ENGINEERING AND THE ORIGINS OF PHILOSOPHY: THE IDEA OF ROLES IN ARCHAIC GREECE

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In the ancient Greek world, prior to the sixth century b.c., there was no institutionalized role of the "wise man" or "philosopher." Stated more abruptly, among those things to which persons in that community may aspire, "being a wisé man" cannot have been one of them, as it would be a socially acknowledged aspiration by the end of the fourth century b.c.[1] In this sense, it would be true to say, that following the enterprises of Plato and Aristotle at the close of the classical period, the pursuit of the philosopher or "being a wise man" became a socially accepted role, and more than that the tradition of philosophers developed precisely because the role had been secured.

Now, if the role of being the "philosopher" or the "wise man" becomes socially current by the close of the fourth century b.c., then the activities of earlier predecessors, which constitute the origins of philosophy, must be properly seen against a different social context, one which did not yet make room for this sort of practice. It has become a commonplace among those scholars who examine the origins of early Greek philosophy to note that, following Aristotle in *Metaphysics* A, the origins of philosophy and the origins of Greek science are coincidental;[2] the earliest "philosophers" were *phusiologoi* or "those who give accounts of nature," according to a later tradition, which classified these activities within a social context which had allocated just that sort of "role" which could not be so discovered in the tradition from which they emerged--those from Miletus like Thales, Axaximander, Anaximenes, the Samians like Pythagoras. But, even if we grant a difference, this does not yet reveal to us the context in which they emerged which envisaged their activities without the benefit of a foresightedness. This approach to re-view the origins of philosophy, in the context of the emergence of its social or institutionalized status, forces us to focus on the origins of Greek science, a science which failed to develop precisely because it failed to secure its own social role. As one historian of science put it: "Ancient Greek science failed to develop not because of its immanent shortcomings but because those who did scientific work did not see themselves, nor were they seen by others, as scientists, but primarily as philosophers, medical practitioners or

astrologers."[3] On this hypothesis, the emergence of philosophers is commonly rooted with Greek science, but whereas the social context lent itself to the development of one kind of prominent social practice, the other failed to achieve that social status, failed to become a role, and hence failed to develop.

Aristotle's account of early predecessors, in the *Metaphysics*, envisages their activity as a stumbling to the truth he believed he had discovered. What Aristotle achieves in that sort of description is the confirmation that the role of philospher, properly understood, had also been stumbling its way to social acknowledgment. When we try to determine what sort of mentality nurtured those "stumblers" like Thales and Pythagoras, thinkers who emerge in the sixth century b.c., in terms of their own context and its social roles, we focus upon the discovery of a new role, within the roles of their archaic community. But, the issue before us is to determine from what sort of role this new role emerged.

Given this setting, I propose to sketch out the following position: (1) The earliest philosophers who emerge in the sixth century b.c.--such as Thales, Anaximander, Pythagoras--emerged from engineering traditions, specifically the ones connected with monumental architecture; (2) The emergence of the social role of philosopher is a result of a political maneuver of the hereditary aristocracy, which back-fired; the engineering traditions engaging in monumental architecture were acting under orders from their patrons, the aristocrats, whose monumental enterprises were mis-calculated to serve to further their claim on authority.

Section II: The Pre-Archaic Setting

The evidence from grave-sites all over Greece, with the exception of the Kerameikos cemetery in Athens, testifies to tremendous de-population following the collapse of the Mycenaean central-palace civilization.[4] Come the ninth and eighth centuries, however, we witness the dawning of the archaic period, quadrupling the population, a re-birth of trade with Cyprus and the east, particularly helpful in stimulating development of metallurgical arts, essential for warfare,[5] of literacy vis-a-vis the introduction of an alphabet, and a new political problem which I shall call the "crisis of sovereignty."[6]

The Mycenaean chieftain, the *wa-na-ka*, an hereditary monarch, came to authority by virtue of a biological inheritance, descended from the divine. Not by appeal to a legal code, so far as we can tell, but by the decree of that chieftain, the right to authority was exercised. But, with the fall of the central-palace, the prevailing idea of sovereignty was undermined.[7] With the following de-populated "dark ages," reversion to a tribal system apparently became the social context of the small community. But, with the resurgence of

growth in population, a crisis of sovereignty arose: Who shall rule? and by virtue of what authority? The new fight for sovereignty was progressively fought with words, and not only swords, within their newly re-discovered literacy. In Mycenae, writing and literacy was exclusively scribal, connected with the vast requirements of record-keeping which makes a central-palace administration possible. With the fall of that system, the re-emergence of literacy came to find a new place, as language and skilled speaking became increasingly central in the fight for power, for sovereignty.

First, in the warring factions of one aristocratic family against another, for land which was becoming increasingly scarce, new defensive postures were adopted. Colonization was one strategy, for those who sought their own land;[8] another strategy, which benefitted from the developments in metallurgy, was the emergence of the hoplite or heavily armed foot-soldier.[9] Here, as Snodgrass so eloquently demonstrated, was an aristocratic maneuver which backfired. In order to protect their land against rival hostile factions, the aristocrats heavily armed the local townspeople to fight on their behalf. That was all well and good. But what happened when, during a year of drought, with food-supplies depleted, the small band of aristocrats, controlling the food-stuffs from within their fortifications, found a thousand "hungry" and heavily armed townspeople banging upon their doors? The dawning of democratic or more egalitarian practice was a natural consequence; their own strategy to further their authority succeeded only in eroding their own control.[10]

Not only did the ruling aristocracy lose foot-hold in this manner in the seventh century b.c. The emergence of written legal codes, and in this sense, the role of lawgiver, first with Dracon c. 650 b.c., and then with Solon[11] were specific measures taken in response to growing tensions bordering on revolution within the social order. Solon's solution was to reinterpret the social order, not in terms of biological inheritance or heredity as the mark of value and political worth, as it was for the aristocracy, but in terms of wealth; he succeeded in re-organizing the four classes within his society, and thereby thwarting a revolution which was felt to be brewing among the discontented lower three classes.

Contemporaneously, in Asia Minor, we witness the birth of tyranny,[12] yet another new role, which Aristotle identifies with a man who comes forth, on behalf of the common people in order to protect them against the excesses of the aristocrats.[13] And Aristotle connects the emergence of the tyrannies with the rise of the minting of coins; the tyrant may have proved to be something of a "counterfeit coin" whose only claim to authority is the impression he has stamped upon his community. Aristotle's complaint that the tyrant's exercise of authority is illegitimate because it is illegal further emphasizes the received history of a debate for the right to

sovereignty, and the technological inventions, made possible by engineers -- those who would prepare the dyes and metals -- which secured the means for those who sought to challenge the authority of the aristocracies.[14]

Homer and those who travelled about singing their hexameters had patrons who, no doubt, supported the bard so far as he would sing a song to their liking. The Homeric song is the hymn to aristocracy,[15] however much it indeed displays a familiarity and interest in the experience of the common-man. That mentality supplied its own manner to secure its position, to fix its own role, and to avoid a challenge. In book XVIII of the Odyssey, Odysseus relates the human condition: in a world confronting us with chaos and confusion, the best advice, says the most clever of all the Greeks, is to simply accept what has been given.[16] The advice is: 'yours is not to question why, yours is but to do and die.' Odysseus' advice reflects the epistemological stance: Human beings cannot know.

The challenge to Homer appears in many ways, partly by Hesiod, but forthrightly by the lyric and elegiac poets, who abandoned the exclusivity of the dactylic hexameter, and the Homeric/aristocratic message contained therein. Sappho and Alcaeus,[17] are two of several lyric poets, on the interface with Asia Minor, on the eastern Greek island of Lesbos, who sang an intensely individualistic and emotionally personal song. And within a century, by the mid-sixth century b.c., Anaximander provides what survives as the earliest prose-fragment,[18] challenging the Homeric hexameter-mentality, and the social context of the roles which it recognized.

It has been supposed that the emergence of prose is both significant and peculiar to the philosophical enterprise. There is something right about this, but the story is complicated when we note that, according to Vitruvius, in book X of the Ten Books on Architecture,[19] contemporaneous with Anaximander's prose there were prose manuscripts on architecture, specifically Theodoros' work on the temple of Hera at Samos, and Chersiphron's work on the temple of Artemis at Ephesus.[20] Within a very narrow geography, and contemporaneously, philosophy and monumental architecture/engineering both give rise to the earliest prosaic expressions. It was this coincidence which encourages us to see, in that archaic society, a common ancestor which gave rise to a flourishing role of philosopher, rather than scientist.

Following the fall of Mycenae, we have so far found no signs of truly monumental architecture in Greece until its re-emergence in the eighth century b.c.[21] From the eighth to the sixth century, the archaeological finds have revealed the development of the sanctuary, and the birth of the "Greek" temple. In brief, we must consider who commissioned the sanctuaries and for what purpose. The patrons of

the early sanctuaries were aristocratic families or wealthy individuals, long before the public building projects of the classical period.[22] For whatever complex reasons they donated their resources, one clear motivation in honoring the cult by constructing a sanctuary was to safe-guard their right to maintain authority over their land and to reinforce their social position.[23] The aristocrats commissioned a group of persons, the engineers, to erect sanctuaries as testimony to a Homeric mentality and man's place within it. Just as the aristocracy mis-calculated the effect of heavily arming the masses, so here those commissioned to erect monuments to an Homerically articulated world of chaos and its guiding aristocratic rule, mis-calculated again.

In the monumental architecture, the engineers discovered order and organization, principles of balance and harmony, and achieved a numerical precision through the development of techniques for constructing on a huge scale.[24] In the process of carrying out the orders of the aristocracy, the engineers, more so than almost any other group, were in a position to have evidence of a highly ordered world, whose structure although not immediately visible was nonetheless discoverable, and whose structure permitted expression in a highly articulate form. In the role of "engineer-builder" which Herodotus can call *architekton*,[25] an engineer/Master Builder, a tradition was ensconced in an activity which revealed the One over Many, amidst the different requirements for various constructions, an activity which revealed highly articulate principles of inter-connection. The traditional roles which housed the"engineers/architekton" were pre-"philosophical" or "pre-scientific."[26]

Thales, who flourishes at the opening of the sixth century b.c., is generally credited with introducing geometry into Greece, and he is specifically credited with introducing at least five theorems collected later in Euclid.[27] He was credited most especially with the practical application of these theoretical discoveries; it is this feature which displays a connection to the "engineering" community. Thales purportedly developed a technique for measuring the height of monumental architecture - the pyramids in Egypt,[28] and extended that technique to calculating the distance of ships at sea.[29] His well-known skill for engineering appears most forcefully in Herodotus who relates the story that Thales diverted the course of the river Halys for Croesus and his army.[30] There can be little doubt that Thales was a practical genius, and was regarded this way by his contemporaries. A practical statesman who supposedly advised the Ionian cities to federate in the face of the Persian threat,[31] and a practical astronomer whose interests in navigation led him to suggest the preference for utilyzing the "Little Bear" rather than the "Great Bear" for locating the pole star,[32] Thales came to be identified with the emergence of a new role, whose

foundations could be isolated in the traditions which engaged in monumental architecture and engineering.

The doxographical tradition envisages Anaximander in a similar fashion. Credited with the discovery of the obliquity of the zodiac,[33] inventor of the seasonal sun-dial which made use of the solstice and equinox,[34] Anaximander was the first Greek geographer to make a map of the earth.[35] These purported accomplishments make no sense outside of a social community in which such activities were already well-established roles--the engineering tradition, broadly conceived, seems to be the best description of that role.

In this sense, it was from a tradition of engineers that those like Thales and Anaximander, and again Pythagoras emerge. Miletus, a thriving economic trading center, in close proximity to the monumental temple of Artemis in Ephesus, as well as the monumental constructions in nearby Priene, Didyma, and Pergamum, provided a social context in which achievements in engineering were among the most outstanding accomplishments of that community. Pythagoras, a religious leader, in the latter half of the sixth century b.c., comes from the very town in which the temple of Hera on Samos is located. At just the time when Pythagoras is flourishing, in his own town, the architekton Eupalinos, commissioned by the tyrant Polycrates (who had already commissioned the construction of an awesome mole in the harbor, which made the protection of his great fleet possible, and the re-building of the temple of Hera, burned half-a-century earlier) constructed a fortification/water-channel through a mountain more than a thousand meters long which was started separately from two ends and in fact met in the center. These three constructions, Herodotus regarded as the three greatest engineering feats in Greece.[36] Such projects all point to social communities in which the success of monumental architecture was peculiarly great.[37] Given the context of the experimentation in engineering, it should seem more understandable how the early Pythagoreans could come to suppose that number is the essentially real nature of a thing, once the precision of numerical language had almost two centuries to find articulate expressions.

There has been a tendency in the scholarly literature on the origins of philosophy, and Greek science for that matter, to neglect the social context and roles, and thus see the emergence of the role of philosopher somewhat ex nihilo, or somehow appearing through the murky veil of myth.[38] The argument I have sketched, although provisional, acknowledges an interdisciplinary approach to our own discipline if we, as philosophers, shall better understand how our earliest "ancestors" found their natural place in philosophy, and calls us to wonder, within and without that role just what sort of role we are "about."

Notes

[1]The manner is which the "role" of philosopher is exhibited by Socrates has no predecessor in Homer. And "roles" like that of Calchas, the prophet, are a freak occurrence in nature, and not a profession for which one trains. Plato and Aristotle establish "schools" and to this extent "institutionalize" that role.

[2] Aristotle, *Metaphysics* A. esp. 987 ff.

[3] Joseph Ben-David, "The Scientific Role: The Conditions of its Establishment in Europe," *Minerva*, Autumn 1965: 15.

[4] C. J. Desborough, *Dark Age Greece*, 1972; Nicolas Coldstream, *Greek Geometric Pottery* (Cambridge UP); Anthony Snodgrass, *Archaic Greece: Age of Experiment* (U of California P, 1979) esp. ch. 1.

[5] Snodgrass ch. 2.

[6] cf. J. Vernant, *The Origins of Greek Thought* (U of California P, 1966). Vernant uses the expression, "The crisis of sovereignty"; I have tried to develop his idea. I also follow his overall assessment of Greek literacy, and its consequences during different stages of development.

[7] Vernant esp. ch. 3.

[8] Thucydides, *Histories* bk. 1.

[9] Snodgrass ch. 1, 2.

[10] Snodgrass ch. 2.

[11] C. J. Emylyn-Jones, *The Ionians and Hellenism* (London: 1980) 107-8; also *Oxford Classical Dictionary*, entry on "Solon."

[12] cf. A. Andrewes, *The Greek Tyrants* (London: 1956); also P. N. Ure, *The Origin of Tyranny* (London: 1922) which argues the thesis that all Greek tyrants were capitalists before they seized power, and M.P. Nilsson, *The Age Of the Early Greek Tyrants* (Belfast: 1936) which argues that tyranny was based upon the growth of industry. See also the brief survey by Mary White, "Greek Tyranny" in the *Phoenix* (1955).

[13] Aristotle, *Politics* 1310 b 10-14.

[14] Aristotle 1257b4-7; 1311a10; on early Greek Coinage, cf. C. Seltzman, *Greek Coins* (Methuen P, 1955); A. Zimmern, *The Greek Commonwealth* (Methuen P, 1922); N. Davis, *Greek Coins and Cities* (London: 1967).

[15]James Redfield, *Nature and Culture in the Iliad.* (Chicago: Univ. of Chicago Press, 1975) 99-127.

[16] Homer, *Odyssey*, bk XVIII, 130-138; see the interesting discussion of the Homeric/aristocratic mentality in a study of burial rituals and practices in Christiane Sourvinou-Inwood, "Trauma in Flux: Death in the 8th century b.c. and After," in *The Greek Renaissance of the 8th century b.c.: Tradition and Innovation*, ed. Robin Haag (Stockholm: 1983) 33-49.

[17] Cf. A. Andrewes for a view of Sappho and Alcaeus from a political perspective.

[18] Stated in this fashion, the claim is not quite right, as I go on to show; contemporaneous with it are prose writings, no longer extant, on architectural treatises. Even Heidegger, in "The Anaximander Fragment," in *Early Greek Thinking* (New York: Harper, 1978) makes this supposition.

[19] Virtuvius, *Ten Books on Architecture*, bk X; see also, J. J. Coulton, *Ancient Greek Architects at Work*, (Ithaca: Cornell UP, 1977) esp. 24.

[20] Ibid.

[21] Coulton ch. 1-3; Desborough ch. 2.

[22] Coulton ch. 1, "Architect, Patron, Project," pp. 15-29.

[23] Snodgrass ch. 2.

[24] The details of the orderly patterns of experiment is examined in Coulton, esp. ch. 3, 4, 5 on "design", "scale", and "form/mass/space".

[25] Herodotus, *Histories*, 3.60, 4.87.

[26] cf. R. S. Brumbaugh, *The Philosophers of Greece* (New York: 1964) whose treatment supports the positions advanced here.

[27] The evidence comes from Proclus, *Eucl.* 65.3ff, Friedl, D-K A 11, and credited with the following theorems: (1) A circle is bisected by its diameter; (2) The angles at the base of a triangle are equal; (3) If two straight lines intersect, the opposite angles are equal; (4) The angle inscribed in a semi-circle is a right angle; (5) A triangle is determined if its base and the angles relative to the base are given.

[28] In Diogenes Laertius, 1, 27, on the authority of Hieronymous of Rhodes.

[29] Diels-Kranz, *Die Fragmente der Vorsokratiker*, "Thales" A20, from Proclus, *Eucl.* 352.14.

[30] Herodotus 1.75.

[31] Plutarch, *Life of Solon*, 2; D-k A11.

[32] Aratus, *Phaen.* 37-9; Ovid, *Trist.* IV, 3, 1-2.

[33] On the authority of Eudemus in *Astronomical History*; is credited to Thales; Diels-Dranz, "Anaximander," 41.7.

[34] D-K A4; Diogenes Laertius, II.1; both on the authority of Eusebius.

[35] Anaximander and Hecataeus are so credited as cartographers, Diogenes Laertius, II, 2; D-k 12A6.

[36] Herodotus 3.60; 4.87.

[37] The elaborately detailed account of the construction of the Eupalinion has been completed by an architect working with the German archaeological school in Pitagoreo, Samos. Cf. Hermann Kienast, Director, The Excavations in Samos, Deutsches Archaeelogisches Institut, Athens, the *Proceedings* for 1979.

[38] The intention here is not to dismiss or degrade earlier

studies, but rather to make clear that a dimension of that study has not been pursued. Cf. the fine accounts which nevertheless dwell little on these issues, W.K.C. Guthrie, *A History of Greek Philosophy* (New York: Cambridge UP,1972) vol. 1, esp. 26-145; K. Freeman, *The Pre-Socratic Philosophers* (Fair Lawn: Oxford UP, 1966) esp. 36-45; F. M. Cornford, *Before and After Socrates* (Cambridge: 1932) esp. 1-29; L. Robin, *Greek Thought and the Origins of the Scientific Thought*, esp. 17-33, and 34-71.