyperboreios.[43]

40. Downfall of the Order

For a time the new Order succeeded in securing supreme power in the Achaian cities, but reaction soon came. Our accounts of these events are much confused by failure to distinguish between the revolt of Kylon in the lifetime of Pythagoras himself, and the later risings which led to the expulsion of the Pythagoreans from Italy. It is only if we keep these apart that we begin to see our way. Timaios appears to have connected the rising of Kylon closely with the events which led to the destruction of Sybaris (510 B.C.). We gather that in some way Pythagoras had shown sympathy with the Sybarites, and had urged the people of Kroton to receive certain refugees who had been expelled by the tyrant Telys. There is no ground for the assertion that he sympathised with these refugees because they were "aristocrats"; they were victims of a tyrant and suppliants, and it is not hard to understand that the Ionian Pythagoras should have felt a certain kindness for the men of the great but unfortunate Ionian city. Kylon, who is expressly stated by Aristoxenos to have been one of the first men of Kroton in wealth and birth,[44] was able to bring about the retirement of Pythagoras to Metapontion, another Achaian city, and it was there that he passed his remaining years.

Disturbances still went on, however, at Kroton after the departure of Pythagoras for Metapontion and after his death. At last, we are told, the Kyloneans set fire to the house of the athlete Milo, where the Pythagoreans were assembled. Of those in the house only two, who were young and strong, Archippos and Lysis, escaped. Archippos retired to Taras, a democratic Dorian state; Lysis, first to Achaia and afterwards to Thebes, where he was later the teacher of Epameinondas.[45] It is impossible to date these events accurately, but the mention of Lysis proves that they were spread over more than one generation. The *coup d'Etat* of Kroton can hardly have occurred before 450 B.C., if the teacher of Epameinondas escaped from it, nor can it have been much later or we should have heard of it in connexion with the foundation of Thourioi in 444 B.C. In a valuable passage, doubtless derived from Timaios, Polybios tells us of the burning of the Pythagorean "lodges" (συνέδρια) in all the Achaian cities, and the way in which he speaks suggests that this went on for a considerable time, till at last peace and order were restored by the Achaians of Peloponnesos.[46] We shall see that at a later date some of the Pythagoreans were able to return to Italy, and once more acquired great influence there.

41. Want of Evidence as to the Teaching of Pythagoras

Of the opinions of Pythagoras we know even less than of his life. Plato and Aristotle clearly knew nothing for certain of ethical or physical doctrines going back to the founder himself.[47] Aristoxenos gave a string of moral precents.[48] Dikaiarchos said hardly anything of what Pythagoras taught his disciples was known except the doctrine of transmigration, the periodic cycle, and the kinship of all living creatures.[49] Pythagoras apparently preferred oral instruction to the dissemination of his opinions by writing, and it was not till Alexandrian times that any one ventured to forge books in his name. The writings ascribed to the first Pythagoreans were also forgeries of the same period.[50] The early history of Pythagoreanism is, therefore, wholly conjectural; but we may still make an attempt to understand, in a very general way, what the position of Pythagoras in the history of Greek thought must have been.

42. Transmigration

In the first place, as we have seen,[51] he taught the doctrine of transmigration.[52] Now this is most easily to be explained as a development of the primitive belief in the kinship of men and beasts, a view which Dikaiarchos said Pythagoras held. Further, this belief is commonly associated with a system of taboos on certain kinds of food, and the Pythagorean rule is best known for its prescription of similar forms of abstinence. It seems certain that Pythagoras brought this with him from Ionia. Timaios told how at Delos he refused to sacrifice on any but the oldest altar, that of Apollo the Father, where only bloodless sacrifices were allowed.[53]

43. Abstinence

It has indeed been doubted whether we can accept what we are told by such late writers as Porphyry on the subject of Pythagorean abstinence. Aristoxenos undoubtedly said Pythagoras did not abstain from animal flesh in general, but only from that of the ploughing ox and the ram.[54] He also said that Pythagoras preferred beans to every other vegetable, as being the most laxative, and that he was partial to sucking-pigs and tender kids.[55] The palpable exaggeration of these statements shows, however, that he is endeavouring to combat a belief which existed in his own day, so we can show, out of his own mouth, that the tradition which made the Pythagoreans abstain from animal flesh and beans goes back to a time long before the Neopythagoreans. The explanation is that Aristoxenos had been the friend of the last of the Pythagoreans; and, in their time, the strict observance had been relaxed, except by some zealots whom the heads of the Society refused to acknowledge.[56] The "Pythagorists" who clung to the old practices were now regarded as heretics, and it was said that the Akousmatics, as they were called, were really followers of Hippasos, who had been excommunicated for revealing secret doctrines. The genuine followers of Pythagoras were the Mathematicians.[57] The satire of the poets of the Middle Comedy proves, however, that, even though the friends of Aristoxenos did not practise

abstinence, there were plenty of people in the fourth century, calling themselves followers of Pythagoras, who did.[58] We know also from Isokrates that they still observed the rule of silence.[59] History has not been kind to the Akousmatics, but they never wholly died out. The names of Diodoros of Aspendos and Nigidius Figulus help to bridge the gulf between them and Apollonios of Tyana.

We have seen that Pythagoras taught the kinship of beasts and men, and we infer that his rule of abstinence from flesh was based, not on humanitarian or ascetic grounds but on taboo. This is strikingly confirmed by a statement in Porphyry's *Defence of Abstinence*, to the effect that, though the Pythagoreans did as a rule abstain from flesh, they nevertheless ate it when they sacrificed to the gods.[60] Now, among primitive peoples, we often find that the sacred animal is slain and eaten on certain solemn occasions, though in ordinary circumstances this would be the greatest of all impieties. Here, again, we have a primitive belief; and we need not attach any weight to the denials of Aristoxenos.[61]

44. Akousmata

We shall now know what to think of the Pythagorean rules and precepts that have come down to us. These are of two kinds, and have different sources. Some of them, derived from Aristoxenos, and for the most part preserved by Iamblichos, are mere precepts of morality. They do not pretend to go back to Pythagoras himself; they are only the sayings which the last generation of "Mathematicians" heard from their predecessors.[62] The second class is of a different nature, and consists of rules called *Akousmata*,[63] which points to their being the property of the sect which had faithfully preserved the old customs. Later writers interpret them as "symbols" of moral truth; but it does not require a practised eye to see that they are genuine taboos. I give a few examples to show what the Pythagorean rule was really like.

1. To abstain from beans.

2. Not to pick up what has fallen.

3. Not to touch a white cock.

4. Not to break bread.

5. Not to step over a crossbar.

6. Not to stir the fire with iron.

7. Not to eat from a whole loaf.

8. Not to pluck a garland.

9. Not to sit on a quart measure.

10. Not to eat the heart.

11. Not to walk on highways.

12. Not to let swallows share one's roof.

13. When the pot is taken off the fire, not to leave the mark of it in the ashes, but to stir them together.

14. Do not look in a mirror beside a light.

15. When you rise from the bedclothes, roll them together and smooth out the impress of the body.

It would be easy to multiply proofs of the close connexion between Pythagoreanism and primitive modes of thought, but what has been said is sufficient for our purpose.

45. Pythagoras as a Man of Science

Now, were this all, we should be tempted to delete the name of Pythagoras from the history of philosophy, and relegate him to the class of "medicine-men" (γόητες) along with Epimenides and Onomakritos. That, however, would be quite wrong. The Pythagorean Society became the chief scientific school of Greece, and it is certain that Pythagorean science goes back to the early years of the fifth century, and therefore to the founder. Herakleitos, who is not partial to him, says that Pythagoras had pursued scientific investigation further than other men.[64] Herodotos called Pythagoras "by no means the weakest sophist of the Hellenes," a title which at this date does not imply the slightest disparagement, but does imply scientific studies.[65] Aristotle said that Pythagoras at first busied himself with mathematics and numbers, though he adds that later he did not renounce the miracle-mongering of Pherekydes.[66] Can we trace any connexion between these two sides of his activity?

We have seen that the aim of the Orphic and other *Orgia* was to obtain release from the "wheel of birth" by means of "purifications" of a primitive type. The new thing in the society founded by Pythagoras seems to have been that, while it admitted all these old practices, it at the same time suggested a deeper idea of what "purification" really is. Aristoxenos said that the Pythagoreans employed music to purge the soul as they used medicine to purge the body.[67] Such methods of

purifying the soul were familiar in the *Orgia* of the Korybantes,[68] and will serve to explain the Pythagorean interest in Harmonics. But there is more than this. If we can trust Herakleides, it was Pythagoras who first distinguished the "three lives," the Theoretic, the Practical, and the Apolaustic, which Aristotle made use of in the *Ethics*. The doctrine is to this effect. We are strangers in this world, and the body is the tomb of the soul, and yet we must not seek to escape by self-murder; for we are the chattels of God who is our herdsman, and without his command we have no right to make our escape.[69] In this life there are three kinds of men, just as there are three sorts of people who come to the Olympic Games. The lowest class is made up of those who come to buy and sell, and next above them are those who come to compete. Best of all, however, are those who come to look on (θεωρεῖν). The greatest purification of all is, therefore, science, and it is the man who devotes himself to that, the true philosopher, who has most effectually released himself from the "wheel of birth." It would be rash to say that Pythagoras expressed himself exactly in this manner; but all these ideas are genuinely Pythagorean, and it is only in some such way that we can bridge the gulf which separates Pythagoras the man of science from Pythagoras the religious teacher.[70] It is easy to understand that most of his followers would rest content with the humbler kinds of purification, and this will account for the sect of the Akousmatics. A few would rise to the higher doctrine, and we have now to ask how much of the later Pythagorean science may be ascribed to Pythagoras himself.

46. Arithmetic

In his treatise on Arithmetic, Aristoxenos said that Pythagoras was the first to carry that study beyond the needs of commerce,[71] and his statement is confirmed by everything we otherwise know. By the end of the fifth century B.C. we find that there is a widespread interest in such subjects and that these are studied for their own sake. Now this new interest cannot have been wholly the work of a school; it must have originated with some great man, and there is no one but Pythagoras to whom we can refer it. As, however, he wrote nothing, we have no sure means of distinguishing his own teaching from that of his followers in the next generation or two. All we can safely say is that, the more primitive any Pythagorean doctrine appears, the more likely it is to be that of Pythagoras himself, and all the more so if it can be shown to have points of contact with views which we know to have been held in his own time or shortly before it. In particular, when we find the later Pythagoreans teaching things that were already something of an anachronism in their own day, we may be pretty sure we are dealing with survivals which only the authority of the master's name could have preserved. Some of these must be mentioned at once, though the developed system belongs to a later part of our story. It is only by separating its earliest form from its later that the place of Pythagoreanism in Greek thought can be made clear, though we must remember that no one can now pretend to draw the line between its successive stages with any certainty.

47. The Figures

One of the most remarkable statements we have about Pythagoreanism is what we are told of Eurytos on the unimpeachable authority of Archytas. Eurytos was the disciple of Philolaos, and Aristoxenos mentioned him along with Philolaos as having taught the last of the Pythagoreans, the men with whom he himself was acquainted. He therefore belongs to the beginning of the fourth century B.C., by which time the Pythagorean system was fully developed, and he was no eccentric enthusiast, but one of the foremost men in the school.[72] We are told of him, then, that he used to give the number of all sorts of things, such as horses and men, and that he demonstrated these by arranging pebbles in a certain way. Moreover, Aristotle compares his procedure to that of those who bring numbers into figures (σχήματα) like the triangle and the square.[73]

Now these statements, and especially the remark of Aristotle last quoted, seem to imply the existence at this date, and earlier, of a numerical symbolism quite distinct from the alphabetical notation on the one hand and from the Euclidean representation of numbers by lines on the other. The former was inconvenient for arithmetical purposes, because the zero was not yet invented.[74] The representation of numbers by lines was adopted to avoid the difficulties raised by the discovery of irrational quantities, and is of much later date. It seems rather that numbers were originally represented by dots arranged in symmetrical and easily recognised patterns, of which the marking of dice or dominoes gives us the best idea. And these markings are, in fact, the best proof that this is a genuinely primitive method of indicating numbers; for they are of unknown antiquity, and go back to the time when men could only count by arranging numbers in such patterns, each of which became, as it were, a fresh unit.

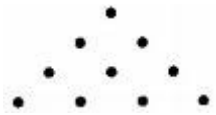
It is, therefore, significant that we do not find any clue to what Aristotle meant by "those who bring numbers into figures like the triangle and the square" till we come to certain late writers who called themselves Pythagoreans, and revived the study of arithmetic as a science independent of geometry. These men not only abandoned the linear symbolism of Euclid, but also regarded the alphabetical notation, which they did use, as inadequate to represent the true nature of number. Nikomachos of Gerasa says expressly that the letters used to represent numbers are purely conventional.[75] The natural thing would be to represent linear or prime numbers by a row of units, polygonal numbers by units arranged so as to mark out the various plane figures, and solid numbers by units disposed in pyramids and so forth.[76] We therefore find figures like this

Now it ought to be obvious that this is no innovation. Of course the employment of the letter *alpha* to represent the units is derived from the conventional notation; but otherwise we are clearly in

presence of something which belongs to the very earliest stage of the science. We also gather that the dots were supposed to represent pebbles (ψῆφοι), and this throws light on early methods of what we still call *calculation*.

48. Triangular, Square and Oblong Numbers

That Aristotle refers to this seems clear, and is confirmed by the tradition that the great revelation made by Pythagoras to mankind was precisely a figure of this kind, the *tektraktys*, by which the Pythagoreans used to swear,[77] and we have the authority of Speusippos for holding that the whole theory was Pythagorean.[78] In later days there were many kinds of *tetraktys,*[79] but the original one, that by which the Pythagoreans swore, was the "tektraktys of the dekad." It was a figure like this:



and represented the number ten as the triangle of four. It showed at a glance that 1+2+3+4=10. Speusippos tells us of several properties which the Pythagoreans discovered in the dekad. It is, for instance, the first number that has in it an equal number of prime and composite numbers. How much of this goes back to Pythagoras himself, we cannot tell; but we are probably justified in referring to him the conclusion that it is "according to nature" that all Hellenes and barbarians count up to ten and then begin over again.

It is obvious that the *tetraktys* may be indefinitely extended so as to exhibit the sums of the series of successive integers in a graphic form, and these sums are accordingly called "triangular numbers."

For similar reasons, the sums of the series of successive odd numbers are called "square numbers," and those of successive even numbers "oblong." If odd numbers are added in the form of *gnomons*,[80] the result is always a similar figure, namely a square, while, if even numbers are added, we get a series of rectangles,[81] as shown by the figure:

It is clear, then, that we are entitled to refer the study of sums of series to Pythagoras himself; but whether he went beyond the oblong, and studied pyramidal or cubic numbers, we cannot say.[82]

49. Geometry and Harmonics

It is easy to see how this way of representing numbers would suggest problems of a geometrical nature. The dots which stand for the pebbles are regularly called "boundary-stones" (ὅροι, *termini*, "terms"), and the area they mark out is the "field " (χώρα).[83] This is evidently an early way of speaking, and may be referred to Pythagoras himself. Now it must have struck him that "fields" could be compared as well as numbers,[84] and it is likely that he knew the rough methods of doing this traditional in Egypt, though certainly these would fail to satisfy him. Once more the tradition is helpful in suggesting the direction his thoughts must have taken. He knew, of course, the use of the triangle 3, 4, 5 in constructing right angles. We have seen (p. 20) that it was familiar in the East from a very early date, and that Thales introduced it to the Hellenes, if they did not know it already. In later writers it is actually called the "Pythagorean triangle." Now the Pythagorean proposition *par excellence* is just that, in a right-angled triangle, the square on the hypotenuse is equal to the squares on the other two sides, and the so-called Pythagorean triangle is the application of its converse to a particular case. The very name "hypotenuse" (ὑποτείνουσα) affords strong confirmation of the intimate connexion between the two things. It means literally "the cord stretching over against," and this is surely just the rope of the "arpedonapt." It is, therefore, quite possible that this proposition was really discovered by Pythagoras, though we cannot be sure of that, and though the demonstration of it which Euclid gives is certainly not his.[85]

50. Incommensurability

One great disappointment, however, awaited him. It follows at once from the Pythagorean proposition that the square on the diagonal of a square is double the square on its side, and this ought surely to be capable of arithmetical expression. As a matter of fact, however, there is no square number which can be divided into two equal square numbers, and so the problem cannot be solved. In this sense, it may be true that Pythagoras discovered the incommensurability of the diagonal and the side of a square, and the proof mentioned by Aristotle, namely, that, if they were commensurable, we should have to say that an even number was equal to an odd number, is distinctly Pythagorean in character.[86] However that may be, it is certain that Pythagoras did not care to pursue the subject any further. He may have stumbled on the fact that the square root of two is a surd, but we know that it was left for Plato's friends, Theodoros of Kyrene and Theaitetos, to give a complete theory of irrationals.[87] For the present, the incommensurability of the diagonal and the square remained, as has been said, a "scandalous exception." Our tradition says that Hippasos of Metapontion was drowned at sea for revealing this skeleton in the cupboard.[88]

51. Proportion and Harmony

These last considerations show that, while it is quite safe to attribute the substance of the early books of Euclid to the early Pythagoreans, his arithmetical method is certainly not theirs. It operates with lines instead of with units, and it can therefore be applied to relations which are not capable of being expressed as equations between rational numbers. That is doubtless why arithmetic is not treated in Euclid till after plane geometry, a complete inversion of the original order. For the same reason, the doctrine of proportion which we find in Euclid cannot be Pythagorean, and is indeed the work of Eudoxos. Yet it is clear that the early Pythagoreans, and probably Pythagoras himself, studied proportion in their own way, and that the three "medieties" (μεσότητες) in particular go back to the founder, especially as the most complicated of them, the "harmonic," stands in close relation to his discovery of the octave. If we take the harmonic proportion 12 : 8 : 6,[89] we find that 12 : 6 is the octave, 12 : 8 the fifth, and 8 : 6 the fourth, and it can hardly be doubted that Pythagoras himself discovered these intervals. The stories about his observing the harmonic intervals in a smithy, and then weighing the hammers that produced them, or suspending weights corresponding to those of the hammers to equal strings, are, indeed, impossible and absurd; but it is sheer waste of time to rationalise them.[90] For our purpose their absurdity is their chief merit. They are not stories which any Greek mathematician could possibly have invented, but popular tales bearing witness to the existence of a real tradition that Pythagoras was the author of this momentous discovery. On the other hand, the statement that he discovered the "consonances" by measuring the lengths corresponding to them on the monochord is quite credible and involves no error in acoustics.

52. Things Are Numbers

It was this, no doubt, that led Pythagoras to say all things were numbers. We shall see that, at a later date, the Pythagoreans identified these numbers with geometrical figures; but the mere fact that they called them "numbers," taken in connexion with what we are told about the method of Eurytos, is sufficient to show this was not the original sense of the doctrine. It is enough to suppose that Pythagoras reasoned somewhat as follows. If musical sounds can be reduced to numbers, why not everything else? There are many likenesses to number in things, and it may well be that a lucky experiment, like that by which the octave was discovered, will reveal their true numerical nature. The Neopythagorean writers, going back in this as in other matters to the earliest tradition of the school, indulge their fancy in tracing out analogies between things and numbers in endless variety; but we are fortunately dispensed from following them in these vagaries. Aristotle tells us distinctly that the Pythagoreans explained only a few things by means of numbers,[91] which means that Pythagoras himself left no developed doctrine on the subject, while the Pythagoreans of the fifth century did not care to add anything of the sort to the tradition. Aristotle does imply, however, that according to them the "right time" (καιρός) was seven, justice was four, and marriage three. These identifications, with a few

others like them, we may safely refer to Pythagoras or his immediate successors; but we must not attach too much importance to them. We must start, not from them, but from any statements we can find that present points of contact with the teaching of the Milesian school. These, we may fairly infer, belong to the system in its most primitive form.

53. Cosmology

Now the most striking statement of this kind is one of Aristotle's. The Pythagoreans held, he tells us, that there was "boundless breath" outside the heavens, and that it was inhaled by the world.[92] In substance, that is the doctrine of Anaximenes, and it becomes practically certain that it was taught by Pythagoras, when we find that Xenophanes denied it.[93] We may infer that the further development of the idea is also due to Pythagoras. We are told that, after the first unit had been formed—however that may have taken place—the nearest part of the Boundless was first drawn in and limited;[94] and that it is the Boundless thus inhaled that keeps the units separate from each other.[95] It represents the interval between them. This is a primitive way of describing discrete quantity.

In these passages of Aristotle, the "breath" is also spoken of as the void or empty. This is a confusion we have already met with in Anaximenes, and it need not surprise us to find it here.[96] We find also clear traces of the other confusion, that of air and vapour. It seems certain, in fact, that Pythagoras identified the Limit with fire, and the Boundless with darkness. We are told by Aristotle that Hippasos made Fire the first principle,[97] and we shall see that Parmenides, in discussing the opinions of his contemporaries, attributes to them the view that there were two primary "forms," Fire and Night.[98] We also find that Light and Darkness appear in the Pythagorean table of opposites under the heads of the Limit and the Unlimited respectively.[99] The identification of breath with darkness here implied is a strong proof of the primitive character of the doctrine; for in the sixth century darkness was supposed to be a sort of vapour, while in the fifth its true nature was known. Plato, with his usual historical tact, makes the Pythagorean Timaios describe mist and darkness as condensed air.[100] We must think, then, of a "field" of darkness or breath marked out by luminous units, an imagination the starry heavens would naturally suggest. It is even probable that we should ascribe to Pythagoras the Milesian view of a plurality of worlds, though it would not have been natural for him to speak of an infinite number. We know, at least, that Petron, one of the early Pythagoreans, said there were just a hundred and eighty-three worlds arranged in a triangles.[101]

54. The Heavenly Bodies

Anaximander had regarded the heavenly bodies as wheels of "air" filled with fire which escapes through certain orifices (§ 21), and there is evidence that Pythagoras adopted the same view.[102] We have

seen that Anaximander only assumed the existence of three such wheels, and it is extremely probable that Pythagoras identified the intervals between these with the three musical intervals he had discovered, the fourth, the fifth, and the octave. That would be the most natural beginning for the doctrine of the "harmony of the spheres," though the expression would be doubly misleading if applied to any theory we can properly ascribe to Pythagoras himself. The word ἁρμονία does not mean harmony, but octave, and the "spheres" are an anachronism. We are still at the stage when wheels or rings were considered sufficient to account for the heavenly bodies.

The distinction between the diurnal revolution of the heavens from east to west, and the slower revolutions of the sun, moon, and planets from west to east, may also be referred to the early days of the school, and probably to Pythagoras himself.[103] It obviously involves a complete break with the theory of a vortex, and suggests that the heavens are spherical. That, however, was the only way to get out of the difficulties of Anaximander's system. If it is to be taken seriously, we must suppose that the motions of the sun, moon, and planets are composite. On the one hand, they have their own revolutions with varying angular velocities from west to east, but they are also carried along by the diurnal revolution from east to west. Apparently this was expressed by saying that the motions of the planetary orbits, which are oblique to the celestial equator, are mastered (κρατεῖται) by the diurnal revolution. The Ionians, down to the Demokritos, never accepted this view. They clung to the theory of the vortex, which made it necessary to hold that all the heavenly bodies revolved in the same direction, so that those which, on the Pythagorean system, have the greatest angular velocity have the least on theirs. On the Pythagorean view, Saturn, for instance, takes about thirty years to complete its revolution; on the Ionian view it is "left behind" far less than any other planet, that is, it more nearly keeps pace with the signs of the Zodiac.[104]

For reasons which will appear later, we may confidently attribute to Pythagoras himself the discovery of the sphericity of the earth which the Ionians, even Anaxagoras and Demokritos, refused to accept. It is probable, however, that he still adhered to the geocentric system, and that the discovery that the earth was a planet belongs to a later generation (§150).

The account just given of the views of Pythagoras is, no doubt, conjectural and incomplete. We have simply assigned to him those portions of the Pythagorean system which appear to be the oldest, and it has not even been possible at this stage to cite fully the evidence on which our discussion is based. It will only appear in its true light when we have examined the second part of the poem of Parmenides and the system of the later Pythagoreans.[105] It is clear at any rate that the great contribution of Pythagoras to science was his discovery that the concordant intervals could be expressed by simple numerical ratios. In principle, at least, that suggests an entirely new view of the relation between the

traditional "opposites." If a perfect attunement (ἁρμονία) of the high and the low can be attained by observing these ratios, it is clear that other opposites may be similarly harmonised. The hot and the cold, the wet and the dry, may be united in a just blend (κρᾶσις), an idea to which our word "temperature" still bears witness.[106] The medical doctrine of the "temperaments" is derived from the same source. Moreover, the famous doctrine of the Mean is only an application of the same idea to the problem of conduct.[107] It is not too much to say that Greek philosophy was henceforward to be dominated by the notion of the perfectly tuned string.

II. XENOPHANES OF KOLOPHON

55. Life of Xenophanes

We have seen how Pythagoras gave a deeper meaning to the religious movement of his time; we have now to consider a very different manifestation of the reaction against the view of the gods which the poets had made familiar. Xenophanes denied the anthropomorphic gods altogether, but was quite unaffected by the revival of religion going on all round him. We still have a fragment of an elegy in which he ridiculed Pythagoras and the doctrine of transmigration.[108] We are also told that he opposed the views of Thales and Pythagoras, and attacked Epimenides, which is likely enough, though no fragments of the kind have come down to us.[109]

It is not easy to determine the date of Xenophanes. Timaios, whose testimony in such matters carries weight, said he was a contemporary of Hieron and Epicharmos, and he certainly seems to have played a part in the anecdotical romance of Hieron's court which amused the Greeks of the fourth century as that of Croesus and the Seven Wise Men amused those of the fifth.[110] As Hieron reigned from 478 to 467 B.C., that would make it impossible to date the birth of Xenophanes earlier than 570 B.C., even if we suppose him to have lived till the age of a hundred. On the other hand, Clement says that Apollodoros gave Ol. XL. (620-616 B.C) as the date of his birth, and adds that his days were prolonged till the time of Dareios and Cyrus.[111] Again, Diogenes, whose information on such matters mostly comes from Apollodoros, says he flourished in Ol. LX. (540-537 B.C.), and Diels holds that Apollodoros really said so.[112] However that may be, it is evident that the date 540 B.C. is based on the assumption that he went to Elea in the year of its foundation, and is, therefore, a mere combination, which need not be taken into account .[113]

What we do know for certain is that Xenophanes had led a wandering life from the age of twenty-five, and that he was still alive and making poetry at the age of ninety-two. He says himself (fr. 8 = 24 Karst.; R. P. 97):

There are by this time threescore years and seven that have tossed my careworn soul[114] up and down the land of Hellas; and there were then five-and-twenty years from my birth, if I can say aught truly about these matters.

It is tempting to suppose that in this passage Xenophanes was referring to the conquest of Ionia by Harpagos, and that he is, in fact, answering the question asked in another poem[115] (fr. 22 = 17 Karst.; R. P. 95 a):

This is the sort of thing we should say by the fireside in the winter-time, as we lie on soft couches after a good meal, drinking sweet wine and crunching chickpeas: "Of what country are you, and how old are you, good sir? And how old were you when the Mede appeared?"

In that case, his birth would fall in 565 B.C., and his connexion with Hieron would be quite credible. We note also that he referred to Pythagoras in the past tense, and is in turn so referred to by Herakleitos.[116]

Theophrastos said that Xenophanes had "heard" Anaximander,[117] and we shall see that he was acquainted with the Ionian cosmology. When driven from his native city, he lived in Sicily, chiefly, we are told, at Zankle and Katana.[118] Like Archilochos before him, he unburdened his soul in elegies and satires, which he recited at the banquets where, we may suppose, the refugees tried to keep up the usages of good Ionian society. The statement that he was a rhapsode has no foundation at all.[119] The singer of elegies was no professional like the rhapsode, but the social equal of his listeners. In his ninety-second year he was still, we have seen, leading a wandering life, which is hardly consistent with the statement that he settled at Elea and founded a school there, especially if we are to think of him as spending his last days at Hieron's court.[120] It is very remarkable that no ancient writer expressly says he ever was at Elea,[121] and all the evidence we have seems inconsistent with his having settled there at all.

56. Poems

According to Diogenes, Xenophanes wrote in hexameters and also composed elegies and iambics against Homer and Hesiod.[122] No good authority says anything of his having written a philosophical poem.[123] Simplicius tells us he had never met with the verses about the earth stretching infinitely downwards (fr. 28),[124] and this means that the Academy possessed no copy of such a poem, which would be very strange if it had ever existed. Simplicius was able to find the complete works of much smaller men. Nor does internal evidence lend any support to the view that Xenophanes wrote a philosophical poem. Diels refers about twenty-eight lines to it, but they would all come in quite as naturally in his attacks on Homer and Hesiod, as I have endeavoured to show. It is also significant that a number of them are derived from commentators on Homer.[125] It is more probable, then, that

Xenophanes expressed such scientific opinions as he had incidentally in his satires. That would be in the manner of the time, as we can see from the remains of Epicharmos.

The satires are called *Silloi* by late writers, and this name may go back to Xenophanes himself. It may, however, originate in the fact that Timon of Phleious, the "sillographer" (*c.* 259 B.C.), put much of his satire upon philosophers into the mouth of Xenophanes. Only one iambic line has been preserved, and that is immediately followed by a hexameter (fr. 14). This suggests that Xenophanes inserted iambic lines among his hexameters in the manner of the *Margites*.

57. The Fragments

I give the fragments according to the text and arrangement of Diels.

ELEGIES

(*1*) Now is the floor clean, and the hands and cups of all; one sets twisted garlands on our heads, another hands us fragrant ointment on a salver. The mixing bowl stands ready, full of gladness, and there is more wine at hand that promises never to leave us in the lurch, soft and smelling of flowers in the jars. In the midst the frankincense sends up its holy scent, and there is cold water, sweet and clean. Brown loaves are set before us and a lordly table laden with cheese and rich honey. The altar in the midst is clustered round with flowers; song and revel fill the halls.

But first it is meet that men should hymn the god with joy, with holy tales and pure words; then after libation and prayer made that we may have strength to do right—for that is in truth the first thing to do—no sin is it to drink as much as a man can take and get home without an attendant, so he be not stricken in years. And of all men is he to be praised who after drinking gives goodly proof of himself in the trial of skill,[126] as memory and strength will serve him. Let him not sing of Titans and Giants--those fictions of the men of old--nor of turbulent civil broils in which is no good thing at all; but to give heedful reverence to the gods is ever good.

(*2*) What if a man win victory in swiftness of foot, or in the *pentathlon*, at Olympia, where is the precinct of Zeus by Pisa's springs, or in wrestling,—what if by cruel boxing or that fearful sport men call *pankration* he become more glorious in the citizens' eyes, and win a place of honour in the sight of all at the games, his food at the public cost from the State, and a gift to be an heirloom for him,-what if he conquer in the chariot-race,—he will not deserve all this for his portion so much as I do. Far better is our art than the strength of men and of horses! These are but thoughtless judgements, nor is it fitting to set strength before goodly art.[127] Even if there arise a mighty boxer among a people, or one great in the *pentathlon* or at wrestling, or one excelling in swiftness of foot—and that stands in honour before all

tasks of men at the games—the city would be none the better governed for that. It is but little joy a city gets of it if a man conquer at the games by Pisa's banks; it is not this that makes fat the store-houses of a city.

(*3*) They learnt dainty and unprofitable ways from the Lydians, so long as they were free from hateful tyranny; they went to the market-place with cloaks of purple dye, not less than a thousand of them all told, vainglorious and proud of their comely tresses, reeking with fragrance from cunning salves.

(*4*) Nor would a man mix wine in a cup by pouring out the wine first, but water first and wine on the top of it.

(*5*) Thou didst send the thigh-bone of a kid and get for it the fat leg of a fatted bull, a worthy guerdon for a man to get, whose glory is to reach every part of Hellas and never to pass away, so long as Greek songs last.[128]

(*7*) And now I will turn to another tale and point the way . . . . Once they say that he (Pythagoras) was passing by when a dog was being beaten and spoke this word: "Stop! don't beat it! For it is the soul of a friend that I recognised when I heard its voice."[129]

(*8*) There are by this time threescore years and seven that have tossed my careworn soul[114] up and down the land of Hellas; and there were then five-and-twenty years from my birth, if I can say aught truly about these matters.

(*9*) Much weaker than an aged man.

SATIRES

(*10*) Since all at first have learnt according to Homer . . . .

(*11*) Homer and Hesiod have ascribed to the gods all things that are a shame and a disgrace among mortals, stealings and adulteries and deceivings of one another. R. P. 99.

(*12*) Since they have uttered many lawless deeds of the gods, stealings and adulteries and deceivings of one another. R. P. *ib.*

(*14*) But mortals deem that the gods are begotten as they are, and have clothes like theirs, and voice and form. R. P. 100.

(*15*) Yes, and if oxen and horses or lions had hands, and could paint with their hands, and produce works of art as men do, horses would paint the forms of the gods like horses, and oxen like oxen, and make their bodies in the image of their several kinds. R. P. *ib.*

(*16*) The Ethiopians make their gods black and snub-nosed; the Thracians say theirs have blue eyes and red hair. R. P. 100 b.

(*18*) The gods have not revealed all things to men from the beginning, but by seeking they find in time what is better. R. P 104 b.

(*23*) One god, the greatest among gods and men, neither in form like unto mortals nor in thought . . . . R. P. 100.

(*24*) He sees all over, thinks all over, and hears all over. R. P. 102.

(*25*) But without toil he swayeth all things by the thought of his mind. R. P. 108 b.

(*26*) And he abideth ever in the selfsame place, moving not at all; nor doth it befit him to go about now hither now thither. R. P. 110 a.

(*27*) All things come from the earth, and in earth all things end. R. P. 103 a.

(*28*) This limit of the earth above is seen at our feet in contact with the air;[130] below it reaches down without a limit. R. P. 103.

(*29*) All things are earth and water that come into being and grow. R. P. 103.

(*30*) The sea is the source of water and the source of wind; for neither in the clouds (would there be any blasts of wind blowing forth) from within without the mighty sea, nor rivers' streams nor rain-water from the sky. The mighty sea is father of clouds and of winds and of rivers.[131] R. P. 103.

(*31*) The sun swinging over[132] the earth and warming it . . . .

(*32*) She that they call Iris is a cloud likewise, purple, scarlet and green to behold. R. P. 103.

(*33*) For we all are born of earth and water. R. P. *ib.*

(*34*) There never was nor will be a man who has certain knowledge about the gods and about all the things I speak of. Even if he should chance to say the complete truth, yet he himself knows not that it is so. But all may have their fancy.[133] R. P. 104.

(*35*) Let these be taken as fancies[134] something like the truth. R. P. 104 a.

(*36*) All of them[135] that are visible for mortals to behold.

(*37*) And in some caves water drips . . . .

(*38*) If god had not made brown honey, men would think figs far sweeter than they do.

58. The Heavenly Bodies

Most of these fragments are not in any way philosophical and those that appear to be so are easily accounted for otherwise. The intention of one of them (fr. 32) is clear. "Iris too" is a cloud, and we may infer that the same thing had been said of the sun, moon, and stars; for the doxographers tell us that these were all explained as "clouds ignited by motion."[136] To the same context clearly belongs the explanation of the St. Elmo's fire which Aetios has preserved. "The things like stars that appear on ships," we are told, "which some call the Dioskouroi, are little clouds made luminous by motion."[137] In the doxographers the same explanation is repeated with trifling variations under the head of moon, stars, comets, lightning, shooting stars, and so forth, which gives the appearance of a systematic cosmology.[138] But the system is due to the arrangement of the work of Theophrastos, and not to Xenophanes; for it is obvious that a very few additional hexameters would amply account for the whole doxography.

What we hear of the sun presents some difficulties. We are told that it is an ignited cloud; but this is not very consistent with the statement that the evaporation of the sea from which clouds arise is due to the sun's heat. Theophrastos stated that the sun, according to Xenophanes, was a collection of sparks from the moist exhalation; but even this leaves the exhalation itself unexplained.[139] That, however, matters little, if the chief aim of Xenophanes was to discredit the anthropomorphic gods, rather than to give a scientific theory of the heavenly bodies. The important thing is that Helios too is a temporary phenomenon. The sun does not go round the earth, as Anaximander taught, but straight on, and the appearance of a circular path is solely due to its increasing distance. So it is not the same sun that rises next morning, but a new one altogether; while eclipses occur because the sun "tumbles into a hole" when it comes to certain uninhabited regions of the earth. An eclipse may last a month. Besides that, there are many suns and moons, one of each for every region of the earth.[140]

The vigorous expression "tumbling into a hole"[141] seems clearly to come from the verses of Xenophanes himself, and there are others of a similar kind, which we must suppose were quoted by Theophrastos. The stars go out in the daytime, but glow again at night "like charcoal embers."[142] The sun is of some use in producing the world and the living creatures in it, but the moon "does no work in

the boat."[143] Such expressions can only be meant to make the heavenly bodies appear ridiculous, and it will therefore be well to ask whether the other supposed cosmological fragments can be interpreted on the same principle.

59. Earth and Water

In fr. 29 Xenophanes says that "all things are earth and water," and Hippolytos has preserved the account given by Theophrastos of the context in which this occurred. It was as follows:

Xenophanes said that a mixture of the earth with the sea is taking place, and that it is being gradually dissolved by the moisture. He says that he has the following proofs of this. Shells are found in midland districts and on hills, and he says that in the quarries at Syracuse has been found the imprint of a fish and of seaweed, at Paros the form of a bayleaf in the depth of the stone, and at Malta flat impressions of all marine animals. These, he says, were produced when all things were formerly mud, and the outlines were dried in the mud. All human beings are destroyed when the earth has been carried down into the sea and turned to mud. This change takes place for all the worlds.—Hipp. *Ref.* i. 14 (R. P. 103 a).

This is, of course, the theory of Anaximander, and we may perhaps credit him rather than Xenophanes with the observations of fossils.[144] Most remarkable of all, however, is the statement that this change applies to "all the worlds." It seems impossible to doubt that Theophrastos attributed a belief in "innumerable worlds" to Xenophanes. As we have seen, Aetios includes him in his list of those who held this doctrine, and Diogenes ascribes it to him also,[145] while Hippolytos seems to take it for granted. We shall find, however, that in another connexion he said the World or God was one. If our interpretation of him is correct, there is no great difficulty here. The point is that, so far from being "a sure seat for all things ever," Gaia too is a passing appearance. That belongs to the attack on Hesiod, and if in this connexion Xenophanes spoke, with Anaximander, of "innumerable worlds," while elsewhere he said that God or the World was one, that may be connected with a still better attested contradiction which we have now to examine.

60. Finite or Infinite

Aristotle tried without success to discover from the poems of Xenophanes whether he regarded the world as finite or infinite. "He made no clear pronouncement on the subject," he tells us.[146] Theophrastos, on the other hand, decided that he regarded it as spherical and finite, because he said it was "equal every way."[147] It really appears that Xenophanes did not feel the contradiction involved in calling the world "equal every way" and infinite. We have seen that he said the sun went right on to infinity, and that agrees with his view of the earth as an infinitely extended plain. He also held (fr. 28)

that, while the earth has an upper limit which we see, it has no limit below. This is attested by Aristotle, who speaks of the earth being "infinitely rooted," and adds that Empedokles criticised Xenophanes for holding this view.[148] It further appears from the fragment of Empedokles quoted by Aristotle that Xenophanes said the vast Air extended infinitely upwards.[149] We are therefore bound to try to find room for an infinite earth and an infinite air in a spherical finite world! That comes of trying to find science in satire. If, on the other hand, we regard these statements from the same point of view as those about the heavenly bodies, we shall see what they probably mean. The story of Ouranos and Gaia was always the chief scandal of the *Theogony,* and the infinite air gets rid of Ouranos altogether. As to the earth stretching infinitely downwards, that gets rid of Tartaros, which Homer described as situated at the bottommost limit of earth and sea, as far beneath Hades as heaven is above the earth.[150] This is pure conjecture, of course; but, if it is even possible, we are entitled to disbelieve that it was in a cosmological poem such startling contradictions occurred.

A more subtle explanation of the difficulty commended itself to the late Peripatetic who wrote an account of the Eleatic school, part of which is still extant in the Aristotelian corpus, and is generally known now as the treatise on *Melissos, Xenophanes, and Gorgias.*[151] He said that Xenophanes declared the world to be neither finite nor infinite, and composed a series of arguments in support of this thesis, to which he added another like it, namely, that the world is neither in motion nor at rest. This has introduced endless confusion into our sources. Alexander used this treatise as well as the work of Theophrastos, and Simplicius supposed the quotations from it to be from Theophrastos too. Having no copy of the poems he was completely baffled, and until recently all accounts of Xenophanes were vitiated by the same confusion. It may be suggested that, but for this, we should never have heard of the "philosophy of Xenophanes," a way of speaking which is really a survival from the days before this scholastic exercise was recognised as having no authority.

61. God and the World

In the passage of the *Metaphysics* just referred to, Aristotle speaks of Xenophanes as "the first partisan of the One,"[152] and the context shows he means to suggest he was the first of the Eleatics. We have seen already that the certain facts of his life make it very unlikely that he settled at Elea and founded a school there, and it is probable that, as usual in such cases, Aristotle is simply reproducing certain statements of Plato. At any rate, Plato had spoken of the Eleatics as the "partisans of the Whole,"[153] and he had also spoken of the school as "starting with Xenophanes and even earlier."[154] The last words, however, show clearly what he meant. Just as he called the Herakleiteans "followers of Homer and still more ancient teachers,"[155] so he attached the Eleatics to Xenophanes and still earlier authorities. We have seen before how these playful and ironical remarks of Plato were taken seriously by his successors, and we must not make too much of this fresh instance of Aristotelian literalness.

Aristotle goes on to tell us that Xenophanes, "referring to the whole world,[156] said the One was god." This clearly alludes to frs. 23-26, where all human attributes are denied of a god who is said to be one and "the greatest among gods and men." It may be added that these verses gain much in point if we think of them as closely connected with frs. 11-16, instead of referring the one set of verses to the Satires and the other to a cosmological poem. It was probably in the same context that Xenophanes called the world or god "equal every way"[157] and denied that it breathed.[158] The statement that there is no mastership among the gods[159] also goes very well with fr. 26. A god has no wants, nor is it fitting for one god to be the servant of others, like Iris and Hermes in Homer.

62. Monotheism or Polytheism

That this "god" is just the world, Aristotle tells us, and the use of the word θεός is quite in accordance with Ionian usage. Xenophanes regarded it as sentient, though without any special organs of sense, and it sways all things by the thought of its mind. He also calls it "one god," and, if that is monotheism, then Xenophanes was a monotheist, though this is surely not how the word is generally understood. The fact is that the expression "one god" wakens all sorts of associations in our mind which did not exist for the Greeks of this time. What Xenophanes is really concerned to deny is the existence of any gods in the proper sense, and the words "One god" mean "No god but the world."[160]

It is certainly wrong, then, to say with Freudenthal that Xenophanes was in any sense a polytheist.[161] That he should use the language of polytheism in his elegies is only what we should expect, and the other references to "gods" can be best explained as incidental to his attack on the anthropomorphic gods of Homer and Hesiod. In one case, Freudenthal has pressed a proverbial way of speaking too hard.[162] Least of all can we admit that Xenophanes allowed the existence of subordinate or departmental gods; for it was just the existence of such that he was chiefly concerned to deny. At the same time, I cannot help thinking that Freudenthal was more nearly right than Wilamowitz, who says that Xenophanes "upheld the only real monotheism that has ever existed upon earth."[163] Diels, I fancy, comes nearer the mark when he calls it a "somewhat narrow pantheism."[164] But all these views would have surprised Xenophanes himself about equally. He was really Goethe's *Weltkind*, with prophets to right and left of him, and he would have smiled if he had known that one day he was to be regarded as a theologian.

1. See p. 14.

2. See p. 3.

3. Pindar, *Ol.* iii. 14-16.

4. Herod. iv. 33. Cf. Farnell, *Cults of the Greek States*, iv. pp. 99 *sqq*.

5. Herod. iv. 36.

6. *Ibid.* iv.13-15.

7. I have discussed the origin of the Pythagorist religion in the *Encyctopaedia of Religion and Ethics* (*sv*. Pythagoras) rather more fully than would be appropriate here.

8. For these gold plates, see the Appendix to Miss Harrison's *Prolegomena to the Study of Greek Religion*, where the texts are discussed and translated by Professor Gilbert Murray.

9. The earliest attested case of a Greek coming under Indian influence is that of Pyrrho of Elis (see my article "Scepticism" in the *Encyclopaedia of Religion and Ethics*). I venture to suggest that the religious ideas referred to may have reached India from the same northern source as they reached Greece, a source which we may vaguely call "Scythian." If, as Caesar tells us (*B.G.* vi. 14, 5), the Gallic Druids taught the doctrine of transmigration, this suggestion is strongly confirmed. The theories of L. von Schroeder (*Pythagoras und die Inder*, 1884) are based on a mistaken view of Pythagoreanism, and appear also to involve chronological impossibilities. See A. Berriedale Keith, " Pythagoras and the Doctrine of Transmigration" (*Journal of the Royal Asiatic Society*, 1909, pp. 569 *sqq.*).

10. The *Phaedo* is dedicated, as it were, to the Pythagorean community at Phleious. Plato speaks in Rep. x. 600 b of Pythagoras as the originator of a private ὁδός τις βίου. Cf. the ἄτραπος of *Phaed.* 66 b.

11. For the Προτρεπτικός, see Bywater in *J. Phil*. ii. p. 35. It was the original of Cicero's *Hortensius*, which had such an effect on Augustine.

12. Plato, *Rep.* 520 c 1, καταβατέον οὖν ἐν μέρει. The Allegory of the Cave seems clearly to be of Orphic origin (Stewart, *Myths of Plato*, p. 252, *n.* 2).

13. For Empedokles, see § 117; for the Pythagoreans, see § 149.

14. I have discussed this point fully in "The Socratic Doctrine of the Soul" (*Proceedings of the British Academy*, 1915-16, p. 235).

15. Plato, *Phaed.* 69 c 3, καὶ κινδυνεύουσι καὶ οἱ τὰς τελετὰς ἡμῖν οὗτοι καταστήσαντες οὐ φαῦλοί τινες εἶναι, ἀλλὰ τῷ ὄντι πάλαι αἰνίττεσθαι κτλ.. The irony of this and similar passages should be unmistakable.

16. Arist. fr. 45 (1483 a 19), τοὺς τελουμένους οὐ μαθεῖν τι δεῖν, ἀλλὰ παθεῖν καὶ διατεθῆναι.

17. Xenophanes, fr. 7.

18. Herakleitos, fr. 17. For the meaning given to κακοτεχνίη, see note *in loc*.

19. Herod. iv. 95.

20. Plato, *Rep.* x. 600 b.

21. *Ibid.* vii. 530 d.

22. Arist. *Met.* A, 5. 986 a 29.

23. Arist. *Rhet.* B, 23. 1398 b 14.

24. Cf. e.g. *Met*. A, 5. 985 b 23; *De caelo*, B, 13. 293 a 20.

25. See Rostagni, "Pitagora e i Pitagorici in Timeo" (*Atti della R. Academia delle Scienze di Torino*, vol. 49 (1913-14), pp. 373 *sqq*.

26. See E. Rohde's papers, "Die Quellen des Iamblichos in seiner Biographie des Pythagoras," in *Rh. Mus.* xxvi. and xxvii.

27. Porphyry's *Life of Pythagoras* is the only considerable extract from his *History of Philosophy* that has survived. The Life by Iamblichos has been edited by Nauck (1884).

28. Iamblichos made a compilation from the arithmetician Nikomachos of Gerasa and the romance of Apollonios of Tyana. Porphyry used Nikomachos and Antonius Diogenes, who wrote a work called *Marvels from beyond Thule*, which is parodied in Lucian's *Vera Historia*.

29. It is Aristotle who told how Pythagoras killed a deadly snake by biting it, how he was seen at Kroton and Metapontion at the same time, how he exhibited his golden thigh at Olympia, and how he was addressed by a voice from heaven when crossing the river Kasas. It was also Aristotle who preserved the valuable piece of information that the Krotoniates identified Pythagoras with Apollo Hyperboreios, and that the Pythagoreans had a division of the λογικὸν ζῷον into τὸ μὲν . . . θεός, τὸ δὲ ἄνθρωπος, τὸ δὲ οἷον Πυθαγόρας. For these and other statements of the same kind, see Diels, *Vors.* 4, 7. It looks as if Aristotle took special pains to emphasise this aspect of Pythagoras out of opposition to the later Pythagoreans who tried to ignore it.

30. Andron wrote a work on the Seven Wise Men, and the title refers to the well-known story (p. 44, *n.* 3).

31. Cf. Herod. iv. 95, and Herakleitos, fr. 17 (R. P. 31 a). Timaios, however, gave his father's name as Demaratos. Herodotos represents him as living at Samos. Aristoxenos said his family came from one of the islands which the Athenians occupied after expelling the Tyrrhenians (Diog. viii. 1). This suggests Lemnos or Imbros, from which the Tyrrhenian "Pelasgians" were expelled by Miltiades (Herod. vi. 140). That explains the story that he was an Etrurian or a Tyrian. Other accounts bring him into connexion with Phleious, but that may be a pious invention of the society which flourished there at the beginning of the fourth century B.C. Pausanias (ii. 13, 1) gives it as a Phleiasian tradition that Hippasos, the great-grandfather of Pythagoras, had emigrated from Phleious to Samos.

32. Eratosthenes wrongly identified Pythagoras with the Olympic victor of Ol. XLVIII 1 (588/7 B.C.), but Apollodoros gave his *floruit* as 532/1, the era of Polykrates. He doubtless based this on the statement of Aristoxenos quoted by Porphyry (*V. Pyth.* 9), that Pythagoras left Samos from dislike to the tyranny of Polykrates (R. P. 53 a).

33. Herakl. fr. 16, 17 (R. P. 31, 31 a).

34. It occurs first in the *Bousiris* of Isokrates, § 28 (R. P. 52).

35. Herod. ii. 81 (R. P. 52 a). The comma at Αἰγυπτίοισι is clearly right. Herodotos believed that the cult of Dionysos was introduced by Melampous (ii. 49), and he means that the Orphics got these practices from the worshippers of Bakchos, while the Pythagoreans got them from the Orphics.

36. Herod. ii. 123 (R. P. *ib.*). The words "whose names I know, but do not write" cannot refer to Pythagoras; for it is only of contemporaries Herodotos speaks in this way (Cf. i. 51, iv. 48). Stein's suggestion that he meant Empedokles seems convincing. Herodotos must have met him at Thourioi. If Herodotos had ever heard of Pythagoras visiting Egypt, he would surely have said so in one or other of these passages. There was no occasion for reserve, as Pythagoras must have died before Herodotos was born.

37. Porph. *V. Pyth.* 9 (R. P. 53 a).

38. From what Herodotos tells us of Demokedes (iii. 131) we may infer that the medical school of Kroton was founded before the time of Pythagoras. The series of Olympian victories won by Krotoniates in the sixth century B.C. is remarkable.

39. For a full discussion of the chronological problem, see Rostagni, *op. cit*. pp. 376 *sqq*. It seems clear that Timaios made the rising of Kylon take place just after the destruction of Sybaris (510 B.C.), with which he connected it. The statement that Pythagoras then retired to Metapontion is confirmed by Cicero, who speaks (*De fin.* v. 4) of the honours still paid to his memory in that city (R. P. 57 c). Aristoxenos (*ap.* Iambl. *V. Pyth.* 249) referred to the same thing (R. P. 57 c). Cf. also Andron, fr. 6 (*F.H.G.* ii. 347).

40. Plato, *Rep.* x. 600 a 9, clearly implies that Pythagoras held no public office. The view that the Pythagorean sect was a political league, maintained in modern times by Krische (*De societatis a Pythagora conditae scopo politico*, 1830), goes back as Rohde has shown (*loc. cit.*), to Dikaiarchos, the champion of the "Practical Life," just as the view that it was primarily a scientific society goes back to the mathematician and musician Aristoxenos.

41. The idea that the Pythagoreans represented the "Dorian ideal" dies very hard. In his *Kulturhistorische Beiträdge* (Heft i. p. 59), Max C. P. Schmidt imagines that later writers call the founder of the sect Pythagoras instead of Pythagores, as he is called by Herakleitos and Demokritos, because he had become "a Dorian of the Dorians." The fact is simply that Πυθαγόρας is the Attic form of Πυθαγόρης, and is no more "Doric" than Ἀναξαγόρας. Even in the reign of Trajan, the Samians still knew that Πυθαγόρης was the correct spelling. Cf. the title vignette in Diels, *Vors.*

42. The only statement which might suggest that Pythagoras took the aristocratic side is the remark in Diogenes (viii. 3) ὥστε σχεδὸν εἶναι ἀριστοκρατίαν τὴν πολιτείαν. That may come from Timaios, but (as the adverb σχεδόν shows) it is not to be taken literally. The Pythagorean rule was no doubt an ἀριστοκρατία in the sense given to the word by Sokrates in Plato's *Republic*, but it was not based either on birth or on wealth, so that it was not an aristocracy in the common Greek sense of the word, and still less an oligarchy. It was more like the "Rule of the Saints." Kylon, the chief opponent of the Pythagoreans, is described by Aristoxenos

(Iamb. *V. Pyth.* 248) as γένει καὶ δόξῃ καὶ πλούτῳ πρωτεύων τῶν πολιτῶν. Taras, later the chief seat of the Pythagoreans, was a democracy. (Cf. Strabo, vi. p. 280, ἴσχυσαν δέ ποτε οἱ Ταραντῖνοι καθ' ὑπερβολὴν πολιτευόμενοι δημοκρατικῶς . . . ἀπεδέξαντο δὲ καὶ τὴν Πυθαγόρειον φιλοσοφίαν κτλ. The truth is that, at this time, the new religion appealed to the people rather than the aristocracies, which were apt to be "free-thinking." Xenophanes, not Pythagoras, is their man.

43. We have the authority of Aristotle, fr. 186. 1510 b 20, for this identification. The names of Abaris and Aristeas stand for a mystical movement parallel to the Orphic, but based on the worship of Apollo. The later tradition makes them predecessors of Pythagoras; and that this has some historical basis appears from Herod. iv. 13 *sqq.*, and above all from the statement that Aristeas had a statue at Metapontion, where Pythagoras died. The connexion of Pythagoras with Salmoxis belongs to the same order of ideas. As the legend of the Hyperboreans is Delian, we see that the religion taught by Pythagoras was genuinely Ionian in its origin, and had nothing to do with Dionysos.

44. See p. 90 *n.* 1. I do not know why modern historians call him a democratic leader.

45. Rohde, *Rhein. Mus.* xxxvi. p. 565, *n.* 1. The later accounts telescope these events into a single catastrophe. Some have it that Pythagoras himself was burned to death in the house of Milo.

46. Polyb. *n.* 39, καθ' οὓς γὰρ καιροὺς ἐν τοῖς κατὰ τὴν Ἰταλίαν τόποις κατὰ τὴν μεγάλην Ἑλλάδα τότε προσαγορευομένην ἐνεπρήσαν τὰ συνέδρια τῶν Πυθαγορείων, μετὰ ταῦτα γενομένου κινήματος ὁλοσχεροῦς περὶ τὰς πολιτείας, (ὅπερ εἰκός, ὡς ἂν τῶν πρώτων ἀνδρῶν ἐξ ἑκάστης πόλεως οὕτω παραλόγως διαφθαρέντων) συνέβη τὰς κατ' ἐκείνους τοὺς τόπους Ἑλληνικὰς πόλεις ἀναπλησθῆναι φόνου καὶ στάσεως καὶ παντοδαπῆς ταραχῆς. ἐν οἷς καιροῖς ἀπὸ τῶν πλείστων μερῶν τῆς Ἑλλάδος πρεσβευόντων ἐπὶ τὰς διαλύσεις, Ἀχαιοῖς καὶ τῇ τούτων πίστει συνεχρήσαντο πρὸς τὴν τῶν παρόντων κακῶν ἐξαγωγήν.

47. When discussing the Pythagorean system, Aristotle always refers it to "the Pythagoreans," not to Pythagoras himself. He is quite clear that what he knew as the Pythagorean system belonged in the main to the days of Empedokles, Anaxagoras, and Leukippos; for, after mentioning these, he goes on to describe the Pythagoreans as "contemporary with and earlier than them" (ἐν δὲ τούτοις καὶ πρὸ τούτων, *Met*. A, 5. 985 b 23).

48. The fragments of the Πυθαγορικαὶ ἀποφάσεις of Aristoxenos are given by Diels, *Vors*. 45 D.

49. Porphyry, *V. Pyth.* 19 (R. P. 55).

50. See Diels, *Dox.* p. 150, and "*Ein gefälschtes Pythagorasbuch*" (*Arch.* iii. pp. 451 *sqq.*); Bernays, Die heraklitischen Briefe, *n*. 1.

51. See above, p. 84.

52. The proper Greek for this is παλιγγενεσία, and the inaccurate term μετεμψύχωσις only occurs in late writers. Some of the Neoplatonists and Christian apologists say μετενσωμάτωσις, which is accurate but cumbrous. Cf. Olympiodoros in *Phaed.* p. 54, 25 (Norvin), τὴν μετεμψύχωσιν, ἤτοι τὴν μετενσωμάτωσιν, διότι οὐ πολλαὶ ψυχαὶ ἓν σῶμα εἰδοποιοῦσιν, ἐπεὶ αὕτη μετεμψύχωσις ἦν, ἀλλὰ μία ψυχὴ διάφορα σώματα μεταμπίσχεται.. See Rohde, *Psyche*, p. 428, *n.* 2.

53. See Diog. viii. 13.

54. Aristoxenos *ap.* Diog. viii. 20, πάντα μὲν τὰ ἄλλα συγχωρεῖν αὐτὸν ἐσθίειν ἔμψυχα, μόνον δ' ἀπέχεσθαι βοὸς ἀροτῆρος καὶ κριοῦ.

55. Aristoxenos *ap.* Gell. iv. 11, 5, Πυθαγόρας δὲ τῶν ὀσπρίων μάλιστα τὸν κύαμον ἐδοκίμασεν· λειαντικόν τε γὰρ εἶναι καὶ διαχωρητικόν· διὸ καὶ μάλιστα κὲχρηται αὐτῷ; *ib.* 6, "porculis quoque minusculis et haedis tenerioribus victitasse, idem Aristoxenus refert." It is just possible that Aristoxenos may be right about the taboo on beans. We know that it was Orphic, and it may have been transferred to the Pythagoreans by mistake. That, however, would not affect the general conclusion that at least some Pythagoreans practised abstinence from various kinds of animal food, which is all that is required.

56. Yet even Aristoxenos recorded that, when Pherekydes died, he was buried by Pythagoras at Delos (Diog. i. 118). It was, perhaps, too notorious to be denied.

57. Hippasos of Kroton or Metapontion (in the catalogue of Iamblichos he is a Sybarite) is, we shall see, the regular scapegoat of the Pythagoreans. Iamblichos, who here follows Nikomachos, says (*V. Pyth.* 81; R. P. 56) that the μαθηματικοί were admitted to be Pythagoreans by the ἀκουσματικοί but did not recognise them in return. We are told (Diog. viii. 7) that the μυστικὸς λόγος ascribed to Pythagoras was really by Hippasos, who wrote it ἐπὶ διαβολῇ Πυθαγόρου, *i.e.* to throw discredit on him by representing him as a purely religious teacher. The term Πυθαγοριστής seems to have been used specially of the Akousmatics, while the scientific

Pythagoreans were called Πυθαγόρειοι in the same way as the followers of other schools were called Ἀναξαγόρειοι, Ἡρακλείτειοι, and the like.

58. For the fragments, see Diels, *Vors*. 45 E. The most striking are Antiphanes, fr. 135, Kock, ὥσπερ Πυθαγορίζων ἐσθίει | ἔμψυχον οὐδέν; Alexis, fr. 220, οἱ Πυθαγορίζοντες γάρ, ὡς ἀκούομεν, | οὔτ' ὄψον ἐσθίουσιν οὔτ' ἄλλ' οὐδὲ ἓν | ἔμψυχον; fr. 196 (from the Πυθαγορίζουσα), ἡ δ' ἑστίασις ἰσχάδες καὶ στέμφυλα | καὶ τυρὸς ἔσται· ταῦτα γὰρ θύειν νόμος | τοῖς Πυθαγορείοις; Aristophon, fr. 9 (from the Πυθαγοριστής, πρὸς τῶν θεῶν οἰόμεθα τοὺς πάλαι ποτέ, | τοὺς Πυθαγοριστὰς γενομένους ὄντως ῥυπᾶν | ἑκόντας ἢ φορεῖν τριβῶνας ἡδέως; Mnesimachos, fr. 1, ὡς Πυθαγοριστὶ θύομεν τῷ Λοχίᾳ | ἔμψυχον οὐδὲν ἐσθίοντες παντελῶς. See also Theokritos xiv. 5, τοιοῦτος καὶ πρᾶν τις ἀφίκετο Πυθαγορικτάς, | ὠχρὸς κἀνυποδητός· Ἀθηναῖος δ' ἔφατ' ἦμεν..

59. Bousiris, § 29, ἔτι γὰρ καὶ νῦν τοὺς προσποιουμένους ἐκείνου μαθητὰς εἶναι μᾶλλον σιγῶντας θαυμάζουσιν ἢ τοὺς ἐπὶ τῷ λέγειν μεγίστην δόξαν ἔχοντας. The Pythagorean silence was called ἐχεμυθία or ἐχερρημοσύνη, both of which seem to be good Ionic words. It is probable that the silence was disciplinary rather than a means of keeping the doctrine secret.

60. See Bernays, *Theophrastos' Schrift über Frömmigkeit*. Porphyry's tract, Περὶ ἀποχῆς ἐμψύχων, is addressed to Castricius Firmus, who had fallen away from the strict vegetarianism of the Pythagoreans. The passage referred to is *De abst*. p. 58, 25 Nauck, ἱστοροῦσι δέ τινες καὶ αὐτοὺς ἅπτεσθαι τῶν ἐμψύχων τοὺς Πυθαγορείους, ὅτε θύοιεν θεοῖς. This does not come, like most of Porphyry's tract, from Theophrastos, but it is in all probability from Herakleides of Pontos. See Bernays, *op. cit.* p. 11. Cf. also Plutarch, *Q. conv.* 729 c (οἱ Πυθαγορικοὶ) ἐγεύοντο τῶν ἱεροθύτων ἀπαρξάμενοι τοῖς θεοῖς.

61. Porphyry (*V. Pyth.* c 15) has preserved a tradition to the effect that Pythagoras recommended a flesh diet for athletes (Milo?). This story must have originated at the same time as those related by Aristoxenos, and in a similar way. In fact, Bernays has shown that it comes from Herakleides of Pontos (*Theophr. Schr.* n. 8). Iamblichos (*V. Pyth.* 5. 25) and others (Diog. viii. 13, 47) got out of this by supposing it referred to a gymnast of the same name. We see here how the Neoplatonists endeavoured to go back to the original form of the Pythagorean legend, and to explain away the fourth-century reconstruction.

62. For the Πυθαγορικαὶ ἀποφάσεις of Aristoxenos, see Diels, *Vors.* 45 D.

63. There is a collection of Ἀκούσματα καὶ σύμβολα in Diels, *Vors.* 45 c.

64. Herakl. fr. 17 (R. P. 31 a). The word ἱστορίη is in itself quite general. What it chiefly means here we see from a valuable notice preserved by Iamblichos, *V. Pyth.* 89, ἐκαλεῖτο δὲ ἡ γεωμετρία πρὸς Πυθαγόρου ἱστορία.

65. Herod. iv. 95.

66. Arist. Περὶ τῶν Πυθαγορείων, fr. 186, 1510 a 39, Πυθαγόρας Μνησάρχου υἱὸς τὸ μὲν πρῶτον διεπονεῖτο περὶ τὰ μαθήματα καὶ τοὺς ἀριθμούς, ὕστερον δέ ποτε καὶ τῆς Φερεκύδου τερατοποιΐας οὐκ ἀπέστη.

67. See Cramer, *An. Par.* i. 172, ὅτι οἱ Πυθαγορικοί, ὡς ἔφη Ἀριστόξενος, καθάρσει ἐχρῶντο τοῦ μὲν σόματος διὰ τῆς ἰατρικῆς, τῆς δὲ ψυχῆς διὰ τῆς μουσικῆς.

68. These are mentioned in Plato, *Laws*, 790 d, a passage which is the origin of Aristotle's doctrine of κάθαρσις. For a full account see Rohde, *Psyche*, ii. 48, *n.* 1.

69. Plato gives this as the Pythagorean view in *Phaed.* 62 b. The passage distinctly implies that it was not merely the theory of Philolaos, but something older.

70. See Döring in *Arch.* v. pp. 505 *sqq.* There seems to be a reference to the theory of the "three lives" in Herakleitos, fr. 111. It was apparently taught in the Pythagorean Society of Phleious; for Herakleides made Pythagoras expound it in a conversation with the tyrant of Phleious (Cic. *Tusc.* v. 3; Diog. pr. 12, viii. 8), and Plato makes Sokrates argue from it in the *Phaedo* (see my note on 68 c 2).

71. Stob. i. p. 20, 1, ἐκ τῶν Ἀριστοξένου περὶ ἀριθμητικῆς, Τὴν δὲ περὶ τοὺς ἀριθμοὺς πραγματείαν μάλιστα πάντων τιμῆσαι δοκεῖ Πυθαγόρας καὶ προαγαγεῖν ἐπὶ τὸ πρόσθεν ἀπαγαγὼν ἀπὸ τῆς τῶν ἐμπόρων χρείας

72. Apart from the story in Iamblichos (*V. Pyth.* 148) that Eurytos heard the voice of Philolaos from the grave after he had been many years dead it is to be noticed that he is mentioned after him in the statement of Aristoxenos referred to (Diog. viii. 46; R. P. 62).

73. Arist. *Met.* N, 5. 1092 b 8 (R. P. 76 a). Aristotle does not quote the authority of Archytas here, but the source of his statement is made quite clear by Theophr. *Met.* p. vi. a 19 (Usener), τοῦτο γὰρ (sc. τὸ μὴ μέχρι του προελθόντα παύεσθαι) τελέου καὶ

φρονοῦντος, ὅπερ Ἀρχύτας ποτ' ἔφη ποιεῖν Εὔρυτον διατιθέντα τινὰς ψήφους· λέγειν γὰρ ὡς ὅδε μὲν ἀνθρώπου ὁ ἀριθμός, ὅδε δὲ ἵππου, ὅδε δ' ἄλλου τινὸς τυγχάνει.

74. The notation used in Greek arithmetical treatises must have originated at a date and in a region where the *Vau* and the *Koppa* were still recognised as letters of the alphabet and retained their original position in it. That points to a Dorian state (Taras or Syracuse?), and to a date not later than the early fourth century B.C. The so-called Arabic figures are usually credited to the Indians, but M. Carra de Vaux has shown (*Scientia*, xxi. pp. 273 *sqq.*) that this idea (which only makes its appearance in the tenth century A.D.) is due to a confusion between the Arabic *hindi*, "Indian," and *hindasi*, "arithmetical." He comes to the conclusion that the "Arabic" numerals were invented by the Neopythagoreans, and brought by the Neoplatonists to Persia, whence they reached the Indians and later the Arabs. The zero, on which the value of the whole system depends, appears to be the initial letter of οὐδέν.

75. Nikomachos of Gerasa, *Introd. Arithm.* p. 83, 12, Hoche, Πρότερον δὲ ἐπιγνωστέον ὅτι ἕκαστον γράμμα ᾧ σημειούμεθα ἀριθμόν, οἷον τὸ ι, ᾧ τὸ δέκα, τὸ κ, ᾧ τὰ εἴκοσι, τὸ ω, ᾧ τα ὀκτακόσια, νόμῳ καὶ συνθήματι ἀνθρωπίνῳ, ἀλλ' οὐ φύσει σημαντικόν ἐστι τοῦ ἀριθμοῦ κτλ. Cf. also Iambl. *in Nicom.* p. 56, 27, Pistelli, ἰστέον γὰρ ὡς τὸ παλαιὸν φυσικώτερον οἱ πρόσθεν ἐσημαίνοντο τὰς τοῦ ἀριθμοῦ ποσότητας, ἀλλ' οὐχ ὥσπερ οἱ νῦν συμβολικῶς.

76. For the prime or rectilinear numbers, cf. *Iambl. in Nicom.* p. 26, 25, Pistelli, πρῶτος μὲν οὖν καὶ ἀσύνθετος ἀριθμός ἐστι περισσὸς ὃς ὑπὸ μόνης μονάδος πληρούντως μετρεῖται, οὐκέτι δὲ καὶ ὑπ' ἄλλου τινὸς μέρους, καὶ ἐπὶ μίαν δὲ διάστασιν προβήσεται ὁ τοιοῦτος, διὰ τοῦτο δὲ αὐτὸν καὶ εὐθυμετρικόν τινες καλοῦσι, Θυμαρίδας δὲ καὶ εὐθυγραμμικόν· ἁπλατὴς γὰρ ἐν τῇ ἐκθέσει ἐφ' ἓν μόνον διιστάμενος. It is generally recognised now that Thymaridas was an early Pythagorean (Tannery, *Mém. scient.* vol. i. *n.* 9; G. Loria, *Scienze esatte*, p. 807); and, if that is so, we have a complete proof that this theory goes back to the early days of the school. For the triangular, oblong, and square numbers, etc., see Theon of Smyrna, pp. 27-37, Hiller, and Nicom. *loc. cit.*

77. Cf. the formula Οὐ μὰ τὸν ἁμετέρᾳ γενεᾷ παραδόντα τετρακτύν, which is all the more likely to be old that it is put into the mouth of Pythagoras by the forger of the Χρυσᾶ ἔπη,, thus making him swear by himself ! See Diels, *Arch.* iii. p. 457.

78. Speusippos wrote a work on the Pythagorean numbers, based chiefly on Philolaos, and a considerable fragment of it is preserved in the *Theologumena Arithmetica*. It will be found in Diels, *Vorsokratiker*, 32 A 13, and is discussed by Tannery, *Science hellène*, pp. 374 *sqq.*

79. See Theon, *Expositio*, pp. 93 *sqq.*, Hiller. The τετρακτύς used in the *Timaeus* is the second described by Theon (*Exp.* p. 94, 10 *sqq.*).

80. In accordance with analogy (p. 21, *n.* i), the original meaning of the word γνώμων must have been that of the carpenter's square. From that are derived its use (1) for the instrument; (2) for the figure added to a square or rectangle to form another square or rectangle. In Euclid (ii. def. 2) this is extended to all parallelograms, and finally the γνώμων is defined by Heron (ed. Heiberg, vol. iv. def. 58) thus: καθόλου δὲ γνώμων ἐστὶν πᾶν, ὃ προσλαβὸν ὁτιοῦν, ἀριθμὸς ἢ σχῆμα, ποιεῖ τὸ ὅλον ὅμοιον ᾧ προσείληφεν These, however, are later developments; for the use of γνώμων in the sense of "perpendicular" by Oinopides of Chios shows that, in the fifth century B.C., it only applied to rectangular figures.

81. Cf. Milhaud, *Philosophes géomètres*, pp. 115 *sqq.* Aristotle puts the matter thus (*Phys.* Γ, 4. 203 a 13): περιτιθεμένων γὰρ τῶν γνωμόνων περὶ τὸ ἓν καὶ χωρὶς ὁτὲ μὲν ἄλλο ἀεὶ γίγνεσθαι τὸ εἶδος, ὁτὲ δὲ ἕν.. This is more clearly stated by Ps.-Plut. (Stob. i. p. 22, 16, ἔτι δὲ τῇ μονάδι τῶν ἐφεξῆς περισσῶν περιτιθεμένων ὁ γινόμενος ἀεὶ τετράγωνός ἐστι· τῶν δὲ ἀρτίων ὁμοίως περιτιθεμένων ἑτερομήκεις καὶ ἄνισοι πάντες ἀποβαίνουσιν, ἴσως δὲ ἰσάκις οὐδείς. It will be observed that Aristotle here uses εἶδος in the sense of "figure." The words καὶ χωρὶς apparently mean χωρὶς τοῦ ἑνός, *i.e.* starting from 2, not from 1.

82. Speusippos (cf. p. 102, *n.* 2) speaks of four as the first pyramidal number; but this is taken from Philolaos, so we cannot safely ascribe it to Pythagoras.

83. Proclus, *in Eucl.* I. p. 136, 8, ἔστι δὲ τὸ ὄνομα (sc. ὅρος) οἰκεῖον τῇ ἐξ ἀρχῆς γεωμετρίᾳ, καθ' ἣν τὰ χωρία ἐμέτρουν καὶ τοὺς ὅρους αὐτῶν ἐφύλαττον ἀσυγχύτους. We have ὅροι of a series (ἔκθεσις), then of a proportion, and in later times of a syllogism. The signs :, ::, .·. seem to be derived from this. The term χώρα is often used by the later Pythagoreans, though Attic usage required χωρίον for a rectangle. The spaces between the γραμμαί of the abacus and the chess-board were also called χῶραι.

84. In his commentary on Euclid i. 44, Proclus tells us on the authority of Eudemos that the παραβολή, ἔλλειψις and ὑπερβολή of χωρία were Pythagorean inventions. For these and the later application of the terms in Conic Sections, see Milhaud, *Philosophes géomètres*, pp. 81 *sqq*.

85. See Proclus's commentary on Euclid i. 47.

86. Arist. *An. Pr.* A, 23. 41 a 26, ὅτι ἀσύμμετρος ἡ διάμετρος διὰ τὸ γίγνεσθαι τὰ περιττὰ ἴσα τοῖς ἀρτίοις συμμέτρου τεθείσης. The proofs given at the end of Euclid's Tenth Book (vol, iii. pp. 408 *sqq*., Heiberg) turn on this very point. They are not Euclidean, and may be substantially Pythagorean. Cf. Milhaud, *Philosophes géomètres*, p. 94.

87. Plato, *Theaet.* 147 d 3 *sqq.*

88. This version of the tradition is mentioned in Iamblichos, *V. Pyth.* 247, and looks older than the other, which we shall come to later (§148). The excommunicated Hippasos is the *enfant terrible* of Pythagoreanism, and the traditions about him are full of instruction. See p. 94, *n.* 2.

89. The harmonic mean is thus defined by Archytas (fr. 2, Diels) ἁ δὲ ὑπεναντία (μεσότας), ἂν καλοῦμεν ἁρμονικάν, ὅκκα ἔωντι <τοῖοι (sc. οἱ ὅροι) · ᾧ> ὁ πρῶτος ὅρος ὑπερέχει τοῦ δευτέρου αὐταύτου μέρει, τωὐτῷ ὁ μέσος τοῦ τρίτου ὑπερέχει τοῦ τρίτου μέρει.. Cf. Plato, *Tim.* 36 a 3, τὴν . . . ταὐτῷ μέρει τῶν ἄκρων αὐτῶν ὑπερέχουσαν καὶ ὑπερεχομένην. The harmonic mean of 12 and 6 is, therefore, 8; for 8=12-12/3 = 6+6/3.

90. The smith's hammers belong to the region of *Märchen*, and it is not true that the notes would correspond to the weight of the hammers, or that, if they did, the weights hung to equal strings would produce the notes. The number of vibrations really varies with the square root of the weights. These inaccuracies were pointed out by Montucla (Martin, *Études sur le Timée,* i. p. 391).

91. Arist. *Met.* M, 4. 1078 b 21 (R. P. 78). The *Theologumena Arithmetica* is full of such fancies (R. P. 78 a). Alexander, *in Met.* p. 38, 8, gives a few definitions which may be old (R. P. 78 c).

92. Arist. *Phys.* Δ, 6. 213 b 22 (R. P. 75).

93. Diog. ix. 119 (R. P, 103 c), ὅλον δ' ὁρᾶν καὶ ὅλον ἀκούειν, μὴ μέντοι ἀναπνεῖν (φησι Ξενοφάνης) So in [Plut.] *Strom.* fr. 4 we read that Xenophanes held μὴ κατὰ πᾶν μέρος περιέχεσθαι ὑπὸ ἀέρος (τὴν γῆν). We may therefore ascribe the statement to Theophrastos without hesitation, in spite of the fact that Diogenes is here drawing on an inferior (biographical) source, as shown by Diels (*Dox.* p. 168). Cf. also Hipp. *Ref.* i. 14, 2,τὴν δὲ γῆν ἄπειρον εἶναι καὶ μήτε ὑπ' ἀέρος μήτε ὑπὸ τοῦ οὐρανοῦ περιέχεσθαι (Ξενοφάνης λέγει).

94. Arist. *Met.* N, 3. 1091 a 13 (R. P. 74).

95. Arist. *Phys.* Δ, 6. 213 b 23 (R. P. 75 a). The words διορίζει τὰς φύσεις have caused unnecessary difficulty, because they have been supposed to attribute the function of limiting to the ἄπειρον. Aristotle makes it quite clear that his meaning is that stated in the text. Cf. especially the words χωρισμοῦ τινος τῶν ἐφεξῆς καὶ διορίσεως. The term διωρισμένον, "discrete," is the proper antithesis to συνεχές, "continuous." In his work on the Pythagorean philosophy, Aristotle used instead the phrase διορίζει τὰς χώρας (Stob. i. p. 156, 8 ; R. P. 75), which is also quite intelligible if we remember what the Pythagoreans meant by χώρα (cf. p. 104, *n.* 2).

96. Cf. Arist. *Phys.* Δ, 6. 213 a 27, οἱ δ' ἄνθρωποι . . . φασὶν ἐν ᾧ ὅλως μηδέν ἐστι, τοῦτ' εἶναι κενόν, διὸ τὸ πλῆρες ἀέρος κενὸν εἶναι ; *De part. an*. B, 10. 656 b 15, τὸ γὰρ κενὸν καλούμενον ἀέρος πλῆρές ἐστι; *De an*. B, 10. 419 b 34, δοκεῖ γὰρ εἶναι κενὸν ὁ ἀήρ.

97. Arist. *Met.* A, 3. 984 a 7 (R. P. 56 c).

98. See Chap. IV. § 91.

99. Arist. *Met.* A, 5. 986 a 25 (R. P. 66).

100. Plato, *Tim.* 58 d 2.

101. This is quoted by Plutarch, *De def. orac*. 422 b, d, from Phanias of Eresos, who gave it on the authority of Hippys of Rhegion. If we may follow Wilamowitz (*Hermes*, xix. p. 444) in supposing that this really means Hippasos of Metapontion (and it was in Rhegion that the Pythagoreans took refuge), this is a very valuable piece of evidence.

102. This will be found in Chap. IV. §93.

103. I formerly doubted this on the ground that Plato appeared to represent the theory as a novelty in *Laws*, 822 a, but Professor Taylor has convinced me that I was wrong. What Plato is denying in that passage is this very doctrine, and the theory he is commending must be that of a simple motion in a new form. This was a discovery of Plato's old age; in the Myth of Er in the *Republic* and in the *Timaeus* we still have the Pythagorean theory of a composite motion. It is true that no writer earlier than Theon of Smyrna (p. 150, 12) expressly ascribes this theory to Pythagoras, but Aetios (ii. 16, 2) says that Alkmaion, a younger

contemporary of Pythagoras, agreed with the mathematicians in holding that the planets had an opposite motion to the fixed stars. His other astronomical views were so crude (§ 96) that he can hardly have invented this.

104. See the account of the theory of Demokritos in Lucretius, v. 621 *sqq*., and cf. above, p. 70. The technical term is ὑπόλειψις. Strictly speaking, the Ionian view is only another way of describing the same phenomena, but it does not lend itself so easily to a consistent theory of the real planetary motions.

105. See Chap. IV. §§ 92-93, and Chap. VII. §§ 150-152.

106. It is impossible not to be struck by the resemblance between this doctrine and Dalton's theory of chemical combination. A formula like H_2O is a beautiful example of a μεσότης. The diagrams of modern stereochemistry have also a curiously Pythagorean appearance. We sometimes feel tempted to say that Pythagoras had really hit upon the secret of the world when he said, "Things are numbers."

107. Aristotle derived his doctrine of the Mean from Plato's *Philebus*, where it is clearly expounded as a Pythagorean doctrine.

108. See fr. 7, below.

109. Diog. ix. 18 (R. P. 97). We know that Xenophanes referred to the prediction of an eclipse by Thales (Chap. I. p. 42, *n*. 1).

110. Timaios *ap.* Clem. *Strom*. i. p. 353 (R. P. 95). There is only one anecdote which actually represents Xenophanes in conversation with Hieron (Plut. *Reg. apophth*. 175 e), but it is natural to understand Arist. Met. Γ, 5. 1010 a 4 as an allusion to a remark made by Epicharmos to him. Aristotle's anecdotes about Xenophanes probably come from the romance of which Xenophon's *Hieron* is also an echo.

111. Clem. *loc. cit*. The mention of Cyrus is confirmed by Hipp. *Ref.* i. 94. Diels thinks Dareios was mentioned first for metrical reasons; but no one has satisfactorily explained why Cyrus should be mentioned at all, unless the early date was intended. On the whole subject, see Jacoby, pp. 204 *sqq*., who is certainly wrong in supposing that ἄχρι τῶν Δαρείου καὶ Κύρου χρόνων can mean "during the times of Dareios and Cyrus."

112. *Rh. Mus.* xxxi. p. 22. He adopts the suggestion of Ritter to read πεντηκόστην for τεσσαρακόστην in Clem. *loc. cit*. (N for M). But Apollodoros gave Athenian archons, not Olympiads.

113. As Elea was founded by the Phokaians six years after they left Phokaia (Herod. i. 164 *sqq*.) its date is just 540-39 B.C. Cf. the way in which Apollodoros dated Empedokles by the era of Thourioi (§ 98).

114. Bergk (*Litteraturgesch.* ii. p. 418, *n*. 23) took φροντίς here to mean the literary work of Xenophanes, but it is surely an anachronism to suppose that at this date it could be used like the Latin *cura*.

115. It was certainly another poem ; for it is in hexameters, while the preceding fragment is in elegiacs.

116. Xenophanes, fr. 7 ; Herakleitos, frs. 16, 17.

117. Diog. ix. 21 (R. P. 96 a).

118. Diog. ix. 18 (R. P. 96). The use of the old name Zankle, instead of the later Messene, points to an early source for this statement—probably the elegies of Xenophanes himself.

119. Diog. ix. 18 (R. P. 97) says αὐτὸς ἐρραψῴδει τὰ ἑαυτοῦ, which is a very different thing. Nothing is said anywhere of his reciting Homer. Gomperz's imaginative picture (*Greek Thinkers*, vol. i. p. 155) has no further support than this single word.

120. Diog. ix. 20 (R. P. 97) says he wrote a poem in 2000 hexameters on the colonisation of Elea. Even if true, this would not prove he lived there; for the foundation of Elea would be a subject of interest to all the Ionian *émigrés*. Moreover, the statement is very suspicious. The stichometric notices of the Seven Wise Men, Epimenides, etc., in Diogenes come from the forger Lobon, and this seems to be from the same source.

121. The only passage which brings him into connexion with Elea is Aristotle's anecdote about the answer he gave the Eleates when they asked him whether they should sacrifice to Leukothea. "If you think her a goddess," he said, "do not lament her; if you do not, do not sacrifice to her" (*Rhet*. B, 26. 1400 b 5 ; R.P. 98 a). Even this does not necessarily imply that he settled at Elea, and in any case such anecdotes are really anonymous. Plutarch tells the story more than once, but he makes it a remark of Xenophanes to the Egyptians (Diels, *Vors*. II A 13), while others tell it of Herakleitos.

122. Diog. ix. 18 (R. P. 97) The word ἐπικόπτων is a reminiscence of Timon fr. 60 (Diels), Ξεινοφάνης ὑπάτυφος Ὁμηραπάτης ἐπικόπτης

123. The oldest reference to a poem Περὶ φύσεως is in the Geneva scholium on *Il.* xxi. 196 (quoting fr. 30), and this goes back to Krates of Mallos. We must remember that such titles are of later date, and Xenophanes had been given a place among philosophers long before the time of Krates. All we can say, therefore, is that the Pergamene librarians gave the title Περὶ φύσεως to some poem of Xenophanes.

124. Simpl. *De caelo*, p. 522, 7 (R. P. 97 b). It is true that two of our fragments (25 and 26) are preserved by Simplicius, but he got them from Alexander. Probably they were quoted by Theophrastos; for it is plain that Alexander had no first-hand knowledge of Xenophanes, or he would not have been taken in by *M.X.G.* (See p. 126.)

125. Three fragments (27, 31, 33) come from the *Homeric Allegories*, two (30, 32) are from Homeric scholia.

126. So I understand ἀμφ' ἀρετῆς. The τόνος is "strength of lungs." The next verses are directed against Hesiod and Alkaios (Diels).

127. At this date "art" is the natural translation of σοφίη in such a writer as Xenophanes.

128. Diels suggests that this is an attack on a poet like Simonides, whose greed was proverbial.

129. The name of Pythagoras does not occur in the lines that have been preserved; but the source of Diogenes viii. 36 must have had the complete elegy before him; for he said the verses occurred ἐν ἐλεγείᾳ, ἧς ἀρχὴ Νῦν αὖτ' ἄλλον ἔπειμι λόγον κτλ..

130. Reading ἠέρι for καὶ ῥεῖ with Diels.

131. This fragment has been recovered from the Geneva scholia on Homer (see *Arch.* iv. p. 652). The words in brackets are added by Diels.

132. The word is ὑπεριέμενος. This is quoted from the *Allegories* as an explanation of the name Hyperion, and doubtless Xenophanes so meant it.

133. It is more natural to take πᾶσι as masculine than as neuter, and ἐπὶ πᾶσι can mean "in the power of all."

134. Reading δεδοξάσθω with Wilamowitz.

135. As Diels suggests, this probably refers to the stars, which Xenophanes held to be clouds.

136. Cf. Diels *ad loc.* (*P. Ph. Fr.* p. 44), "ut Sol et cetera astra, quae cum in nebulas evanescerent, deorum simul opinio casura erat."

137. Aet. ii. 18, I (*Dox.* p. 347), Ξενοφάνης τοὺς ἐπὶ τῶν πλοίων φαινομένους οἷον ἀστέρας, οὓς καὶ Διοσκούρους καλοῦσί τινες, νεφέλια εἶναι κατὰ τὴν ποιὰν κίνησιν παραλάμποντα.

138. The passages from Aetios are collected in Diels, *Vors.* 11 A 38 *sqq.*

139. Aet. ii. 20, 3 (Dox. p. 348), Ξενοφάνης ἐκ νεφῶν πεπυρωμένων εἶναι τὸν ἥλιον. Θεόφραστος ἐν τοῖς Φυσικοῖς γέγραφεν ἐκ πυριδίων μὲν τῶν συναθροιζομένων ἐκ τῆς ὑγρᾶς ἀναθυμιάσεως, συναθροιζόντων δὲ τὸν ἥλιον. It seems likely from these words that Theophrastos pointed out the contradiction, as his manner was.

140. Aet. ii. 24, 9 (*Dox.* p. 355). πολλοὺς εἶναι ἡλίους καὶ σελήνας κατὰ κλίματα τῆς γῆς καὶ ἀποτομὰς καὶ ζώνας, κατὰ δέ τινα καιρὸν ἐμπίπτειν τὸν δίσκον εἴς τινα ἀποτομὴν τῆς γῆς οὐκ οἰκουμένην ὑφ' ἡμῶν καὶ οὕτως ὥσπερ κενεμβατοῦντα ἔκλειψιν ὑποφαίνειν· ὁ δ' αὐτὸς τὸν ἥλιον εἰς ἄπειρον μὲν προιέναι, δοκεῖν δὲ κυκλεῖσθαι διὰ τὴν ἀπόστασιν.

141. That this is the meaning of κενεμβατέω appears sufficiently from the passages referred to in Liddell and Scott, and it describes a total eclipse very well.

142. Aet. ii. 13, 14 (*Dox.* p. 343), ἀναζωπυρεῖν νύκτωρ καθάπερ τοὺς ἄνθρακας.

143. Aet. ii. 30, 8 (*Dox.* p. 362), τὸν μὲν ἥλιον χρήσιμον εἶναι πρὸς τὴν τοῦ κόσμου καὶ τὴν τῶν ἐν αὐτῷ ζῴων γένεσίν τε καὶ διοίκησιν, τὴν δὲ σελήνην παρέλκειν. The verb παρέλκειν means "to cork." (Cf. Aristophanes, *Pax*, 1306). In Hellenistic Greek the metaphor is no longer felt, and παρέλκει means "is redundant," "is superfluous."

144. There is an interesting note on these in Gomperz's *Greek Thinkers* (Eng. trans. i. p. 551). I have translated his conjecture φυκῶν instead of the MS. φωκῶν, as this is said to involve a palaeontological impossibility, and impressions of fucoids are found, not indeed in the quarries of Syracuse, but near them. It is said also that there are no marine fossils in Paros, so the MS. reading δάφνης need not be changed to ἀφύης with Gronovius. The fact that the fossil was in the depth of the stone seemed to show that Parian marble was once mud. It was no doubt imaginary.

145. Aet. ii. 1, 2 (*Dox*. p. 327); Diog. ix. 19 (R. P. 103 c). It is true that this passage of Diogenes comes from the biographical compendium (*Dox*. p. 168); but it is difficult to doubt the Theophrastean origin of a statement found in Aetios, Hippolytos, and Diogenes.

146. Arist. Met. A, 5. 986 b 23 (R. P. 101). οὐδὲν διεσαφήνισεν

147. This is given as an inference by Simpl. *Phys.* p. 23, 18 (R. P. 108 b), διὰ τὸ πανταχόθεν ὅμοιον. It does not merely come from *M.X.G.* (R. P. 108), πάντῃ δ' ὅμοιον ὄντα σφαιροειδῆ εἶναι. Hippolytos has it too (*Ref.* i. 14; R. P. 102 a), so it goes back to Theophrastos. Timon of Phleious understood Xenophanes in the same way; for he makes him call the One ἴσον ἁπάντῃ (fr. 60, Diels; R. P. 102 a).

148. Arist. *De caelo*, B, 13. 294 a 21 (R. P. 103 b).

149. I take δαψιλός as an attribute and ἀπείρονα as predicate to both subjects.

150. *Il*. viii.13-16, 478-481, especially the words οὐδ' εἴ κε τὰ νείατα πείραθ' ἵκηαι | γαίης καὶ πόντοιο κτλ. *Iliad* viii. must have seemed a particularly bad book to Xenophanes.

151. In Bekker's edition this treatise bears the title Περὶ Ξενοφάνους, περὶ Ζήνωνος, περὶ Γοργίου, but the best MS. gives as the titles of its three sections: (1) Περὶ Ζήνωνος, (2) Περὶ Ξενοφάνους, (3) Περὶ Γοργίου. The first section, however, plainly refers to Melissos, so the whole treatise is now entitled *De Melisso, Xenophane, Gorgia* (*M.X.G.*). It has been edited by Apelt in the Teubner Series, and more recently by Diels (*Abh. der k. Preuss. Akad.* 1900), who has also given the section dealing with Xenophanes in *Vors*. II A 28. He has now withdrawn the view maintained in *Dox.* p. 108 that the work belongs to the third century B.C., and holds that it was a *Peripatetico eclectico* (i.e. *sceptica, platonica, stoica admiscente*) *circa Christi natalem conscriptum.* The writer would have no first-hand knowledge of his poems, and the order in which the philosophers are discussed is that of the passage in the *Metaphysics* which suggested the whole thing. It is possible that a section on Parmenides preceded what we now have.

152. *Met*. A, 5. 986 b 21 (R. P. 101), πρῶτος τούτων ἐνίσας. The verb ἐνίζειν occurs nowhere else, but is plainly formed on the analogy of μηδίζειν, φιλιππίζειν and the like.

153. *Theaet*. 181 a 6, τοῦ ὅλου στασιῶται. The noun στασιώτης has no other meaning than "partisan," and the context shows that this is what it means here. The derivation στασιώτας .. . ἀπὸ τῆς στάσεως appears first in Sext. *Math*. x. 46, where the term στασιῶται is incorrectly ascribed to Aristotle and supposed to mean those who made the universe stationary, an impossible interpretation.

154. *Soph.* 242 d 5 (R. P. 101 b). If the passage implies that Xenophanes settled at Elea, it equally implies this of his imaginary predecessors. But Elea was not founded till Xenophanes was in the prime of life.

155. *Theaet.* 179 a 3, τῶν Ἡρακλειτείων ἤ, ὥσπερ σὺ λέγεις, Ὁμηρείων καὶ ἔτι παλαιοτέρων. Here Homer stands to the Herakleiteans in just the same relation as Xenophanes does to the Eleatics in the *Sophist*. In just the same spirit, Epicharmos, the contemporary of Xenophanes, is mentioned, along with Homer, as a predecessor of the ῥέοντες (*Theaet.* 152 e).

156. *Met.* 986 b 24. The words cannot mean "gazing up at the whole heavens," or anything of that sort. They are taken as I take them by Bonitz (*im Hinblicke auf den ganzen Himmel*) and Zeller (*im Hinblick auf das Weltganze*). The word ἀποβλέπειν had become too colourless to mean more, and οὐρανός means what was later called κόσμος.

157. See above, p. 125, *n.* 1.

158. Diog. ix. 19 (R. P. 103 c), ὅλον δ' ὁρᾶν καὶ ὅλον ἀκούειν, μὴ μέντοι ἀναπνεῖν. See above, p. 108, *n.* 2.

159. [Plut.] *Strom.* fr. 4, ἀποφαίνεται δὲ καὶ περὶ θεῶν ὡς οὐδεμιᾶς ἡγεμονίας ἐν αὐτοῖς οὔσης· οὐ γὰρ ὅσιον δεσπόζεσθαί τινα τῶν θεῶν, ἐπιδεῖσθαί τε μηδενὸς αὐτῶν μηδένα μηδ' ὅλως, ἀκούειν δὲ καὶ ὁρᾶν καθόλου καὶ μὴ κατὰ μέρος.

160. The fact that he speaks of the world as living and sentient makes no difference. No Greek ever doubted that the world was in some sense a ζῷον.

161. Freudenthal, *Die Theologie des Xenophanes* (Breslau, 1886).

162. Xenophanes calls his god "greatest among gods and men," but this is simply a case of "polar expression," to which parallels will be found in Wilamowitz's note to Euripides' *Herakles*, v. 1106 Cf. especially the statement of Herakleitos (fr. 20) that "no one of gods or men" made the world.

163. Griechische Literatur, p. 38.

164. *Parmenides Lehrgedicht*, p. 9.