Notes

NOTES

CHAPTER I

1. A clear overview of this situation is found in J. Burnet 1930. For example p. 39: "All we can really be said to know of (Thales) comes from Herodotus."

2. Commentators sometimes consciously take account of this, e.g., B. Farrington, 1961, 41, 55.

3. On the dates of Empedokles see M.R. Wright 1981, 3–6. Wright estimates the working period as 470's to 430's.

4. In this same sense their contemporary Sophokles presided over the perfecting of tragedy as the ultimate display of human affective life. This evaluation of the importance and universality of the work of Empedokles is not automatically given by his critics but I share it with S. Toulon and J. Goodfield, *The Architecture of Matter* (New York 1962) 53–54. B. Farrington 1961, 58–59 also accorded a great significance to Empedokles, particularly for his demonstration of the "corporeality of viewless air". Farrington's discussion of this is almost panegyrical; it is, of course, quite true that that insight of the philosopher pointed far into the future and is one of the most modern of Greek scientific ideas. G.E.R. Lloyd 1970(1), 39–42 evaluated the Four Elements theory in the light of the modern conception of elements. S. Sambursky 1987, 17–20, lays particular emphasis on Empedokles' discovery that "light propagates through space and requires time to do so"—another insight confirmed by modern science. Although academic critics show appreciation of this or that feature of the work of Empedokles, no one to my knowledge has treated him as a consummate artist of ideas which can literally be visualized in a picture—as I shall try to demonstrate in this study—as well as understood in a poem. In this respect he is *the* High Classical philosopher just as Plato is *the* Late Classical philosopher.

5. For a summary of the problem see M.L. West 1971, 115–170.

6. G.S. Kirk 1974, Ch. 12.

7. R. Carpenter 1959, Ch. IV.

8. This is defended specifically by Kirk 1974, 299–300. Herakleitos' use of Logos is interpreted by many writers as a spiritual symptom, not least by those who speak of an esoteric tradition, e.g., Wilhelm Kelber in 1958, *passim* (Stuttgart) but denied by West, 1971, 124. The arguments of Karl Schefold (1959) are directed specifically to a pervading sense of the divine in all Greek life and nowhere more specifically, on the basis of ornament, than on his p. 27. He is one of the few commentators to refer to developments in European culture since 1800 as skewing the contemporary view on this. Equally concerned with a primary engagement of Greek thought with suprapersonal forces is Friedrich Hiebel, (1953). Some commentators deal with this problem more in terms of the overriding concern of mid-century psychiatry which, absorbed with the human experience of anxiety, works with the dichotomy of rational and irrational: so E.R. Dodds (1951); J.J. Pollitt (1972, 3–8) on Order and Chaos.

9. These terms derive from Ernst Buschor, 1980, 6–9.

10. Cf. "Hot and Cold, Dry and Wet in Early Greek Thought" by G. E. R. Lloyd in *Studies in Pre-Socratic Philosophy* Vol. I, The Beginnings of Philosophy, ed. David J. Farley and R. E. Allen (New York 1970) 255–280, esp. 267–269 on possible origins of the Four Elements theory.

11. Cf. Herakleitos Frag. 126: "cold things grow hot, hot is cooled, wet is dried, dry becomes wet"; Aristotle, de gen. et cor. B, ii,iii.

12. The abbreviated description of the piece by Henri Frankfort, 1954, 10, masks the totality of the conception. Earth, as the hard, lifeless mineral realm it appears to us, can hardly have been in the consciousness of this early epoch, for earth was felt to belong to the gods along with everything else, to be a part of them, as it were—hence more spiritual than physical in our sense. Even the earliest Greek philosophers who speculated on the four elements still had an awareness of the divine nature of each element. If we demand logical placement of earth in the composition of the Warka vase, we can find it only minimally in the consideration that the life-giving water of Mesopotamia in the lowest frieze flows on top of the earth element—not in a void. What the composition really pictures is the absorption of the artist in divine being, while the earth conditions that support life are present more as ancillaries. The spiritual approach of the Near Eastern artists to the depiction of mineral, plant, animal and man was thoroughly discussed by Walter Andrae in "Der Alte Orient" in *Handbuch der Archäologie* hrsg. v.W. Otto, Munich 1939, 754–780. M.L. West 1971, 31–41 discusses the so-called "five elements" and "three elements" recognized in early Iran and India. As all these served religious purposes rather than conceptual thinking a rigid consistency in number is not to be expected. The Egyptian fourfold schema of (physical body), KA, BA, and Akh (W.S.

Smith 1958, 9) perhaps more readily constitutes a doctrinal conception anterior to, but very similar to, the Greek version of the four members (see below).

13. Precisely the same evaluation is given by W. Burkert 1985, 318. Cf. also M.W. Wright 1981, 76.

14. Buschor 1980, 18–20 and G. Kantorowicz 1992, 17–18.

15. F.M. Cornford 1937, 6.

16. Peter Heusser, *Der Schweizer Arzt und Philosoph Ignaz Paul Vital Troxler (1780–1866): Seine Philosophie, Anthropologie und Medizintheorie* (Basel & Stuttgart 1984). Successor to Troxler is Friedrich Husemann, psychiatrist, who used Steiner's concept of a four-organ system in demonstrating the inner dynamics of the four elements in bodily-psychic functions as a basis for therapy: *Das Bild des Menschen als Grundlage der Heilkunst* Vol I (1940). Cf. also Ekkehard Meffert, *Carl Gustav Carus: Sein Leben, seine Anschauung von der Erde* (Stuttgart 1986). Carus is an important and creative 19th century thinker who viewed the earth as a living organism.

17. *Der Aufbau der Realen Welt : Grundriss der allgemeinen Kategorienlehre* 3. ed. (Berlin 1964) 173–183 (Kap. 20). Hartmann is the academic philosopher who most closely approached my viewpoint. His paper "Die Anfänge des Schichtungsgedankens in der alten Philosophie" in *Kleinere Schriften* II (Berlin 1957) 164–191 not only gives a perceptive account of the relation of Plato and Aristotle to the idea of four members of the human being but also explains why modern philosophy (sc. also psychology and anthropology) is largely unaware of these members *as a system* (that is, an explanation of human reality): This situation has, of course, arisen from the following circumstance. The historian of philosophy can recognize in his array of materials from texts *only* those insights that he has himself already worked out in the sense of a systematic philosophy. The nineteenth century interpreters and compilers who created the modern view of Aristotle lacked the sustained ability to do this—and most particularly in regard to the question of ontology, which plays a fundamental role in any evaluation of ancient thought. (translated by J.L. Benson) That statement, written in 1943, was followed by an expression of hope that improvement in this critical matter was on the way. Certainly, in Hartmann's case, there is no doubt that the power of the four-member system was felt (see Ch. I, n.16). Hartmann does not give a detailed history of the concept but does treat that aspect casually.

18. Besides Steiner's books and voluminous published lectures an enormous and ever-growing secondary literature exists dealing with, among other things, research on the various physical and life sciences. His work is often tangential to the traditional "Panpsychic" stream (see Tuchman, 187ff.) but eludes exact classification. It is of some interest that the concept of the etheric body, which in Steiner's view regulates the rhythmic processes of an organism, has been paralleled non-conceptually in recent years in medical parlance by the "biological clock".

19. The general framework of the macrocosmic-microcosmic view of Hellenism historically has to be based on Plato and Aristotle, that is, at the most developed stage of the Four Elements philosophy. Whether or not one takes a teleological view of the development itself does not in any way exclude the importance of unstable and even contentious attitudes towards aspects of it at various times, any more than it excludes powerful background guidance on the part of the Pythagoreans. I do not consider it my task here to trace the history of the concept of soul both because this has been done by others and because it is in effect not essential to the large picture I am trying to sketch out in this study.

20. A measure of the difficulty is the temptation felt by some commentators to treat ancient philosophical-scientific matters in a somewhat mechanical way. An example of this is the claim made by B. Farrington 1961, 143 that existence of the economic class structure in Athens that Plato wanted to improve by organizing society into rulers, police and workers *gave* him the idea of dividing the soul into reason, spirit and appetites. Further: "As with Plato, the master-and-slave relation provides the basic pattern for his (Aristotle's) thought in *every* sphere (emphasis mine) ": Ibid, 145. Again he ascribes the specific originality of the Ionian thinkers to the fact that they applied "to all major phenomena of nature modes of thought derived from their control of technique": Ibid, 135. A one-sided viewpoint thus obscures what might otherwise be useful observations.

21. See, e.g., Arthur Zajonc, 1993, 301–302.

22. The precise nature and urgency of this crisis have been recently defined by Brian Appleyard, *Understanding the Present: Science and the Soul of Man* (Doubleday 1993) passim.

CHAPTER II

1. See J.J. Pollitt 1965, 221 and 228.

2. Kranz 1912, 138–139 (where the rest of the passage referred to is given in Greek). Kranz virtually admits in the last paragraph of p. 128 that Empedokles could not have meant this.

3. *Farbenlehre Hist. Teil Naturwissen. Schriften I. Teil* (Artemis Verlag Zurich 1949) 254 (*Geschichte der Farbenlehre*).

4. Cf. W. Burkert 1985, 298 on Orphics and Pythagoreans; also p.318 on the religiously inclined nature of Empedokles; A. Mele in "La Storia (Crotone)" *Att. dal ventitresimo Consegno di Studi sulla Magna Grecia* (Taranto 1984) 23 n. 79. On the question of Pythagorean tendencies in the Platonic Academy (perhaps the source of the information provided by Aetius) see K. Gaiser 1965, 214 n. 71.

5. G.M. Stratton, *Theophrastus and the Greek Physiological Psychology before Aristotle* (London 1917): *de sensibus* 73–82 (text and translation, 132 f.).

6. H. Dürbeck 1977, 113.

7. Dürbeck 1977, 57. Even Theophrastus, 82—or is it his translator?—falls into the error of questioning whether Demokritos was opposing "green" (πράσινον) to red. But the question would be equally valid if Theophrastus meant yellow, since it is a question of the structure of the color.

8. For reference see note 3.

9. P.J. Bouma 1947, 205 explains that the "colour properties" of an observer can be defined through measurement with equal accuracy on the basis of either Newton's "spectral" colors or of Goethe's border colors, but that in the first mentioned case the process is by far easier because, among other things, negative quantities do not have to be taken into consideration. Goethe, and also Plato, would surely have replied that convenience is a poor criterion for truth and that it would be better to sacrifice that and proceed more slowly, in order to avoid missing or distorting a part of reality.

10. Or should be interpreted, at least, in the spirit of dialectics, to use the terminology of Gaiser, 183. Dürbeck, 63 gives the result of his philological investigation of *lambron* as: *"zeigt an allen Stellen mehr Ethos als wirklich fassbare Bedeutung. Ein hohes Wortethos ist auch ein Noem, allerdings ein solches, das sich oft genug, wie hier, nicht genau fassen lässt."* With this gesture Plato may have wanted to make clear, at least to his own poetic sensibility, that colors—which the Greeks normally treated in a very objective way—do also have a mental/moral aspect, just as Goethe felt that this aspect was a vital part of color reality.

11. *Goethes Werke* Herausgegeben im Auftrage der Grossherzogin Sophia von Sachsen (Weimar 1906) Erste Abteilung Vol. 32, 97, 19ff.

12. One need only examine the artifacts in any ethnographical museum to establish this visually. As an example for many, I cite here a tradition related by a Maya descendant, Giacondi Belli (Belize) in an article entitled "Journey to the Lost City of the Jaguar" published in *Nature Conservancy* 44 (1994) 14 : "I look up and see the ceiba tree. A sacred tree for the Mayas. In their cosmogony, the world was thought to be a square, flat surface, suspended between 13 successive heavens and nine underworlds, each of them ruled by a god. On the geographic center of the Earth, a great ceiba tree grew, while four smaller trees stood on its four corners. Each corner had a separate color: white for the North, yellow for the South, red for the East, black for the West. "

13. The hue of Attic soil is sometimes supposed to be the reason (i.e., sheer convenience), but nothing *compels* artisans to accept unchanged what is at hand, and concealing ground color as Attic potters long did—is a common phenomenon in ceramics: cf, for example, the blue ceramics of the New Kingdom in Egypt. Further discussion of this see Note 4, Chapter III.

14. W. Kranz 1912, 128 n 4.

15. *Aristotle Minor Works* (Loeb Class. Library) Cambridge, Massachusetts 1955 Vol. 1 Translated by W.S. Hett: *Aristotelous peri Xhromon* (from the Peripatetic School, of unknown authorship: Theophrastus? Strato?) *passim*.

16. Plato, *Timaeus*, 55A. A detailed discussion of the relationships among all these shapes is to be found in Plutarch's "Why the Oracles Cease to Give Answers" (*De defectu oraculorum*) 32–34 in *Plutarch's Essays and Miscellanies* edited by W.W. Grodam (Boston 1906) Vol. IV.

17. This conclusion arises inevitably from a fragment of Empedokles himself: see under his testimonia A and, of course, the elegant disquisition on qualities by Plato (*Timaeus*, 49).

18. Ernst Lehrs, *Mensch und Materie* (Frankfurt-a-M 1966) Goetheanismus Ch. VII.

19. *Punkt und Linie zu Fläche*, 1926 (*Point and Line to Plane* Dover, 115 f.)

20. J. Pawlick, *Praxis der Farbe* (Cologne 1981) 214.

21. See translation reference in n. 16.

22. Hermann Diels 1964, B17, 27–29: B26, 1–2.

Historians of ancient philosophy traditionally interpret the cyclic aspect of Empedokles' philosophy as an alternating dominance of love and strife, i.e., of "forces." Undoubtedly that had high priority in the thought of the ancients. Yet this approach neglects a possible similar significance in the other term of the Empedoklean statement quoted here: dominance of the (four) elements in rotation. Coming to this problem from the direction of color, I found it necessary to conceive a way of doing justice to the processual quality of the elements (a Greek concept though not usually mentioned) and to the differentiation between macrocosm and microcosm (also implicit in ancient thought). Obviously I do not claim that Empedokles or anyone else actually systematized his philosophy in my conceptual terms; yet certain conclusions from them concerning colors and Hippocratic medicine, if not more, are implicit in fifth century culture and all the more in the pragmatic achievements of Hellenistic engineering and chemistry.

Thus there are now two parallel interpretive streams: that of the traditional scholarly analysis of cycles, e.g., D. O'Brien's *Empedokles' Cosmic Cycle* or in B. Inwood, *The Poem of Empedocles* (Toronto 1982)46–52—in which there is no mention of any of the factors I have just brought up; and the one I am developing here out of analysis of art and from diverse clues in previous scholarship. In stressing processual quality I do not exclude the operation of love and strife—indeed that has to be the essential mover of the rotation of the elements to dominance. That is not, however, to say that I can offer any definitive suggestions about the technique of its operation—anymore than can O'Brien and those he reports on, who do not agree on how or even whether love and strife operate in turn. In any case the two interpretive streams under discussion seem to me to express complementation rather than contradiction and to demonstrate again the richness of fabric of any creative moment in world history, going beyond the ability of human consciousness to exhaust.

In the foregoing sense it can be pointed out that my demonstration of triadic stages in the rotation of the elements in Greek sculpture opens the way to a new hypothesis. Empedokles' mention of a "double tale" (*dipl'ereo*): the coming together and growing apart of roots, can hardly exclude a middle phase in which the process starts to reverse itself, comes to a balance and then starts on the opposite course. Logically this is more plausible than the assumption of a single abrupt and dramatic turning point whereby things are completely turned around. It could therefore be supposed that the thinking stage is dominated by the creativity of strife (in reaction against an old order) and that in the feeling stage the new creation is then gradually harmonized by the increased activity of love so that in the final (willing) stage, all things desire each other in the now refined conditions of the cycle in progress. In due course the cycle begins over again. In this way, the *simultaneous* rotation of the elements *and* love and strife can be accounted for.

N.B. I follow Diels-Kranz and Freeman in the interpretation and translation of the passage under discussion. However, if one is going to doubt that Empedokles was referring to elements as well as forces—as does H. Lambrides, *Empedocles A Philosophical Investigation* (University, Alabama 1976) 67–69—then it must be counterclaimed that the whole thrust of the section (fr. 17) in which it occurs would leave no sense in these lines without elements but could if necessary be understood without forces.

23. Sigerist 1961, 101–106.

24. According to the astute arguments of W. Müri in "Melancholische und schwarze Galle": *Antike Medizin* (ed. N. Flashar, Darmstadt 1971, 165–191: excerpted from *Mus. Helv.* 10, 1953 21–38, 49) the systematic differentiation between black and yellow gall first turns up in "On the Nature of the Human Being", which he dates to about 400 (cf. W.H. Jones in the Loeb edition of this with the date of 440–400). Müri rightly calls attention to the mental agility of the Greeks in recognizing such subtle distinctions as four instead of three seasons and keeping "psychological" apart from "mental". Yet it is surely a modern preconception to propose some systematic compulsion toward fourfold division. Who was forcing whom to do this? I prefer to assume that Hippokrates—if not Empedokles himself—had absorbed the artistic model of contrapposto, perhaps in stages as it was being worked out, and simply applied that to his own concerns. Just when the results were written down cannot, of course, be known but the detailed structure of the scheme rather suggests the spirit of the High Classical Reaction (see Introduction, chart following paragraph 10). Another problem is whether the statement in the Hippocratic work *On Diet* which A. Krug (*Heilkunst und Heilkult: Medizin der Antike*, Munich 1985, 21–38, 49) takes to be evidence of an alternative system, represents the refusal of the author of that work to relinquish the old macrocosmic system in favor of new ideas, given that the definitions of the elements fire and water in *On Diet* remain unchanged (see Chapter II, *The Ancient Sources*, Hippokratic Writings, B).

25. "Antike und Mittelalter" in *Historische Anthropologie* Bd. I Krankheit, Heilkunst, Heilung (Freiburg 1978) 257.

CHAPTER III

1. Harold Mielsch, *Buntmarmore aus Rom im Antikenmuseum Berlin* (Staatliche Museen Preussischer Kulturbesitz 1985) pls. 1–24.

2. A maverick account preserved by Diodoros has been cited by B. Farrington 1961, 82–85 as an early example of dialectical reasoning (in the Marxist sense). If this account is not based on a sophistic spoof—perhaps the most likely explanation—there is in any case too little known about its context and date to evaluate it as an exception to the general trend of ancient culture.

3. Jean Bollack 1969: 1, 73.

4. On this tradition see my remarks in *Bamboula at Kourion* (Philadelphia 1972) 119f. The olive green variety of earlier clay survived perhaps most tenaciously, although not in great quantities, in the Corinthian ceramic stream. As a color, olive green is, or can be, a mixture of black and yellow.

5. Cook 1960, 251.

6. J. Boardman 1974, 57.

7. The change in meaning of black is made all the more obvious by the continued use of the traditional blackfigure style at the same time. See J. Boardman 1974, 113.

8. See A. Zajonc 1993, 292–329.

9. Cf. G.E.R. Lloyd 1990, 14–38 on this development. He seems to think of it exclusively, or at least largely, as an intellectual process.

10. Irma Wehgartner, 1983, 3. On an interesting episode of Early Archaic vase painting see S. Morris, *The Black and White Style Athens and Aigina in the Orientalizing Period* (New Haven 1985) 27, where a connection between white and light can be inferred.

11. Mertens 1977 (throughout).

12. Mertens 1977, 106.

13. For this reason it is sometimes called in scholarly writings “the so-called four color painting” (Wehgartner, 78). From this we can draw two conclusions. First, the unhappy experimentation with white backgrounds for black figures probably awakened the insight that white is the representative color of noetic consciousness, while this step in turn—given the holistic tendencies of Greek thought—entailed reflection on how the other three colors are related to white. It is apparent from the seignorial position of *nous* in the macrocosmic hierarchy (*Seinshierarchie* as opposed to *Daseinshierachie*—the microcosmic series) that such a maturation of thought could only be set in motion by a real attempt to use white. Secondly, the appearance of this quadripartite synthesis, fluid though it may have been, toward the end of the Protoclassical period is probably the first complete statement of the *principle* of contrapposto and created purely out of artistic intuition. This would therefore not only considerably precede Polykleitos and

Empedokles but even be somewhat earlier than the first provisional version of contrapposto—in terms of dynamic ponderation—in sculpture that we know of (assuming the Kritios Boy to be datable to about 480).

14. Keuls 1978, 69–70 ad Aristotle, *Meteorologika*, 374b, 31–34.

15. The word *prisma* is used by Euklid (II Deff. 13) in connection with its geometric shape: cf. PW s.v. Euklides, 1018. Hellenistic Greeks were at least interested in the refraction of light as it affected katoptrics (*Hdbh d. Altertumwiss.* V, 1,2 I: L. Herberg, Geschichte der Mathematik und Naturwissenschaften im Alterthum: IV Optik, 73–79). It is my understanding that there is at least one natural means of access to the spectral phenomenon, *viz.*, quartz crystals. However these are said to produce *double* bands of each color at the border of the light ray—a perhaps confusing impression (cf. Rudolf Rykart, *Quartz-Monographie*, OH-Verlag Thun 1989 : I have not personally been able to consult this publication).

16. I am thinking of temple geometry as this is recovered by Tons Brunés, *The Secrets of Ancient Geometry and Its Use* (Copenhagen 1967).

17. Goethe concerned himself with this problem in *Beiträge zur Chromatik*, Par. 29:"...thus pure white is a representative of light, pure black a representative of darkness". Rudolf Steiner, in editing this (Kurschner edition, Weimar) commented: "white then in Goethe's view is only the representative of light, whereas Newtonian optics claims it as light itself. But at most one could say that white is a condition of matter under the influence of unadulterated light, or that white appears as matter that resists light by its opacity. " This is obviously a, if not *the*, central problem in color studies and has been thought about extensively by philosophers such as Wittgenstein as well. It therefore seems pertinent to quote a rather long passage from an exceedingly astute commentator whose work is hardly known in the English speaking world, and perhaps only marginally to German art historians: E. Strauss, *Koloritgeschichtliche Untersuchungen zur Malerei seit Giotto* (Deutscher Kunstverlag 1972) 125 (my translation):

> Through this process there is a firming up of those elements of color which are supported by a system of linear structuring, foremost among them being those that most purely represent the phenomena light and shade, colorless as these are. That only black and white are capable of doing this has, of course, always been understood and accepted, and yet the whole long route to complete autonomy of picture colors had to be traversed before this article of knowledge could finally be accepted in the practice of artists. Not even Otto Philipp Runge—who in his color theory gave more room than any other artist-theoretician before him to reflections on the manifestations of light and dark and the problems these present to the painter—succeeded in consistently incorporating into his own painting his own pregnant observations about the two "polar colors". Nevertheless, he came to the remarkable realization that white and black are to be considered "figures" of light and dark. Through this important insight color acquires a form-quality: the "etheric essence" of light and darkness first of all takes on a definite reproducible shape.

> On this point Runge's ideas come very close to Klee's evaluation of white and black as the primary components of chiaroscuro in painting. For to Klee's way of thinking what consists of white is simply the light itself, whether this is applied pigment or simply part of the surface color of the picture support itself. By the same token pure black stands for pure darkness.
>
> This materialization of darkness through the deepest, most absolutely scaled color quality signifies at the same time a decidedly upward valuation of darkness as a picture element. It also contains a basic innovation. By identifying darkness with pure black, Klee gives the former the same color status as that which light gets through being represented by white—and makes it, through this opposition, for the first time tangible to the senses. He creates a balance between these two potencies which could not exist so long as the conception of the natural primacy of light as the only animating force had uncontested validity also in regard to pictorial light. But "what may be true in Nature, the dominant activity of the white pole, must not seduce the painter to a one-sided view." In fact, Klee goes so far in this relativizing of light and pure white as its equivalent as to deny it even in its isolated state any automatic power of its own. It can perhaps acquire this in its "interaction with opposites." Painting thereby does not reckon *only* with a light-energy set against a specified darkness, but just as much with a black energy set against a specified light, and so with two forces that work in opposite directions.

18. Cf. the title of J. Boardman's article, "Silver is White" *RevArch* 1987, 279–295.

19. However much Goethe's expectation in this case was an (understandable) misunderstanding of Newton's *crucis experimentum*, it also harbored intuitively an inevitable criticism of Newton's legacy in its capacity as an absolute model for the world view that swept all before it. That legacy starts from the premise that the phenomena of nature can be understood as mathematical abstractions which in turn can be used to manipulate said phenomena quite arbitrarily to serve human convenience. Curiously, this premise is not inapplicable to the way that Newton himself silenced his contemporary critics: Hook, Huygen, Marcotte, etc., more through his great authority and clever politicking than through honest consideration of their doubts. The problematical nature of this whole side of modern science troubled Goethe more than any other factor of the culture of his time. Despite the fact that he hardly made a breach in the impregnable fortress that was Newtonian science at that time, the problems he aired have never ceased to exercise theoreticians of science (e.g., Helmholtz and Heisenberg). A number of studies have appeared recently in the Anglo-Saxon world which attempt in an unprejudiced way to do justice to Goethe's concerns: J.P.S. Uberoi, *The Other Mind of Europe: Goethe as a Scientist* (Delhi 1984) ; Frederick Amrine, ed. *Goethe and the Sciences: a Reappraisal* Boston Studies in the Philosophy of Science, no. 97 (1987) ; and D.L. Sepper, *Goethe Contra Newton Polemics and the Project for a New Science of Color* (Cambridge University Press 1988). Particularly the last mentioned sets out trenchantly the ramifications of the controversy not only for the science of Goethe's time but also of our own age. He concludes that Goethe's conception of the scientific method represents an ideal which—despite his inability to gain a hearing for it—has in

many ways been validated in the 20th century through sheer necessity. Thus "we have seen that rejecting Goethe's science as the imaginings of a poet is false; perhaps it is not fanciful to suggest that as poet Goethe recognized with unmatched clarity the role of language in science, its symbolic and inalienably metaphoric character" (192).

20. This scheme is based on that in Ott & Proskauer I 1980, 327.

My terms, "Dark spectrum" and "Light spectrum" do not appear there, although Goethe is said by John Salter (see Rudolf Steiner, *Colour*, p. 78) to have used the terms in a reverse sense (no exact reference is given); Goethe did not use them generally nor has anyone else, so far as I can determine. Rather, the two spectra, if given any description at all, have been called the Newton-Goethe spectra. The purpose of my terms is to go beyond that purely theoretical controversy and suggest the actual dark background against which the light coming through the prism prduces the "physical" colors, and the actual light background against which light through the prism produces the "metaphysical" colors.

21. The rainbow is a special problem. Individual atmospheric colors arise according to the polaric rule: dark before light makes red, while light before dark makes blue, interfacing with such physical factors as rain drops and dust. But the position of white at the center of the Dark spectrum seems to me not to be taken sufficiently into account in explanations of various phenomena.

22. One could try to formulate it in this way: although the prism can make these colors physically visible, they are by virtue of their inverse relationship to light-dark more hovering over than entering into physicality.

23. In the experience of H.G. Hetzel (see Appendix B) many scientists condemn the physical theories of Goethe without having investigated them, that is, on hearsay. More fair-minded scientists, such as R.M. Boynton (*Human color Vision*, Rineholt, 1979, 22) and P.J. Bouma 1947, 204), recognize that a holistic interpretation of reality such as that of Goethe would naturally produce a quite different understanding of color than Newton's.

24. Cook 1960, 178.

25. Clairmont 1993, Chapter III A–D.

26. Scheibler 1974, 99.

27. The background color of Hellenistic wall painting is usually white or gray-white: cf. V.J. Bruno 1977, figs. 6–13: idem 1988, *passim*. Now white no longer conveys only a contemplative attitude toward death but stands for human consciousness on a broader basis.

28. Bruno 1977, 58–59.

29. Antiquity had already touched on this question. "The Aristotelian Problemata xxxviii", 8 (967b) in *The Works of Aristotle* Vol. VII, tr. by E.S. Forster (Oxford 1929) asks: "Why do men become darker complexioned as they become older? Is it because

anything which decays becomes blacker, except mildew? And old age and decay are the same thing. Further, since the blood when it dries up becomes blacker, it is only likely that the older men are the darker they are; for it is the blood which naturally gives color to our bodies."

CHAPTER IV

1. On the possible functions of this slab see Ridgway 1977, 193 note 8.

2. *EAA* VI, 201–4; also reproduced by W. Biers, *The Archaeology of Greece* color fig. 7 and by M. Andronicos, M. Chatzidakis and V. Karageorghis, *The Greek Museums* (Athems 1975) 69 fig. 48.

3. Orlandos refers to this as "interamente bianco (ora leggeremente ingiallito) ottenuto con gesso". Yet he describes the central panel of an altar as "di colore giallastro", although in the colored reproduction there is no difference whatsoever with the background color. Is therefore the overall yellowish tint the last remains of a yellow surface coat, a phenomenon met with in sculpture? However, a pure yellow to represent air does not seem likely at this stage. Orlandos does not mention a background for the contemporary pinakes B–C (perhaps because of their poor condition). But in the case of D, which he specifically dates to the end of the sixth or beginning of the fifth century, he describes the background as white.

4. Cf. *EAA* Supplemento (1970) s.v. Paestum; recently on this *Dialoghi di Archeologia* terza serie 5 (1987) No. 2: 113–123 (L. Cerchiai, "Sulle Tombe del Taffatore e della Caccia e Pesca").

5. AJA 60 (1956) 256 Pl. 86 figs. 20–21; AJA 74 (1970) 251–253 Pls. 59–61.

6. The assumptions implicit in Newtonian color theory are so pervasive and unquestioned that it may perhaps seem that something similar to them ought to have existed in antiquity to which the four color palette would form a curious exception!

7. Bruno 1977, 66 came, in my opinion, to the correct conclusion: that there is no contradiction and that, in fact, Greek painters from the beginning of the fifth to the end of the fourth centuries all painted essentially with four colors, though obviously not without advancing in their consciousness to the possibilities of combining them with other colors. After that, however, I cannot follow his arguments to the end. The four color palette of Polygnotos can only have been black, white, red and yellow as in early white-ground painting.

8. Wehgartner 1981, 18. Comparisons of Polygnotos' supposed figure style with Archaic paintings outside Greece have no cogency. We do not know the scale of his frescoes and there is in any case no way to determine what his aesthetic preferences in regard to outline figures may have been. But if we assume use of a white background, at least in

part, then there were psychological reasons for using, at least to some extent, outline figures, just as in ceramics (see Chapter III, The Emergence of Redfigure Style, paragraph 15).

9. The use of pure red and yellow as decorative accents—for example as encircling bands or on tongues—was of course known in Archaic pottery. I noted instances of this in *CVA* USA 29 Philadelphia 2, p. 43. So-called purple enhancements on Corinthian animals and other figures represent, in my opinion, simply a strengthened red.

10. Bruno 1977, 107.

11. A reference to black in connection with grief (not specifically connected with death) in a way reminiscent of Mediterranean cultures of today is given by Lucian: Pollitt 1965, 165.

12. Color reproduction in R. Brilliant's *The Art of the Greeks* (1972) 237.

13. Bruno 1977, Fig. 11; L. Zhivkova 1971, pl. 33.

14. In the vase painting of the third century from Lipari and Centuripe one finds similar, if less exalted, examples of the use of blue (and white) that have at least a poetic quality—even if transcendence is not certainly intended. See P.P. Kahane, *Ancient and Classical Art* (2000 Years of World Art, I, 1967) 161–62 ; M. Robertson, *Greek Painting* (Skira 1959) 173–174.

15. Pollitt 1965, 228.

16. Petsas 1966, Plate 1 followed by plates with details in color.

17. Petsas 1966, 181.

18. Andronicos 1989, 37.

19. Andronicos 1989, 114.

20. Andronicos 1989, 224. My hesitancy about accepting this date as definitive stems from the absence of original works positively datable to the Late Classical period for comparison. Thus, despite very strong theoretical connections to that period, it seems better for the present to leave the question open.

21. Andronicos 1989, 115.

22. Andronicos 1989, fig. 52 and Bruno 1977, pl. 8.

23. Andronicos 1989, 85 fig. 45.

24. Bruno 1977, figs. 1–5.

25. G. Richter 1969, 278–79; for a color reproduction see JdI 96 (1981) 141 fig. 1. The violet of the walls contrasts with an immediately juxtaposed yellow pillow. Other instances of this complementarity are not so clear in the color reproductions of other stelai published here but V. von Graeve and F. Preusser 1981, 152 point out exact parallels in details of shading on painted reliefs.

26. A. Rouveret, *Historie et Imaginaire de la Peinture Ancienne Ve siècle av. J.-C.-Ier siècle ap. J.-C.* (Rome 1989) Series: BEFAR 274, p. 258 accepts the explanation of *colores floridi et austeri* as being a reference to the ability of certain colors to reflect or to absorb light. Apparently she connects this with the invention of the technique of showing light and shadows in painting (Apelles). This hypothesis, while not unreasonable, retains an element of speculation in the absence of any panel paintings of the period in question. More ingeniously, she tries to rescue the modern concept of three primary colors by allowing black (in the four color system) to have included a form of very dark blue (*tryginum*, p. 260)—much as did Bruno. From my point of view this is an exercise in futility.

27. That Greek artists did to some extent occupy themselves in making copies of existing painting is actually documented in one case (Pollitt 1965, 170) and there is, of course, the famous instance of the Alexander mosaic. Thus, there is a built-in likelihood that quite similar, if not exact, coloration was involved especially if four color painting in the strictest sense characterized a famous original, for one could not change this much without changing the character of the painting. On the other hand, in perhaps many other cases, the temptation to "modernize" the coloration must have been strong. An exact parallel to this is the current debate over whether to re-issue classic black and white films in technicolor. And who is to say that later artists did not sometimes "adapt" the composition of an older painting and alter its color scheme in quite arbitrary fashion, making of it a separate work of art, (as in the case of statues)? A modern parallel for this would be the many versions of a tropical lagoon scene inspired by a lithograph of "Morning in the Tropics" by Frederick Church (Walters Art Gallery, Baltimore). Hardly any of these could be called a true copy (probably most were not intended to be) and some of them are quite stunning new compositions in their own right. One could wonder also whether there were black and white sketches of famous artists' works in circulation among later artists so that something like the recreation of prints and engravings in European painting with entirely new colors took place. In short, the question of "copies", especially in regard to color, brings one into a morass of unresolved and unresolvable problems.

28. For instance, M. Andronicos 1989, 117 writes "Historians of Greek painting have regularly sought help from Greek vase paintings from earlier periods (the fifth century B.C.) and for later periods (fourth-second centuries B.C.) in Roman works which 'are inspired by', 'imitate' or 'copy' Greek originals. I am afraid that in both the first and second cases the help afforded by these pictorial sources—valuable in all other respects—have usually proved misleading". Martin Robertson (1975, 574–577) has squarely faced this vexed question of how copies could have been made at all, let alone how faithful the copyist wanted to be, and arrived at a skeptical position paralleling my own on the subject.

29. Bruno 1985, 18. In his further exposition (e.g., in Ch. V) of the effects of light figures on dark backgrounds in the late period, Bruno speculates that the principle descends from the Classical architectural use of Eleusinian marble as a background for lighter

relief figures. Certainly subsequent generations must have seen it or at least heard of this, but immediate inspiration may have come over other routes, such as mosaics or vase-painting, as Bruno realizes. His comparison of the wall paintings with modern surrealism is intriguing but we simply cannot know how valid the analogy is. He asks: "Is there any reason to believe that the emotions of the subconscious *as we experience them in dreams* were any different for those living in classical antiquity than they are today? (p. 62; emphasis mine). Can we equate our post-Freudian consciousness with an age two thousand years ago when there was no conception of the subconscious?

30. Schefold 1952, 176.

31. The study by Roger Ling, *Roman Painting* (Cambridge Press 1991) laudably and consistently pays attention to the fact that all paintings are colored; what I offer here is nevertheless more complete and detailed and, of course, takes account of the Goethean spectra. On the Boscoreale figural scenes: Ling, 104–106; Boscotrecase: Ling, 114.

32. B. Nogara, *Le Nozze Aldobrandini e i Paesaggi con scene dell'Odissea e le altre Pitture murale antiche conservata nella Bibilioteca Vaticana e nei Musei Pontifici* (Milan 1917) ; Helbig 1969, 353–60. Color reproductions: EEA V, facing 818; A Maiuri, 1953, 33. These give scenes I-II; b & w reproductions of various scenes ubiquitous in the literature; EWA VII, pl 180: scene VIII in color.

33. Nogara (see note 32) reproduces in both b & w and color but the latter does not do justice to white and yellow. Better color reproductions in Maiuri 1953, 24, 30. In general I follow the interpretation suggested by B. Andreae, "Igni et Aqua Accipi: zur aldobrandinischen Hochzeit" in *Römische Quartalschrift* 57 (1962) 3–16). (See also Helbig, III, 360–66). The reasons for this will become apparent in my further discussion. In my interpretation of the color choices in the AW I depend on the suggestions for meaning worked out in Illustration 16. It will be seen that the terms given there can be no more than directional signals in approaching any specific painting. The case of yellow is particularly interesting here, since that color is rather insistently connected with the bridal "condition" in Roman testimonia, e.g., Pliny, NH XXI.46: *Lutei video honorem antiquissimum, in nuptialibus flammeis totum feminia concessum* (I understand that yellow was the earliest color to be highly esteemed and was granted as an exclusive privilege to women for their bridal veils). There are indeed yellow veils in other Roman bridal representations and Laetitia LaFollette, to whom I am indebted for these references and translations, believes she has seen traces on the Aldobrandini veil. In any case, the use of yellow in connection with the bride in general—if it is as ancient as it seems to be—is deeply connected with the philosophy of the four colors. Varro Ling. V.61 says *Igitur causa nascendi duplex: ignis et aqua. Ideo ea nuptiis in limine adhibentur, quod coniungitur hic, et mas ignis…aqua femina…* (Therefore the conditions of procreation are two: fire and water. Thus these are used at the threshold in weddings, because there is union here, and the fire is male…and the water is the female…). In the most dynamic cosmic sense fire is red (Illustration 12 A) and, since Egyptian beginnings, the color of the male is red, presumably thus pointing to pure activity. White normally designates the opposite state, pure passivity, and is so used for the female: in the same

paradigm water is white. But in the strict sense of liquefaction (Illustration 12 C, and throughout the microcosmic series: Illustration 13 E-H) water is yellow. This does full justice to the role of the liquid element in the processes of the generation of physical beings.

34. P.H. von Blanckenhagen and Beatrice Green, "The Aldobrandini Wedding Reconsidered" *RM* 82 (1975) 85–98. Other considerations brought forward here also lack cogency. The slab on which the youth is seated is compared to a "bench-like stone placed exactly like the slab on which the young man of the AW is sprawling. " But a narrow bench is not a low wide slab and moreover it is placed *many feet* distant from the bed in what is obviously a closed-off room. The *female* figures on the bench are seated primly and normally. The value of this comparison eludes me. Von Blanckenhagen laboriously reconstructs a lost painting of the wedding of Alexander and Roxane which he admits is in no way comparable to the AW but then proceeds to invent the composition of another lost painting which is claimed to be reproduced in the AW. Surely this is the kind of speculation which Andronicos (n. 28) warned against. Another factor which makes me suspicious of a total prototype for the AW is the blue background. There is so far no evidence whatsoever that figures were placed *in toto* against transatmospheric blue in the fourth and third centuries B.C. My impression is that this is not likely to have occurred until the Late Hellenistic period (in Alexandria?) with the creation of landscapes with scaled down figures, horizon and sky (e.g., the Odyssey Landscapes). In any case the coloration of the AW in no way agrees with the four color style which was predominant in the Protohellenistic and Early Hellenistic periods. Finally, even if we granted all the identifications of the figures proposed by the authors, it seems highly unlikely that, in the moral atmosphere of the Augustan period, a wedding picture of a Hellenistic prince would have been used without a specific Roman application—and von Blanckenhagen does admit in the end that Curtius' interpretation "may not have been entirely wrong."

35. Moreover, architectural parts of wall decoration are usually shadowless, that is, do not throw shadows, although shadows can appear on them (e.g., façade in the Casa dei Misteri where the two outer columns and the plinths have illogically placed heraldic shadows: illustrated in color in *Palette* 13, 1953, fig. 5 in "Die Wahl der Farben in der antiken Kunst" by K. Schefold).

36. There was an incipient, though quite unsteady, interest in this in a few still lifes (cf. A. Maiuri 1953, 135 and B Maiuri 1957, 131) and in some of the theatrical mosaics (e.g., tambourine player of Dioskourides: EEA III opp. 120 and EWA VII p. 166—both in color).

37. T.H. Fokker, *Catalogo Sommario della Galleria Doria Pamphili* (Rome 1959) 12: Poussin, oil on canvas 1.41 x 2.42m.; Giorgio Torselli, *La Galleria Doria Pamphili* (Rome 1969) fig. 385 b & w illustration (Poussin).

38. General description of room: K. Schefold, 1952, 67–71; detail of scene with figures on white background; EAA VI, facing 214; another detail in color: girl decanting perfume (A. Maiuri 1953, 29).

39. Sacral landscape (*paesaggio a fondo nero*): A Maiuri 1953, 122 in color; B. Maiuri 1957, 105–107; detail also in color. Night scene: A. Maiuri 1953, 75 in color.

40. J.J. Pollitt 1965, 228.

41. In connection with the third century painted stele of Hediste K. Schefold writes ("Die hellenistische Blütezeit der Malerei" in *Sitzber. Bay. AK. Wiss.* 1985 Heft 2, 10): "Although there is depth in space, it in no way dominates the figure; on the contrary, all pictorial elements, even indications of body perspective, are subordinated to the plasticity of the forms. Greek art understood space as something that existed between three dimensional forms, not as a concept in itself, as in Roman and later European art". This conclusion, based on form analysis alone, approximates my own conclusion.

42. On the tendency of some impressionists to believe that the human eye properly recorded the world as a flat picture (via the optical theories of Hermann von Helmholtz) see H. Honour and J. Fleming, *The Visual Arts: A History* (Prentice-Hall 1982) 523 and notice also the attraction of Japanese art for these artists.

CHAPTER V

1. A casual survey of books on Greek Sculpture of the last half century which have indices (only about half of them) revealed that color was often not mentioned at all and at best received only the briefest of mention—usually to the effect that it was used for contrast between figures and background or between figure and attire. J. Boardman, *The Sculptures of the Parthenon* (Austin 1985) 34 assumes that flesh parts were left in plain white marble while costume and accoutrements were painted. This view was also expressed in regard to later works by M. Bieber, *Sculpture of the Hellenistic Age* (New York 1961) 20. On this question in general and on *ganosis* see Reuterswärd, 67 and especially V. von Graeve and F. Preusser (1981), 152–53. The Renaissance and Neoclassical tradition of unpainted flesh in sculpture may account for our general lack of enthusiasm in visualizing color there, as illustrated by the fate of the so-called "Tainted Venus" in the Walker Art Gallery, Liverpool, by John Gibson (1799–1866). Commissioned by the Preston family and exhibited in 1862, it scandalized a number of critics who felt that—despite its classical pose—it had been made by the color to look like a naked English woman. In late 20th century superrealistic sculpture, faithful imitation of flesh color has become a commonplace but, of course, the figures so treated are devoid of Classical pretensions.

2. Reuterswärd 1960; this is still the basic comprehensive study on this subject but an unpublished Columbia University dissertation by P. Dimitrious, "The Polychromy of

Greek Sculpture: to the Beginning of the Hellenistic Period" should be noted. There is no lack of interest in pursuing special problems connected with color, as in the research of von Graeve and Preusser 1981 on the techniques used in painting on marble; or as in the research on painted inscriptions on the Siphnian Treasury by V. Brinkmann, "Die aufgemalten Namenbeischriften am Nord—und Ostfries des Siphnierschatzhauses" (*BCH* 109, 1985, 77–109). In other types of research color is touched on incidentally, as in "Birds, Maniskoi, and Head Attributes in Archaic Greece" by B.S. Ridgway in *AJA* 94 (1990) 594 : comments on color occur in connection with types of headdress on statues.

3. *Die Polychromie der hellenistischen Plastik* ; mimeographed dissertation, Mainz 1964.

4. L. Wittgenstein, *Remarks on Colour*, ed. by G.E.M. Anscome (Oxford n.d.) 1–8 passim, 15 and occasionally elsewhere; on this see Jonathan Westphal, *Boston Studies in the Philosophy of the Sciences*, no. 97 (Dordrecht 1987) 19–340.

APPENDIX A

1. Based largely on holdings of the Naples Archaeological Museum. Next to each inventory number mentioned I have placed a corresponding numeration in Karl Schefold's *Die Wände Pompejis: Topographisches Verzeichnis der Bildmotive* (Berlin 1957) or an equivalent notation if available.

2. Scheibler 1978, 302.

3. Ibid, 303.

4. A Maiuri 1953, 69 color; B. Maiuri 1957, 80–81 with color detail.

5. My field notes list this as 9987 which must be erroneous but letters to the museum have not resolved the difficulty. An excerpt in color from a marine mosaic in the Naples National Museum—not further identified in any way by the author—clearly shows the system of alternating black and green lines to indicate water: S. Rossi: *Mosaics A Survey of their History and Technique* (Praeger 1970) fig. 7.

6. E. Pfuhl, *Malerei und Zeichnung der Griechen* (Munich 1923) fig. 686: "Einübung eines Satyrchors"; illustrated in color in *Mosaici e Mosaicisti nell'Antichità*, opp. p. 12 (listed as Estratto dalla Enciclopedia dell'Arte Antica, Rome 1967 but this figure is not in the article on mosaics in the EAA).

7. Helbig 1969, 332–33, dated there mid-third c. A.D. This mosaic, which shows a spacious terrain with animals and buildings, is of particular interest because of the large amounts of green in it. This documents the growing awareness of an urban-oriented civilization of the actual colors of rural nature and it prepared for the widespread popularity of green in Early Byzantine mosaics for symbolical purposes (e.g., San Apollinare in Classe).

8. B. Nogara, *I Mosaici Antichi Conservati nei Palazzi Pontifici del Vaticano* (Milan 1910) pl. VIII. I am informed by Dr. F. Buranelli that this mosaic is not under the jurisdiction of the Vatican and Gregorian Museums and has not been given an inventory number.