Ἄπειρος and Circularity

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THE ATTEMPT to connect ἄπειρος with the notion of circularity is not a novel concept. The way was indicated as far back as Aristotle, who includes in his *Physics* under the discussion of the theoretical possibility of the existence of the ἄπειρον, the 'infinite', a mention of the application of the adjective to objects such as rings which are uniform and characterized by the absence of a bezel.[1] Porphyry, whose investigation of ἄπειρος and circularity I shall consider at length in the body of this essay, collected several examples of import similar to that of Aristotle's ring. More recently Cornford concluded that it actively has the meaning 'circular'.[2] The latter two discussions, of which Porphyry's is dependent upon Aristotle and Cornford's practically a restatement of Porphyry, have both gone awry and have convinced no one who has considered the matter carefully. I, too, believe that their position is substantially untenable, but I am, however, prepared to grant that this was a result more of their method than of what they intuitively sensed. I intend to demonstrate here that ἄπειρος may indeed be related to a notion of circularity in itself, but that this is a latent meaning and therefore seldom expressed with absolute clarity, and that this meaning of ἄπειρος by itself was obscured after Pythagorean doctrine spread and gained notice. Furthermore, I submit that Ὠκεανός, the River Okeanos, is the primal concept behind the idea of circularity in it and that it is from here that the picture of the circular ἄπειρος which Porphyry presents has its origin.

I want to approach ἄπειρος first of all by considering its etymology. In so doing I must stress the fact that ἀπείρων, ἀπειρέσιος, ἀπερείσιος and ἀπείριτος are all epic variants of ἄπειρος, which dominates later prose usage. Moreover, these epic variants tend to have their own restricted formulaic usages, as ἀπερείσιος does, for instance, in the

[1] *Ph.* 3.4–8 contains a general discussion of ἄπειρος. The example of the ring is in *Ph.* 207a2–7.

[2] F. M. Cornford, "The Invention of Space," in *Essays in Honour of Gilbert Murray* (London 1936) 226; and *Principium Sapientiae* (Cambridge 1952) 171–77. For a general review of all the arguments see L. Sweeney, *Infinity in the Presocratics* (The Hague 1972) 1ff.

Homeric phrase ἀπερείϲι' ἄποινα.[3] Considering the narrow range of these individual words and their eventual telescoping into ἄπειροϲ, we may consider their etymologies together and not make serious distinctions among them.[4]

The root of all these words is Indo-European **per*, which had an 'end-directed' signification. Kahn has well argued that the *alpha*-privative in ἄπειροϲ negates not the noun πέραϲ but the verbal root **per-*, which may be seen in πείρω, περάω, περαίνω, as well as in numerous preverbs, such as πρό, παρά and περί.[5] Schwyzer goes so far as to say that "παρά und die Nebenform παραί gehören etymologisch zunächst mit πάροϲ 'früher' zusammen, weiter auch mit περί, πέρα, πρό, πρόϲ, usw."[6] When one further considers that περί may appear as πέρ and that πέρα is often joined in compounds in the form περ-, it is easy to see that confusion could arise between different, developed denotations of **per-*. Frisk, for example, glosses πέρα as "darüber hinaus, weiter, länger, mehr, jenseits," while he glosses περί as "ringsum, überaus, durchaus." Contrast these developments to the original **per-*, which Schwyzer says meant "im Hinausgehen, Hinübergehen über, im Durchdringen."[7]

Among modern philologists Schulze was the first to stress the περί aspect of ἄπειροϲ or, more accurately, of ἀπείριτοϲ. He analyzed ἀπείριτοϲ as **a-peri-itos* and explained the suffix *-itos* as drawn from ἰέναι, for which he compared ἀμαξιτόϲ and the Latin *orbita*; he translated it as that which '*circumiri nequit*'. He allowed, however, that it was possible that it might mean '*transire*', with the *-peri-* equivalent to Latin *per*.[8] Nevertheless, it has been his first explanation which later philologists have accepted. Bechtel agreed with Schulze in his identification of *-itos* with ἰέναι, and he gave an equivalent translation

[3] In the *Iliad* 11 times with ἄποινα; once with ἕδνα in both the *Iliad* and the *Odyssey*.

[4] *Cf.* Ch. Kahn, *Anaximander and the Origins of Greek Cosmology* (New York 1960) 231 [hereafter KAHN, *AOGC*].

[5] Kahn, *AOGC* 232. Ann L. Bergren, *The Poetics of a Formulaic Process: Etymology and Usage of πεῖραρ in Homer and Archaic Poetry* (Diss. Harvard 1973), stresses the **per* significance of πεῖραρ as 'goal-oriented'.

[6] Ed. Schwyzer, *Griechische Grammatik* II (Munich 1939–53) 491f; *cf.* also H. Frisk, *Griechische etymologisches Wörterbuch* (Heidelberg 1960–72) *s.v.* περί.

[7] Schwyzer, *op.cit.* (*supra* n.6) II. 499f: "Diese Bedeutungen kennt auch noch das Griechische; doch ist hier wie im Indisch-Iranischen 'rings um, um' die Hauptsbedeutung geworden. Ursprünglich war von περί in dieser Bedeutung ἀμφί 'zu beiden Seiten' verschieden; doch verblasste der Unterschied, bes. bei ἀμφί."

[8] W. Schulze, *Quaestiones epicae* (Gütersloh 1892) 116 n.3.

of ἀπείριτος as that "um den man nicht herum gehen kann."[9] More recently Chantraine has said that it "pourrait . . . signifier 'dont on ne peut faire le tour' de ἀ-περι-ιτος." Thus he too relies upon Schulze's comparison with ἀμαξιτός and assumes that the base of the word is a negated **per(i)*.[10] Frisk, however, is troubled by the *-i-* in *-itos*; Schwyzer offers a qualitative interpretation which satisfies neither Chantraine nor Frisk.[11]

The significance of ἄπειρος, keeping in mind its **per* root, is 'what cannot be passed over from end to end' with a connotation of circular movement; Kahn maintains that this easily passes into the sense of 'immense, enormous' in relation to human perspective, a sense associated with Homeric usage.[12] The Heraclitean concept of circularity and the applicability of ἄπειρος to a circle I shall consider below when I examine Porphyry's arguments.

On the whole, then, it is best to posit the connection of ἀπείριτος and hence ἄπειρος (from *ἀπέριος > ἄπειρος by metathesis, as ἀπερείσιος = ἀπειρέσιος) with περί. ἄπειρος, moreover, is often associated with περι-compounds, especially περιέχω, in philosophic speculation. Aristotle informs us that Anaximander (as is likely, to judge from the context) stated that his ἄπειρον surrounded (περιέχειν) the world. Anaximenes replaced Anaximander's τὸ ἄπειρον as ἀρχή with an ἄπειρος ἀήρ; he still allowed it to surround the world.[13] Elsewhere

[9] F. Bechtel, *Lexilogus zu Homer* (Halle 1914) 49.

[10] P. Chantraine, *Dictionnaire étymologique de la langue grecque* (Paris 1968–) *s.v.* ἀπειρέσιος.

[11] See Frisk, *op.cit.* (*supra* n.6) *s.v.* ἀπειρέσιος; Schwyzer, *op.cit.* (*supra* n.6) I.106 n.3.

[12] Kahn, *AOGC* 232f. Porphyry, *Quaestionum Homericarum ad Iliadem pertinentium reliquiae* 14.200 (fasc. II pp.189ff ed. H. Schrader, Leipzig 1882), had already hinted at the relative quality of ἄπειρος, when he wrote that σημαίνει δὲ τὸ ἄπειρον καὶ τὸ πεπερασμένον μὲν τῇ ἑαυτοῦ φύσει, ἡμῖν δ' ἀπερίληπτον (regarding Schrader's text, see *infra* n.30). G. J. M. Bartelink, who wrote the articles on ἀπείριτος and ἀπείρων in *Lexicon des frühgriechischen Epos* fasc. VI (Göttingen 1969), stresses that the endlessness is relative to the viewer. See also P. J. Bicknell, "τὸ ἄπειρον, ἄπειρος ἀήρ and τὸ περιέχον," *Acta Classica* 9 (1966) 39.

[13] Arist. *Ph.* 203b12; Aëtius 1.3.4 (=H. Diels and W. Kranz, *Die Fragmenta der Vorsokratiker*[16] [Dublin–Zürich 1972] 13 B 2 [hereafter Diels-Kranz]). *Cf.* also Arist. *Cael.* 303b12, ὃ περιέχειν φασὶ πάντας τοὺς οὐρανοὺς ἄπειρον ὄν, and Pl. *Ti.* 31A4, 31A8, and 33B1. On the whole question of περιέχειν as a reminiscence of Anaximander, see A. E. Taylor, *A Commentary on Plato's Timaeus* (Oxford 1928) *ad* 31A4; and F. Solmsen, "Anaximander's Infinite: Traces and Influences," *AGPh* 44 (1962) 109–31. It is beyond the scope of this paper to discuss the problem of 'qualitatively indefinite' versus 'quantitatively infinite'. H. Fränkel, *Wege u. Formen frühgriechischen Denkens* (Munich 1955) 189ff, declares for 'qualitatively indefinite', and W. K. C. Guthrie, *A History of Greek Philosophy* I (Cambridge 1962–) 83ff, prefers this meaning (without excluding the other). G. S. Kirk and J. E. Raven, *The Presocratic Philosophers* (Cambridge 1969) 108–10, argue on the basis of early usage that the spatial sense of

Aristotle says that certain philosophers granted the *ἄπειρον* the right and prerogative of *τὸ πάντα περιέχειν καὶ τὸ πᾶν ἐν ἑαυτῷ ἔχειν*.[14] Aristotle replaced it, however, in his scheme with the *οὐρανόϲ*. In this scheme the *οὐρανόϲ* encloses a complete system. It is the function of *τὸ πᾶν* to surround, not the *ἄπειρον*, which Aristotle defines as a potential but not realized whole; the *ἄπειρον* is a mere part, and so it is impossible that it should embrace and define anything. This follows, according to Aristotle's logical system, for two reasons. First, in his division of causes he defines the *ἄπειρον* as material cause: *οὐ περιέχει ἀλλὰ περιέχεται, ᾗ ἄπειρον . . . περιέχεται γὰρ ὡϲ ἡ ὕλη ἐντὸϲ καὶ τὸ ἄπειρον, περιέχει δὲ τὸ εἶδοϲ*.[15] Aristotle's discussion in these sections fairly bristles with *περιέχω* in its many forms, with active and passive forms opposed to one another. He is upbraiding those philosophers who have granted to the *ἄπειρον* (= material cause) the prerogative of the formal cause, that of defining and outlining the whole, in this case, the world.[16]

Aristotle is here changing the *ἄπειρον* from the external factor that it was in Anaximander, Anaximenes and others into an internal factor. Beyond a matter of the four causes, Aristotle is also faced with the problem of a body infinite in extension. Such a thing appears impossible within Aristotelian terminology, since "body is defined as that which is limited by a surface."[17] To the end of *Physics* 3.6 he is occupied with exposing the fallacies involved in equating *ἄπειρον* and *τὸ πᾶν* (= *ὅλον*). This is in keeping with the overall tenor of *Physics* 3.4–8, which is a general discussion on the possibility of the existence of infinity.

ἄπειροϲ predominates (though not necessarily in the sense of 'infinite'), but they consider it uncertain that Anaximander intended precisely this. Certainly, however, Aristotle understood the word as 'infinite', and in his discussion 'qualitatively indeterminate' (*i.e.* amorphous) expectedly gives way to an overriding emphasis on Form. One should imbibe the salutary warning of Guthrie, however, that with Anaximander we are not at a stage where "distinctions between different uses of the same word are possible" (*op.cit.* I.86; *cf.* 109).

It is likewise not the aim of this paper to consider the question of innumerable worlds in Anaximander. Recent discussions of this problem (with references to earlier work) may be found in Kirk and Raven, *op.cit.* 121–23; Kahn, *AOGC* 46–53; and Guthrie, *op.cit.* I.106–15.

[14] *Ph.* 207a19.

[15] *ibid.* 207a25–b1. *Cf.* also *Cael.* 312a12–13, *φαμὲν δὲ τὸ μὲν περιέχον τοῦ εἴδουϲ εἶναι, τὸ δὲ περιεχόμενον τῆϲ ὕληϲ.*

[16] *Cf.* the language of Pl. *Ti.* 31A4 and 31A8 in a similar context. Also note LSJ *περιέχω* I.1.b.

[17] W. D. Ross, *Aristotle: Physics, Revised Text with Introduction and Commentary* (Oxford 1955) 364. *Cf.* Sweeney, *op.cit.* (*supra* n.2) 92, 170f.

We obviously have to deal with two senses of the ἄπειρον: in the first, that of the earlier physicist-philosophers, it is external and active (περιέχει), while in the second view, that of Aristotle, it has become an internalized phenomenon and is now a passive factor (περιέχεται).

At the same time as he is involved in changing the orientation of the ἄπειρον, Aristotle alters its definition to keep it in agreement with his concept of the infinite as always undefined and incomplete: οὐ γὰρ οὗ μηδὲν ἔξω, ἀλλ' οὗ ἀεί τι ἔξω ἐcτί, τοῦτο ἄπειρόν ἐcτιν.[18] The basis for his definition of it is the principle of infinite division and addition which he enunciates just prior to this. To be sure, when Anaximander stated that the ἄπειρον surrounded all things, he probably assumed that all of space was occupied with his ἄπειρον, and therefore that it was a type of ὅλον. This, however, was unacceptable to later philosophers.[19] In the *Timaeus*, for instance, Plato speaks of a cosmos which contains ἓν ὅλον ἕκαcτον (of its four constituent elements) and which leaves μέροc οὐδὲν οὐδενὸc . . . ἔξωθεν, but on the contrary is "whole and wholly complete."[20] Furthermore, he describes this sphere as ἐκ μέcου πάντῃ πρὸc τὰc τελευτὰc ἴcον ἀπέχον, which is, moreover, reminiscent of the explanation generally accepted for Parmenides' 'sphere', where πείρατα are imposed upon it (fr.8) to serve as the confines of an unvarying reality.[21] Guthrie notes that the argument for confining all reality within bounds seems to be that "what is *apeiron* is essentially unfinished, incomplete, never a perfect whole however much of it one may include."[22] Parmenides, of course, did not say this in so many words; it is, however, a valid extrapolation of his doctrine from the viewpoint of Aristotelian terminology. The trail leads irrevocably back from Aristotle, to the *Timaeus*, to Parmenides; following the lead of Plato, Aristotle is making a fundamental return to a position taken (but with serious objections concerning the existence of anything ἄπειρον) by Parmenides. Yet it is not until Aristotle that we can see an explicit definition of the status of the ἄπειρον, and it is in the course of his definition that he manifestly diverges from Parmenides, both because Parmenides absolutely

[18] *Ph.* 207a1.

[19] Solmsen, *op.cit.* (*supra* n.13) 120–22.

[20] *Ti.* 32c5–33A7.

[21] See Taylor, *op.cit.* (*supra* n.13) *ad* 33B4–5, for a reference to Parmenides. On the question of the 'sphere', see now G. E. L. Owen, "Eleatic Questions," *CQ* N.S. 10 (1960) 95–101; and Guthrie, *op.cit.* (*supra* n.13) II.43ff.

[22] Guthrie, *op.cit.* (*supra* n.13) II.38.

denied the existence of an ἄπειρον and also because he did not posit a physically existent sphere.

In attempting to define further the nature of the ἄπειρον, Aristotle indicates that it is that which is ἀδιεξίτητον, 'incapable of being crossed from side to side'. In part his reason for saying this is because the infinite always has something further to be negotiated. Almost certainly he owes something for this conception of the ἀδιεξίτητον ἄπειρον to Zeno's paradoxes of motion, particularly the first one (*Ph.* 239b11–14), which may be complemented by an infinite regress to disallow the possibility of motion entirely or (as here) the possibility of reaching a terminus. Elsewhere in the *Physics* Aristotle uses similar language, once in defining the sense in which something is 'intraversable' (τὸ ἀδύνατον διελθεῖν) and again in his disquisition on circular motion at the end of the *Physics* (διελθεῖν δὲ τὴν ἄπειρον [*sc.* φορὰν] ἀδύνατον).[23] Solmsen has opined that the source of the concept of an ἀδιεξίτητον for Anaximander's thought is Hesiod, *Theogony* 736ff. The poets, he thinks, had not yet discovered the possibility of 'absolute' infinity; a space demanding more than a year to negotiate boggles the simple mind and is felt to be (practically) infinite.[24] This is very close to the manner in which Porphyry and Kahn arrive at a relativistic concept of ἄπειρον, which they find confirmed in Homer. It is for this reason that Homer, while he describes both the earth and sea as ἀπείρων, nonetheless imposes πείρατα upon them—their πείρατα are so distant relative to the capacity of the Homeric man for travel that they are, for all intents, beyond the grasp of the mortal imagination.

It is Ὠκεανός, of course, which provides the πείρατα for the earth, and, conversely, the earth's shores are the inner πείρατα for the River Okeanos. According to Bergren, "the πείρατα γαίηϲ is the earth's physical extremity . . . it is the line between opposite elements." It is thus coextensive with the πείρατα Ὠκεανοῖο. Bergren maintains that the most archaic signification of πεῖραρ in Greek is the concrete designation of the earth's extremity and that every time πείρατα

[23] *Ph.* 204a14, 204a4, 265a19–20. *Cf.* also the comment on Zeno in *Ph.* 233a22, τὸ μὴ ἐνδέχεϲθαι τὰ ἄπειρα διελθεῖν. Porphyry recalls Aristotle's terminology in the phrase ἀδιεξιτήτου ἀπείρου (p.192.24 ed. Schrader [*supra* n.12]). Also, Simpl. *in Phys.* 470–71 opposes ἄπειροϲ to διεξοδευτόϲ and διαπορευτόϲ.

[24] See Solmsen, *op.cit.* (*supra* n.13) 122f, esp. 123 n.58, for the Hesiodic origin of ἀδιεξίτητον. *Cf.* Pind. *Pyth.* 10.63.

γαίης denotes the end of the earth in Homer (which it does in all but one instance of the phrase), the context includes the streams of Okeanos.[25] Even as the earth, described as *ἀπείρων*, is delimited at its boundaries by Okeanos, so Okeanos, which provides the *πείρατα* to the earth, is itself *ἀπείρων*, since it lies even beyond the earth's immeasurable magnitude and therefore surpasses it in distance from our hypothetical observer, as well as because it has a circumference obviously larger than the *orbis terrarum* and is an unbroken circle, according to one implication of the later Heraclitean fragment. Extrapolating from Anaximander's point of view, then, Okeanos would be a physical, geometrical representation of *τὸ ἄπειρον* (and so itself becomes *ἄπειρος*) because it encircles (*περιέχει*) the earth, which is itself *ἀπείρων*, according to the relativistic Homeric interpretation.

Aristotle is the first to remark that a uniform ring which has no socket for a gemstone may be called *ἄπειρος*: *καὶ γὰρ τοὺς δακτυλίους ἀπείρους λέγουσι τοὺς μὴ ἔχοντας σφενδόνην, ὅτι αἰεί τι ἔξω ἔστι λαμβάνειν*. To be sure, he goes on to reproach this (colloquial?) usage for a lack of precision: *καθ' ὁμοιότητα μέν τινα λέγοντες, οὐ μέντοι κυρίως· δεῖ γὰρ τοῦτό τε ὑπάρχειν καὶ μηδέποτε τὸ αὐτὸ λαμβάνεσθαι· ἐν δὲ τῷ κύκλῳ οὐ γίγνεται οὕτως ἀλλ' αἰεὶ τὸ ἐφεξῆς μόνον ἕτερον*. He concludes by associating this with his opposition of *τὸ ἄπειρον* and *τὸ πᾶν* and with his concept of *ἀδιεξίτητον*: *ἄπειρον μὲν οὖν ἐστιν οὗ κατὰ τὸ ποσὸν λαμβάνουσιν αἰεί τι λαμβάνειν ἔστιν ἔξω. οὗ δὲ μηδὲν ἔξω, τοῦτ' ἔστι τέλειον καὶ ὅλον*.[26]

That a circle may be called *ἄπειρος* is evidently a developed geometric concept,[27] which the early philosophers seized upon as a convenient and intriguing method to express that continuity which remains unbroken, temporally or otherwise. Heraclitus, fr.103

[25] Bergren, *op.cit.* (*supra* n.5), goes on to say that *πείρατα* denotes not a physical material as such but the function of anything that binds or defines, and which forms the limit of anything's outward extension.

[26] *Ph.* 207a2–9.

[27] This is Kahn's argument in "Anaximander and the Arguments Concerning the *Apeiron* at *Physics* 203b4–15," in *Festschrift Ernst Kapp* (Hamburg 1958) 28f [hereafter KAHN, "Anaximander"]. This idea may well be indebted to medical concepts; see Kahn, "Anaximander" 25–27, and G. S. Kirk, *Heraclitus: The Cosmic Fragments* (Cambridge 1954) 113–15. Hesychius picks up the geometrical possibilities when he glosses *ἄπειρον* as *πολύ, ἄγευστον* (confusing what are actually two different words), *περιφερές, στρογγύλον, διὰ τὸ μήτε ἀρχὴν μήτε πέρας ἔχειν*. Latte, in his ed. of Hesychius (Copenhagen 1953), notes that this explanation was borrowed from Diogenianus of Heraklea, a Greek grammarian of Hadrian's time; this shows the continuity and persistence of this explanation.

ξυνὸν (γὰρ) ἀρχὴ καὶ πέραϲ ἐπὶ κύκλου, quoted by Porphyry in his discussion of the circularity implied in ἄπειροϲ, does not mean to imply more than the coincidence of the beginning and end in a circle, for here Heraclitus is concerned with the coupling of opposite quantities; but it very early came to be associated with the idea of continuous motion, which can only be found on a circle. Thus Aristotle echoes this idea more than once, as when he says τοῦ δὲ κύκλῳ ϲώματοϲ ὁ αὐτὸϲ τόποϲ ὅθεν ἤρξατο καὶ εἰϲ ὃν τελευτᾷ, and when he says that continuous motion is possible only on a circle, since elsewhere οὐ γὰρ ϲυνάπτει τῇ ἀρχῇ τὸ πέραϲ.[28] In addition Alcmaeon is quoted in the *Problemata* on human mortality as follows: τοὺϲ γὰρ ἀνθρώπουϲ φηϲὶν Ἀλκμαίων διὰ τοῦτο ἀπόλλυϲθαι, ὅτι οὐ δύνανται τὴν ἀρχὴν τῷ τέλει προϲάψαι.[29] It is at once obvious, particularly if one considers the possibility that this may have been a common saying, that Aristotle has in the former instance paraphrased Alcmaeon. Porphyry's quotation from Heraclitus was undoubtedly influenced by Aristotle, who was himself influenced by Heraclitus.

Aristotle's remarks on the annular possibilities of ἄπειροϲ evidently intrigued Porphyry, for when he was compiling his *Quaestiones Homericae* he devoted several pages to an exegesis of the various senses of ἄπειροϲ.[30] His lemma was *Iliad* 14.200f: εἶμι γὰρ ὀψομένη πολυφόρβου πείρατα γαίηϲ, | Ὠκεανόν τε, θεῶν γένεϲιν, καὶ μητέρα Τηθύν. In his subsequent discussion Porphyry indicates various senses of ἄπειροϲ: (1) ἢ κατὰ μέγεθοϲ ἢ κατὰ πλῆθοϲ,[31] (2) the relativistic ἄπειροϲ already noted, (3) that associated with objects of exceeding beauty, and (4) that connected with circular or spherical objects. It is in the context of the last meaning that Porphyry quotes the Heraclitus fragment to which I have already referred. He continues by quoting several

[28] *Cael.* 279b2, *Ph.* 264b27. To Aristotle's quotations we may add the similar sentiments of [Arist.] *MXG* 977b4 (=Diels-Kranz 21 A 28) on Xenophanes (apropos a sphere, however) and 974a9–11 (=Diels-Kranz 30 A 5) on Melissus (of temporal continuity).

[29] [Arist.] *Pr.* 916a33–35.

[30] My discussion of Porphyry is based on pp.189ff of Schrader's ed. (*supra* n.12). Schrader's bold reconstruction of the text of Porphyry can no longer be accepted; see H. Erbse in *Zetemata* 24 (1960) 17–77. The long comment on *Il.* 14.200 here under discussion comes from *Codex Ven.* B (*manus secunda*) and so (following Erbse) its authenticity is beyond doubt. The philosophical nature of the argument also is an indication of its Porphyrian origin. (I am indebted to Professor Henrichs for his help in resolving my questions on the text of Porphyry.)

[31] The division of ἄπειροϲ into ἢ κατὰ μέγεθοϲ ἢ κατὰ πλῆθοϲ is at least as old as Zeno; *cf.* Diels-Kranz 29 B 1, B 3 and Simpl. *in Phys.* 22.9 (=Diels-Kranz 13 A 5).

references in poets which associate ἄπειροc and unbroken circularity, on the basis of which Cornford concluded that in classical Greek it may actually and actively entail circularity.[32] As other scholars have shown, however, the fact that round objects are spoken of as ἄπειροc by poets in a few instances need not imply that all unlimited objects are considered round, but rather that the notion of circularity is contained in the nouns to which the adjective is attached.[33] Porphyry, moreover, not only leads astray those who refer to him, but he is led astray by his own sources when he says that Homer believed in a spherical earth: *ὥcτε cυνάγεται, εἴπερ ἡ γῆ πεπεραcμένη ῥηθεῖcα ἄπειροc πάλιν ἐρρήθη, μὴ διὰ τὸ μὴ ἐξίτητον αὐτὴν εἶναι κατὰ μέγεθοc εἰρῆcθαι ἄπειρον, διὰ δὲ τὸ cφαιροειδῆ εἶναι καὶ τοιαύτην αὐτὴν κατὰ cχῆμα ὑπειλῆφθαι.* Porphyry likely had Heraclitus, the composer of the Homeric allegories, in mind when he wrote this; the passage of Homer cited as the lemma and the general tone of the disquisition confirm it. Heraclitus first of all cites the movements of the winds as a proof that Homer believed in τὸ τοῦ κόcμου cφαιροειδέc. Later he writes that ἄπειρον δ' ἂν ὁ κύκλοc ὀνομάζοιτο δικαίωc, ἐπειδήπερ ἀμήχανόν ἐcτι δεῖξαι πέραc ἐν αὐτῷ τι. Lastly he quotes as the 'clearest' proof of the spherical world the symbol of Achilles' shield.[34]

Heraclitus and Porphyry were not the only ones who thought that Homer had believed in a spherical world; Eustathius also makes this same mistake, perhaps misled by the Porphyry passage, but, if not, at

[32] The references are Ar. fr.250 (Edmonds); Aesch. fr.379 (Nauck²); Eur. *Or.* 25 and fr.941 (Nauck²). Cornford, *Principium Sapientiae* (*supra* n.2) 173, also quotes Empedocles fr.28, where he takes ἀπείρων Σφαῖροc κυκλοτερήc as one extended phrase meaning 'spherical'.

[33] See, among others, G. Vlastos' review-article on Cornford, *Principium Sapientiae* (*supra* n.2) in *Gnomon* 27 (1955) 74 n.2; H. B. Gottschalk, "Anaximander's Apeiron," *Phronesis* 10 (1965) 51–53; and Bicknell, *op.cit.* (*supra* n.12) 41. Bicknell maintains that τὸ ἄπειρον in Anaximander is spherical, arguing thus: Cornford will have been correct in regarding this *apeiron* as a spherical thing, but not because the word bears of itself any such sense. The *apeiron* is spherical because in its original state it was coterminous with the present cosmos, which appears spherical to the observer (or rather hemispherical, for the other half "follows from the observation of the movements of the heavenly bodies and is demanded by the dictates of symmetry").

[34] Heraclitus, *Allégories d'Homère*, chs. 47–48 (ed. F. Buffière [Paris 1962]). Such comments as Heraclitus and Porphyry present are in large part from the common stock of allegorical interpretation in existence concerning Homer. A neoplatonist such as Porphyry would be aware of these interpretations, and it is difficult to believe that this particular lemma and disquisition are unrelated to Heraclitus. On Heraclitus' own predilections, *cf. infra* n.38. Lastly, as Professor Henrichs advises me, earlier glosses on ἀπείρονα γαῖαν (as well as Heraclitus' comments) demonstrate the anteriority of the argument to the Porphyrian state.

least ultimately misled by the same body of allegorical scholia behind all these interpretations; the old error persists.[35] According to Heidel the confusion in our sources between the circle and the sphere is common. This is due in part to the ambiguity of the term *ϲτρογγύλοϲ*, which may mean either 'round' or 'spherical'. In the fifth century B.C. the term was not used exclusively—or even generally—with reference to a sphere.[36] Heidel further asserts that Posidonius is likely to have credited Parmenides with positing a spherical world, and he also says that Posidonius was "at least the proximate source for the statements of Aëtius (3.10.1) that Thales and the Stoics and their respective adherents taught the sphericity of the earth and for the assertion of Diogenes Laertius (2.1) that Anaximander held that doctrine."[37] Certainly no one now believes that Homer or Hesiod (or Thales and Anaximander) conceived of the earth as spherical (not even Cornford said that). Hippolytus (*Haer.* 1.6.3 = Diels-Kranz 12 A 11), moreover, informs us that Anaximander believed in a circular but flat earth. To the best of our knowledge Plato (*Phd.* 108E ff) was the first to conceive of a spherical earth in the center of a cosmic sphere.

The key to this discussion of the spherical earth lies, I submit, in the train of thought which Heraclitus the Allegorizer presents to us.[38] For Heraclitus *ἄπειροϲ* and sphericity < circularity are inextricably entwined with the description of Achilles' shield in the *Iliad*. Nor is this surprising, for the oblong body-shield purports to show the world surrounded at its edges by the River Okeanos. The Hesiodic *Scutum* presents a similar picture of Okeanos, flowing round the rim and

[35] Eustathius, *ad Il.* 7.446: *Ἰϲτέον δὲ ὅτι γῆν λέγει ἀπείρονα ἀντὶ τοῦ ἄπειρον, ὡϲ Εὐριπίδηϲ ἐν Φαίδρᾳ φηϲί. καὶ εἴρηται μὲν καὶ ἀλλαχοῦ περὶ τούτου· καὶ νῦν δὲ ῥητέον ὅτι τε ἐντεῦθεν παραφράϲαϲ Εὐριπίδηϲ ἀτέρμονα ἔϲοπτρα εἶπε τὰ κυκλοτερῆ, ὅπερ ταὐτόν ἐϲτι τῷ ἀπείρονα, ἐπεὶ καὶ τὸ τέρμα καὶ τὸ πέραϲ τὸ αὐτὸ δήλουϲι. καὶ ὅτι καθ' Ὅμηρον μὲν ἀπείρων ἡ ὅλη γῆ ὃ ἐϲτι ϲφαιροειδὴϲ καὶ ϲτρογγύλη.*

[36] W. A. Heidel, *The Frame of the Ancient Greek Maps* (New York 1937) 68–74.

[37] *ibid.* 67. This obviously is an easy error to commit, judging by the number of scholars who have so erred. See Owen, *op.cit.* (*supra* n.21) 95ff, for a convincing denial that Parmenides meant us to understand his system as establishing a spherical world. Diogenes Laertius elsewhere (8.48) has a rather vague and confusing statement assigning a 'round' earth to various philosophers; see Heidel, *op.cit.* (*supra* n.36) 73, and Sweeney, *op.cit.* (*supra* n.2) *passim.*

[38] Heraclitus' interpretation accords well with his attitude toward classical writers. Reinhardt, "Herakleitos 12" in *RE* 15 (1912) 508–10, comments that "Dieser Traktat verfolgt den Zweck, die Dogmen der anerkannten Philosophen, besonders Platons, Aristoteles, und der Stoiker, in systematischer Folge aus den Homerischen Epen abzuleiten." *Cf.* Cic. *Nat.D.* 1.41 and A. S. Pease's commentary (Cambridge [Mass.] 1955) *ad loc.*

enclosing the other scenes of the shield.[39] The belief in an outer river which surrounds the fringes of the inhabited world is ancient, common to Mesopotamian legend and Egyptian lore long before it became a fixture in Greek civilization. Indeed, a Babylonian world-map on a cuneiform tablet now located in the British Museum shows the earth encircled by this outer river.[40] Herodotus shows the extent of this belief when he ridicules Homer and the contemporary mapmakers because they represented the circular earth as surrounded by the River Okeanos.[41] The Greeks also shared with the Egyptians the belief that the sun, after setting in the west, journeys back to the east along Okeanos; the Greeks had it sail in a golden bowl (representing the sun itself), the Egyptians in a ship.[42]

Some Homeric usages aid in the attempt to associate Okeanos and *ἄπειρος* in the sense of an unbroken circular river. First of all, there is *ἀψόρροος*, '(Okeanos) flowing back into itself (as it encircles the earth)'. Homer uses the word twice, both times of Okeanos, once in the *Iliad* apropos the structure of Achilles' shield and once in the *Odyssey*. Eustathius (*ad Od.* 20.65) glosses the word as follows: *'Αψόρροος δὲ 'Ωκεανὸς ὁ κύκλῳ τῆς γῆς περινοστῶν καὶ ἂψ πάλιν ἐπὶ τὸ αὐτὸ ἱκνούμενος κατὰ τό, περιτελλομένων ἐνιαυτῶν. οἱ δὲ παλαιοὶ φράζουσι καὶ οὕτως· ἀψόρροος, ὁ εἰς ἑαυτὸν ἀναλύων ἐν τῷ εἰλεῖσθαι κύκλῳ περὶ τὴν γῆν.*[43] The thought behind *Iliad* 18.402f (. . . *περὶ δὲ ῥόος 'Ωκεανοῖο* |

[39] *Il.* 18.607f; *Scut.* 314f.

[40] BM no.92687. This tablet is reproduced in *Cuneiform Texts in the British Museum* pt.XXII (1906) pl. 48. It is also reproduced in Kahn, *AOGC* pl. I. 'Okeanos' is probably a non-Indo-European word; see Frisk, *op.cit.* (*supra* n.6) *s.v.* *'Ωκεανός*; Kirk and Raven, *op.cit.* (*supra* n.13) 14 n.3; and P. Weizsäcker in W. H. Roscher, *Ausführliches Lexicon d. griechischen u. römischen Mythologie* III.1 (Leipzig 1908) 816. *Cf.* R. B. Onians, *The Origins of European Thought* (Cambridge 1951) 249; P. Seligman, *The Apeiron of Anaximander* (London 1962) 142; and F. Gisinger in *RE* 17 (1937) 2309f. More recently A. Carnoy has proposed a Pelasgian origin in *AntCl* 24 (1955) 27f, but see E. Vermeule, *Greece in the Bronze Age* (Chicago 1964) 18f and 60ff, for a critical appraisal of our knowledge of Pelasgian. Lastly, the situation of other sea-related words in Greek (*e.g.* *ἅλς, πέλαγος, πόντος*; the origin of *θάλασσα* is unknown) should be noted, since they are often non-Indo-European words or words with a new signification. See Frisk, *op.cit.* (*supra* n.6), and Chantraine, *op.cit.* (*supra* n.10), on these words; on *πόντος* see E. Benveniste in *Word* 10 (1954) 256f.

[41] Hdt. 2.23 and 4.36. For a convenient summary of the matter see Kirk and Raven, *op.cit.* (*supra* n.13) 11–14.

[42] The Greek belief is presented in Mimnermus fr.10 and Stesichorus fr.6 (Diehl). See Kirk and Raven, *op.cit.* (*supra* n.13) 14f, and Seligman, *op.cit.* (*supra* n.40) 134.

[43] The Homeric passages are *Il.* 18.399 and *Od.* 20.65. In the latter passage, it is curious that Homer should speak of the *προχοαί* of Okeanos, since it is normally considered an unbroken circular stream (and hence without a mouth). The explanation of this apparent

ἀφρῷ μορμύρων ῥέεν ἄϲπετοϲ) is very similar, where περὶ . . . ῥέεν provides the idea of circularity and ἄϲπετοϲ the notion of continuity. Okeanos is the circling stream which joins its end to its beginning and, as such, is a primary model for the evolution of the Heraclitean circle, and so it fulfills the definition of ἄπειροϲ as that which cannot be circumnavigated.

Homer never applies ἄπειροϲ directly to Okeanos; he uses the **aper-* family with γαῖα and πόντοϲ. From his usage of it with the latter we may conclude that he associates it with the notion of annular circularity. For instance, in *Odyssey* 10.194f Odysseus climbs a rocky lookout and observes an island τὴν πέρι πόντοϲ ἀπείριτοϲ ἐϲτεφάνωται, "which the sea encircles in an unbroken ring."[44] The sense in *Hymn. Hom.Ven.* 120 (παίζομεν, ἀμφὶ δ' ὅμιλοϲ ἀπείριτοϲ ἐϲτεφάνωτο) may well be similar, though here ἀπείριτοϲ could mean 'uncounted'. These usages, associated with ἀμφί or περί, recall the associations with περιέχω. Homer adds two more words to our list, ἀμφίαλοϲ (used five times in the *Odyssey*, always in the phrase ἀμφιάλῳ Ἰθάκῃ) and περίρρυτοϲ (used once in the *Odyssey*, of Crete). Eustathius connects ἀμφίαλοϲ with the line of the *Odyssey* quoted above when he writes τὴν δὲ κατ' αὐτὴν νῆϲον, περὶ πόντοϲ ἀπείριτοϲ ἐϲτεφάνωται, ἤγουν κύκλῳ περιέχει ὡϲ ἀμφίαλον. Thus the idea that Okeanos binds together and encircles the earth is transferred to passages in which the sea encircles an island—the River Okeanos is to the earth as the sea is to an island. Thus circular continuity advances from Okeanos to πόντοϲ.

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inconsistency lies in Penelope's wish: she wants to be carried off to the end of the world (=Okeanos) and go down to Hades to see Odysseus. She is thinking either of the underground sources of Okeanos (or Okeanos as the source of other rivers) or perhaps of Acheron-like appearances of rivers from below ground, since such places were commonly considered to afford descent to the underworld. This is not merely Hades as the land beyond the πείρατα γαίηϲ found in *Od.* 4.563 and the *Nekyia* of Book 11. (In formulaic terms, the phrase must be related to προχοῆϲ ποταμοῦ, in *Od.* 11.242, etc., but this does not demean the importance of the transfer.)

[44] See R. Mondolfo, *El Infinito en el pensamiento de la antigüedad clásica*, transl. F. González Ríos (Buenos Aires 1952) ch. 5. It is wrong to translate ἀπείριτοϲ here as 'impossible to traverse'. Odysseus has in fact just crossed this strait. The circularity implied in it is made emphatic by ἐϲτεφάνωται. To be sure, the phrase could mean merely 'surrounded by a huge expanse of sea', and πόντοϲ in the sense of 'a path over dangerous terrain' would not hinder this; *cf.* W. B. Stanford in his edition of the *Odyssey* (London 1967) *ad loc.* But the use of πέρι . . . ἐϲτεφάνωται seems to me against this; *cf.* LSJ *s.vv.* ϲτεφανόω and περιϲτεφανόω, esp. the reference to [Arist.] *Mund.* 393b17.

An intriguing possibility is afforded by the connection of ἀπείρων with πόντος. Accustomed as we are because of our world overview to our capability of sailing the open seas without worry regarding the status of our ultimate destination, we often forget that the Greeks historically tried to avoid such voyages and instead preferred to sail along the coastline, occasionally island-hopping as was possible through the Cyclades. Consider, then, a northern voyage *around* the Aegean: during the winter months when sailing would be prohibited this would properly be an ἀπείρων πόντος in the sense of that which cannot be circumnavigated. The use of ἀπείρων in the phrase Ἑλλήσποντος ἀπείρων (*Il.* 24.545) and the uses with γαῖα then are secondary and generalized, and they mean more simply 'huge, immense', the transference of meaning which Kahn favors and which I have mentioned above.[45]

Seligman considers Okeanos to be a highly developed antecedent of Anaximander's ἄπειρον. He is particularly impressed by the iconographic significance of Okeanos as a source for the development of the metaphysical ἄπειρον, and for this he rightly refers to the Babylonian cuneiform tablet. In addition he mentions the French orientalist Clermont-Ganneau, who posited that an optic mythology has preceded every aural mythology and that a pictorial representation regulated the conceptual, abstract product of mythology. The concrete myth of Okeanos, on this theory, preceded the metaphysical symbol of the ἄπειρον.[46]

We must take account of the astral and temporal qualities of ἄπειρος. The Greek notion of time was not strictly linear, but circular, stretching infinitely into the past and future with some remote junction. As such it was always connected with the astral phases. Eternity as a philosophic concept first appears in a dialectical analysis of ἀρχή and πέρας, but the source of the temporal concept is the phases of the heavenly bodies and the seasons.[47] This is the source of Alcmaeon's saying in *Problemata* 916a33–35 (*supra* p.132; *cf. Ph.* 264b27) and may also be the origin of Anaximander's belief, reported in [Plut.] *Stromateis* 2 (= Diels-Kranz 12 A 10), that generation and

[45] It is interesting that the phrase Ἑλλήσποντος ἀπείρων attracted Gibbon; see *Decline and Fall* II.145 in Bury's 6th ed. (London 1913).

[46] The reference to Ch. Clermont-Ganneau is to his *L'Imagerie phénicienne et la mythologie iconologique chez les Grecs* (Paris 1880) p.xvii.

[47] See Kahn, "Anaximander" 28, and the sources quoted by him there; *cf.* also Guthrie, *op.cit.* (*supra* n.13) I.351–53.

destruction occur *ἐξ ἀπείρου αἰῶνος ἀνακυκλουμένων πάντων αὐτῶν*, a variation on the Homeric phrase which employs *περιτελλόμενος* with the particular time period in question. Indeed, temporal infinity is one of the basic types of infinity which Aristotle allows (*Ph.* 206a9–b3). Kahn goes so far as to say that the idea of incessant recurrence in the eternal life of nature, as opposed to the *ἀρχή* and *πέρας* of mortals, is the origin of the eternal motions of the Milesians and of 'eternity' in general.[48]

One problem in analyzing the early significance of *ἄπειρος* is to assess correctly its relationship, very noticeable later, with *πέρας*. Certainly Homer calls the earth *ἀπείρων* but still places *πείρατα* upon it. Yet Homer is far from opposing the two terms in a *figura etymologica*; they do not occur next to one another there. At the very earliest it may be Anaximander who opposes the two, but we cannot be certain since we have so little of his actual wording and since later information about him and explanations of his doctrine are often expressed in terminology developed after his lifetime. Aristotle's explanation of *ἄπειρον* as an *ἀρχή* in *Physics* 203b7–8 connects it with *τέλος* and *πέρας*; this entire discussion is commonly considered to be directed primarily at Anaximander,[49] yet we have no certain grounds for positing that he specifically associated *ἄπειρον* and *πέρας*. Moreover, regarding the suggestion that he may have argued for the infinitude of his *ἄπειρον* on the basis of its having neither an *ἀρχή* nor a *πέρας*, we are faced with the use of Aristotelian-Peripatetic terminology, where *ἀρχή* is the material principle, the substratum, and in the Aristotle passage it carries this significance in addition to its sense of 'beginning'. It certainly bears this signification in the problematic passages of Simplicius (*in Phys.* 24.13= Diels-Kranz 12 A 9.5) and Hippolytus (*Haer.* 1.6.2= Diels-Kranz 12 A 11).[50] On the other hand, Anaximander may well have described the *ἄπειρον* as *ἀΐδιον . . . καὶ ἀγήρω* (Hippol. *Haer.* 1.6.1= Diels-Kranz 12 B 2) and *ἀθάνατον . . . καὶ ἀνώλεθρον* (Arist. *Ph.* 203b13), usages for which there is prior warrant;[51] the

[48] To Kahn's references in "Anaximander" 27 (Philo, *de Opif.Mund.* 13.44 and Arist. *Cael.* 284a3–13) may be added Arist. *Metaph.* 1074a37–38.

[49] As Solmsen, *op.cit.* (*supra* n.13) 109–14. This is also the basis of Kahn's argument in "Anaximander." *Cf.* Sweeney, *op.cit.* (*supra* n.2) 74ff, esp. 87–92.

[50] The problem of the *ἀρχή* is summarized in Kirk and Raven, *op.cit.* (*supra* n.13) 104–08.

[51] See Kahn, *AOGC* 43, and Solmsen, *op.cit.* (*supra* n.13) 114 n.19. Though Anaximander may have used these adjectives to express privation of *γένεσις* and *θάνατος* or *φθορά*, he is unlikely to have expressed his argument in terms of the abstracts *γένεσις* and *φθορά* them-

ἀπέραντον reported in Aëtius (1.3.3 = Diels-Kranz 12 A 14) is possibly the phraseology of Anaximander, but far more likely it is applied to him by Aëtius (or his source) on the basis of its similarity to the other qualifying phrases, its common use (in prose and poetry) from the fifth century onwards, and particularly on the basis of its use in Aristotle in describing infinity in *Physics* 204b21 and *Metaphysics* 1066b33 (ἄπειρον δὲ τὸ ἀπεράντωϲ διεϲτηκόϲ). That Aristotle connected ἄπειρον with πέραϲ as its negative partner admits of little doubt, as we may gather from *Physics* 203b7–8[52] and 207a1–15, as well as from his discussion of τὸ διέξοδον in *Physics* 204a3–6.

Aristotle's collocation of ἄπειρον–πέραϲ is an opposition which we encounter first of all in the Pythagoreans. We know for certain that Aristotle was cognizant of the Pythagorean association of these terms since he reproduces it in the Table of Opposites in *Metaphysics* 986a23–26 (*cf.* 990a8–9). It is certainly not until after the Pythagoreans posited the opposition that the association of ἄπειρον with πέραϲ became so important and dominated subsequent thought insofar as ἄπειρον was thenceforth considered the negative of πέραϲ.[53]

Though mention of ἄπειρον would have been anathema to Parmenides, whose use of πέραϲ serves to mark not a limit in time but rather the invariancy of the subject, Melissos dissents (fr.2) from his stand on time (past, present, future) by granting the existence of these states and of ἄπειρον.[54] The fragments of a later Pythagorean, Philolaus, show the same opposition (Diels-Kranz 44 B 1, B 2; *cf.* A 9).[55]

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selves (found in Simpl. *in Phys.* 24.17ff [= Diels-Kranz 12 B 1] in the context of his quotation of Anaximander; *cf.* [Plut.] *Strom.* 2 [= Diels-Kranz 12 A 10], Hippol. *Haer.* 1.6.1 [= Diels-Kranz 12 A 11], and Arist. *Ph.* 203b8), which were well established in Peripatetic terminology but do not belong to early Presocratic vocabulary, at least according to Kirk and Raven, *op.cit.* (*supra* n.13) 117f. I find this to be true of φθορά more than of γένεϲιϲ; γένεϲιϲ is found in Homer, though in a somewhat concrete signification, and γένεϲιϲ καὶ ὄλεθροϲ in Parm. fr.8.27 (*cf.* 8.21) should be noted. As a doublet, however, what Kirk postulates of γένεϲιϲ καὶ φθορά is true: they are apparently not found together earlier than Plato (*cf.* LSJ *s.vv.* γένεϲιϲ, φθορά). On the adjectives mentioned here, *cf.* Pl. *Ti.* 33A2 and 33A7 (ἀγήρων καὶ ἄνοϲον) and the parallels adduced by Taylor, *op.cit.* (*supra* n.13) *ad loc.*

[52] Kahn, *AOGC* 233 n.1, assumes on the basis of this passage that Anaximander "probably defined τὸ ἄπειρον by opposition to πέραϲ." Though possible, it is improbable, as I hope to have shown; it is rather a collocation Aristotle has taken over from the Pythagoreans and assimilated into his own teaching (the discussion of this point falls next in this article). *Cf.* Sweeney, *op.cit.* (*supra* n.2) 87–92.

[53] Thus Solmsen, *op.cit.* (*supra* n.13) 116, and Bicknell, *op.cit.* (*supra* n.12) 39.

[54] *Cf.* Owen, *op.cit.* (*supra* n.21) 97–101.

[55] The fragments ascribed to Philolaus may not be his, but may rather have been

Otherwise among the Presocratics *ἄπειροϲ* tends generally to be utilized in several contexts, all of which parallel our own sense of 'countless', 'boundless', or 'infinite'. It may have a temporal significance, as in [Plut.] *Stromateis* 2 and 7 (= Diels-Kranz 12 A 10 and 68 A 39), *ἐξ ἀπείρου αἰῶνοϲ* (or *χρόνου*), but probably its most frequent context is that of *τὸ κατὰ μέγεθοϲ* or *τὸ κατὰ πλῆθοϲ*.[56]

What can we conclude about *ἄπειροϲ* then? I believe that we may assert that the notion of circularity is indeed inherent in it. That it ever actively in itself had this sense is doubtful on the basis of our present evidence; no incontrovertible example of it can be produced. It is significant, however, that *ἄπειροϲ* is often used in conjunction with words compounded of *περί*. Okeanos certainly represents a pre-Greek, non-Indo-European forerunner of the *ἀπείρων πόντοϲ*; Homer presents indications of this. Although only a conjecture, I submit that it may represent the Greek abhorrence of sailing the open seas, especially during the wintry season. Finally, the collocation of *ἄπειρον* and *πέραϲ*, based on an etymological association which is seemingly obvious and therefore plausible, dates only from Pythagorean times, after which it has been generally accepted as valid.[57]

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written by someone dependent upon Aristotle's account of the Pythagoreans (see Kirk and Raven, *op.cit.* [*supra* n.13] 308–11, for a summary of the problem). For my purposes it is of little consequence since I am positing that the doublet, important to the Pythagorean school, caused the two words to be associated thereafter. Nonetheless, *ἄπειροϲ* could afterwards still signify not only 'boundless', but a Homeric 'immense' as well, as Bicknell, *op.cit.* (*supra* n.12) 40, observes.

[56] For example, Simpl. *in Phys.* 22.9 (=Diels-Kranz 13 A 5); Diog.Laert. 9.44; Anaxag. fr.1 (=Diels-Kranz 59 B 1); but above all Zeno (Diels-Kranz 29 B 1, B 3). The reason for its appearance is obvious. Zeno was denying motion (and plurality) by establishing limits within a regression (and progression) in an infinite, geometrical series. *Cf.* Porphyry's analysis, *supra*.

[57] I am grateful to Professors G. E. L. Owen, T. Irwin and A. Henrichs, and to Dr Martha C. Nussbaum for help with this essay.