You are right in asking what possibly could be said that would be new about Goethe's disclosure of Newton's optics. What could be added to the statement by Heisenberg (1941), and reiterated by Weizsäcker (1957), that Goethe and Newton accessed truth in different ways, one through physics and the other through poetry. Yet even these classical efforts at a fair and balanced view sound like apologies and make it abundantly clear that Newton did "good science," while Goethe did something else, something important, although not immanently useful, at least not to the logical positivist of the nineteenth century or to consumer technology of the twentieth century. Yet times have changed and in the 1980s, in the wake of the environmental movement, it has become possible for the Goethe apologists to take the moral high road, and with cause re-evaluate his place in the win-loss column of science. Kreutzer's "portrait of a loser" (Porträt eines Verliers, 1980) marks this turning point with confessional frankness; at the outset he quickly dispatches with Goethe's errors in optics and focuses his essay on the importance of Goethe's science for the human being, on ethical and political issues, on the question of "how we wish to live" (wie wir zu leben wünschen, 46).

The value of Goethe's anthropocentric science is not new to scholarship (Steiner, 1891; 1950; Dilthey, 1906; Cassirer, 1932), but written in 1980, Kreutzer's essay did mark a trend to re-examine Goethe's alternative to mainstream science and to locate it in ecology, "the science of interrelationships between living creatures and their environment" (Altner, 1987: 341). This
trend to establish a connection between Goethe's science and the movement of environmentalism, to the re-discovery of a "Greener Goethe," I think, gives new meaning to earlier studies on his connection to the Naturphilosophen, to German romantic science (Godfried-Von Aesch, 1941; Knight, 1970;1976; Lenoir, 1978), and to ask what his disclosure of Newton's optics might tell us about the roots to a science of ecology, about the goals and objectives of German romantic science, about the structure of the romantic experiment, about a program of research in holistic science.

Historians have hinted at the importance of Goethe to the tradition that has shaped environmentalism, noting, for example, the fact that the first issue of Nature from 1869 "opened with a collection of aphorisms by the German poet Goethe" (Sheldrake, 1991:69,213). Measured by a curriculum of physics Goethe has always been a loser, yet, inspired by the causes of environmentalism, there has been renewed effort to focus on the teleological character of Goethe's science, on "Goethe's grüne Wissenschaft" (Muschg, 1986), "Goethes Farbentheologie" (Schöne, 1987) and "Goethe's grüne Weltfrömmigkeit" (Hermand, 1991). In this context recent full-length studies on "Goethe contra Newton" (Sepper, 1988), on Goethe's "Wissenschaft gegen die Zeit" (Höpfner, 1990), have once again put his polemics with Newton into center stage. What was Goethe trying to disclose with his line-by-line commentary on the first two books of Newton's Optics.

Elsewhere I have examined this question as a problem of historiography, arguing that polemics was for Goethe a genre of critical writings and that it served him as a hermeneutic devise for bridging science and history of science (Fink, 1991:50-55). Sandwiched between a volume on his own color theory and a volume on the history of optics, it was not hard to make the case for the literary value of his volume on the polemics with Newton. But what I did
not discuss and what has become increasingly odd about the Goethe-Newton debate is that it sounds as if these two heroes of western culture lived at the same time. As if they actually argued at a conference, or at least exchanged nasty letters. But since they were separated by more than a century, we are not dealing with a live debate, rather with an issue that will not go away and with each age will receive new attention and interpretation. Today, in the light of the politics of the "Earth Summit," it is quite clearly environmentalism that has actualized the differences and raised the status of the issue to one of conflict between "good science" and "sensitive science." Thus to really understand the issue, one needs to look at the events that inspired not just Goethe, but an entire generation of Germans toward an alternative, toward the romantic experiment that attempted, if not to replace, at least to add vitalism to the mechanics of the world machine (Lenoir, 1980; 1989)

**The Storm and Stress Cause**

In Goethe's novel from 1774, Werther tried to break the class distinctions that separated him from Lotte; he cried out against the either-or logic that formed the basis of civil discourse and shaped social values affecting everything in life from writing bureaucratic memos to cutting down the beautiful walnut trees in the old preacher's yard (WA, I,19:61,65,122). In another idiom, Georg Forster kept a journal of abuses committed against animals and aborigines in the cause of science during the voyage around the world with Captain Cook (1968,1:41). And focussing these issues of the Storm and Stress decade (1770-80), Herder argued against the normative conceptions of progress and development, in one essay grounding the origin of language in the individual's awareness of the self (SA,5: 34) and in another measuring the
development of a culture by indigenous inclinations and propensities (SA, 5: 486-88). A few decades later, writers of the Storm and Stress generation turned the questions about human, plant, and animal relationships into a philosophy of nature (Naturphilosophie) designed to integrate the human being with its environment (Lenoir, 1978).

Inspired by the social naturalism of Rousseau (LaFreniere, 1990: 41), Goethe was only part of a chorus protesting an array of conditions that inhibited the dignity and worth of the human being. But by 1790 he had become the leading edge of romantic reaction to a world order guided by reductive doctrines of science and by linear views of prosperity (Höpfner, 1991: 178). And by the turn of the century he had begun to focus the full force of his literary and scientific genius into a project that went beyond inspired nature studies (Tompkins and Bird, 1973: 118-34), or even beyond the projection of an alternative science (Amrine, Zucker and Wheeler, 1987: 257-388). Critics have noted that the roots of modern environmentalism are located in the poetic inspiration of writers like Goethe (Oelschlaeger, 1991: 123-24), some emphasizing the importance of this connection with reference to the first issue of Nature from 1869, which "opened with a collection of aphorisms by the German poet Goethe" (Sheldrake, 1991: 69,213).

But these hints at a connection between Goethe's poetic and scientific writings do not do justice to the Storm and Stress urge to social change, to the romantics struggle for an organic view of life, to Goethe's polemics with the Newtonian paradigm, or to a philosophy of nature designed to advance organic teleology (Lenoir, 1989).

In Goethe the trends initiated in the Storm and Stress period came into focus during his mid-life (1790-1810), and it was at the end of this period that they reached maturity as a poetics of human nature. They merit attention because we, too, live in a period where problems of ordinary life have gone beyond the call for sensitivity and have reached a point where there is
need for projects of holism, for curricula in which the problem becomes the program, where the
game of science is played by environmentalists, politicians, humanists, and scientists as a zero
sum gain. Today there are parallels to the age of Goethe too real to ignore, including the Storm
and Stress of the sixties, the demonstrations for basic civil rights, the literatures of sensitivity, the
curricula for social change, the resistance to foreign rule, the call for local empowerment, and the
claims for self-determination, all trends that have signaled the need to re-evaluate the discourse
on the place of the human being in the natural world.

First Signs of the Project

Goethe's projection of the human being's place in nature began early in life, as early as
his student days at the University of Strasbourg where he offered fifty-six theses for disputatio
toward his degree in law, in the first one proposing that "natural law is what nature has taught all
creatures" (Jus naturae est, quod natura omnia animalia docuit, WA, I,37,119). This thesis was
considered simplistic by the law faculty, and the collection as a whole, as viewed then and now,
does not seem to propose a logical argument; however, taken individually some of the theses
were seeds for serious questions that would later surface in poetic and scientific writings, like
number fifty-five which asks about the rights and responsibilities of a mother in childbirth, the
question central to the Gretchen episode in the Faust story: "Should the woman who kills her
newly born child suffer the death penalty? There is no unity among the learned on this point"
(An foemina partum recenter editum trucidans capite plectenda fit? quaestio est inter Doctores
controversa, p. 125). Denied access to the Ph. D., Goethe here took a swing at the law faculty by
posing a question as vexing for his era as abortion is for ours.
Goethe began his poetics of human nature from the outside looking in at the academic establishment, initially at the law faculty, and later at the physics faculty, moving from formal student disputations to professional strategies of scientific polemics. From the beginning Goethe's defense of nature's unity was anthropocentric. It was inspired by questions about the quality of human life, about the relationship of the human being to the environment, and about the manner in which science disrupts the organic harmony of society and nature.

In his essay "On Granite" (Über den Granit, LA,I,1,57-63) from 1784, he began by recording his enthusiasm for the geological formations of granite, but he was careful to distinguish his passions for hikes in nature from objective work done in his "study" (Studierstube, p. 60), where his "spirit has no wings" (Geist hat keine Flügel, p. 62). His second essay from comparative anatomy was centered even more decidedly on the human being, indeed, may better be assigned to anthropology than to anatomy. This we see in the title: "An Intermaxillary Bone is to be Ascribed to the Upper Jaw of the Human Being and Animals" (Dem Menschen wie den Tieren ist ein Zwischen knochen der obern Kinnlade zuzuschreiben, LA,I,9,154-61). Following this bold assertion in the introduction to the essay, he again made clear distinctions between the author-enthusiast and the author-scientist, in the third paragraph, in the first person, announcing his intention to report his discovery of the intermaxillary bone as concisely as possible.

Yet, it was not until mid-life, from 1790-1810, that Goethe began to formulate his concept of morphology, to develop his view of organicism, and to work out his strategy in defense of the human beings' place in nature. By 1810 this strategy climaxed in two different forms, the first in 1809 in a novel on marriage, Elective Affinities (Die Wahlverwandtschaften, WA,I,20), and the other a year later as a polemic against science, his Disclosure of Newton's
In these two works, written nearly in tandem and published at the end of two decades of research in science and in the history of science, Goethe offered two critiques on the uses of the experiment (Schaffer, 1989). In the one he disputed the way Newton tortured and parsed colors with his optical instruments, and in the second the way Mittler tortured, separated, and eventually destroyed human beings with his moral instruments. Both are an expression of his view of an experiment, one carried out on nature and the other on human beings.

**Uses of the Experiment**

Clearly Goethe's criticism of the scientific establishment was focused on the instrumentation of the disciplines. In his century received laboratory techniques called for the isolation and reduction of observable phenomena to a single crucial experiment (experimentum crucis, LA I, 5, 84-85), to a salient moment of the lab experience. This he came to reject early in the mid-life period, in 1793 focusing the title to his essay on "The Experiment as Mediator of the Object and Subject" (Der Versuch als Vermittler von Objekt und Subjekt, LA I, 8, 305-15). In his view the experiment was "a mediator of continuity" (Fink, 1991:36), not only in the correspondences of the intermaxillary jawbones among humans and animals, but also in the relationship of the observer and the observed, of the subject and the object. That is, not only was Goethe's science anthropocentric, but the experiment itself was designed as a series of connected phenomena, beginning with those most immediate to and most distant from the observer. Thus, his color theory began with physiological and ended with optical colors. In essence this is "the romantic experiment," it is the universality of the organism's relations to its environment. And
the task of the scientist is to re-present that totality, to re-create a topography of nature, and to do it from the perspective of the human being.

The role of the scientist as "a mediator of continuity" is central to Goethe's concept of an experiment. Most of his essay on the experiment is an argument for an alternative to the traditional approaches that continue to dominate science, an alternative to the inclination to devise "hypotheses" (Hypothesen), "theories" (Theorien), "terminology" (Terminologien), and "systems" (Systemen, p. 310). In his view this kind of science becomes increasingly arbitrary and at one point or another reaches a crisis that forces human beings into artificial relationships with nature and each other. This predicament he observed both in Newtonian optics and Linnean biology. This kind of science eventually becomes more a mirror of the scientists' cognitive self than of nature's organic unity. Thus, the main task of the romantic experiment is to organize the phenomena of nature as patterns of correspondences, as a serial homology, as "spheres of things" (Kreise der Dinge, p. 305) measured by indigenous standards. In his view, a science that represents nature as a serial homology comes much closer to objectivity than does the experiment grounded in theory. Thus, "the real duty of the scientist" (die eigentliche Pflicht des Naturforschers, p. 312) is to search for redundant connections and parallels in nature, even at the risk of creating boredom.

In his view this kind of experiment depends on the type of "demonstration" (Darlegung) and "recapitulation" (Rekapitulation) found in mathematics, while theoretical experimentation depends on the "arguments" (Argumente, p. 313) of the rhetorician. In his view the physicist, like the rhetorician, does not seek linkages in nature, rather seeks "completely isolated relationships" (ganz isolierte Verhältnisse, p. 313), which serve to delimit and focus the issue, and in turn to confine and control nature. Goethe made this criticism of a "crucial experiment"
(experimentum crucis) early in his mid-life without mentioning the names of specific scientists, but over the next two decades it would become central to his polemics against established science of the period (LA,I,5,86-88).

The Disclosure

What specifically did Goethe disclose in his commentary on Newton's *Opticks?* His volume on polemics, the second of the three volume publication from 1810 *On Color Theory* (Zur Farbenlehre, LAI,4,5,6), consists of 680 numbered paragraphs divided by nine section titles, including an "Introduction" (Einleitung, 1-5) and a "Conclusion" (Abschluß, 193-4). The bulk of the polemics is a line-by-line commentary on the first book of the *Opticks* (4th ed., 1730), around 300 paragraphs devoted to the first part and over 350 to the second part of Book One. Thus Goethe dealt largely with that part of Newton's work that treated "the reflection and refraction of light, the formation of images and the production of spectra by prism, the properties of colored light and the composition of white light and its dispersion," where Newton relied on definitions, axioms and experimental data (I. B. Cohen, 1952:xxv). Goethe did not deal critically with the second book that "admits hypotheses" (1952: xxvii), or with the third that includes the queries and conjectures, although these parts do figure into Goethe's critique, especially in the early part of the polemics where he defines his disclosure (#1-23), contrasts science and natural philosophy (#15-23), and criticizes "proof by experiments" (Beweis durch Experimente, #30-33).

In the opening paragraphy, Goethe observed that polemics in his color theory was unavoidable because the dominating theory, namely Newton's, did not permit observing phenomena "in their actual relationships" (in ihren eigentlichen Verhältnissen, LA,I,5,1), a
constriction that followed from Newton's "hypothetical claims" (hypothetischen Aussprüche, 1). In his view, "the nature of colors" (Natur der Farbe, 1) first of all did not conform to the theory and secondly, by putting "Hypotheses up front" (Hypothesen an die Spitze, 1), an "artificial" (künstlich, 1) arrangement of the phenomena was created. This, from a romantic scientist's point of view, is the disclosure: the failure to maintain organic wholeness in the study of color phenomena.

But the disclosure goes deeper. In paragraph six, the longest of his Introduction, he takes issue with the scientific method behind the experimental results. Goethe accepted methods that go from experience to principle and vice versa, and even a mixture of both. However, he could not accept the style of courtroom advocacy that "what is supposed to be introduced, deduced, explained, proved, was assumed as known" (Was erst eingeführt, abgeleitet, erklärt, bewiesen werden sollte, schon als bekannt annimmt, 2). This disclosure is more literary than scientific, and yet it seems to have been the motor that drove the detailed critique. For Goethe found Newton's arrangement of data "without order" (ohne Ordnung, 2) and presented according to convenience" (nach Belieben), an arrangement so varied and extensive that even the better minds prefer "such a chaos" (solch ein Chaos) to the pain of sorting through the conflicting elements" (streitenden Elemente, 3). This Goethe found acceptable for it would be impossible for anyone who had not studied color phenomena "in a certain natural connection" (in einer gewissen natürlichen Verknüpfung, 3). For this reason he hopes that his "natural presentation" (natürlicher Vortrag, 3) will bring a "healing light" (ein heilsames Licht, 3) to the 100 year debate.

Following the disclosure that Newton did not study "the nature of colors" and that he did not make a "natural presentation," Goethe looked at the experiment itself as a problem in his debate with established science. In his view, Newton's experiments follow from definitions and
axioms in which the same phenomenon under study and only the laboratory conditions are varied. Secondly these conditions produce results that cannot be observed visually. The claim of these experiments was that they yield universalities, generalizations, but in Goethe's view they in effect focus the sphere of phenomena, the organic examples, ever more narrowly: the disclosure is of deep-hole specialization, of the clash between the specific goals of good science, and the holistic concerns of environmentalists (McCormick, 1991: 195-203).

Goethe's fourth and final disclosure was that specialization is further advanced by the fact that Newton's *Opticks* gained a reputations for being mathematical and thus claimed status as a comprehensive study of color phenomena. In Goethe's view it excluded pratically everything that had to do with "natural or artistic vision" (natürliches oder künstliches Sehen, 4), and that, written in a simple and naive form of English, did not conform to the mathematical expectations embedded in the Latin and German understanding of the word "optics. This linguistic fact was important to Goethe's disclosure, for he thought it significant that Newton was more of a physicist than a mathematician, and that his mathamatical treatment of phenomena was only "pretended" (scheinbar, 4). Goethe considered the discovery of the achromatic telescope proof of the pudding, namely that Newton had not mathematized the study of light and color; thus, the proper title of Newton's work should be "Chromatics" (Chromatik, 4), the field to which he ascribed his own work.

Following the introduction to his disclosure, Goethe inserted a section he called an "Interlocution" (Zwischenrede, 5-8), a short discourse distinguishing the differences between his science and that of "the learned and unlearned world" (die gelehrte und ungelehrte Welt, 5). This short discourse crystalizes the difference between the science of Newton and that of Goethe, a classic exemplar of the conflict of disciplinary and environmental science. In paragraph
eighteen Goethe rejected a theory of colors limited by the rigid control and analysis of light, which is supposedly opened and exposed in its parts like a can of sardines. For his part he
claimed to work with a homogeneous light, giving emphasis to the "external conditions" (äußere
Bedingungen, 7) that stimulate the production of colors. In his view this approach ascribes
"value and dignity" (Wert und Würde, 7) to the environment of light. Plate I from the
supplement to his Zur Farbenlehre (LA, I, 7, 45) shows a collection of the external conditions
where light participates in the generation of light:

Show Slide

This slide only shows the theoretical conclusions that he drew from his study of the "nature of
colors." His writings abound with the effect of light on darkness, on trees and flowers, liquids
and solids, on rocks, mountains, human skulls, beautiful women, diamonds, squares, and a
kaleidoscope of images, real and imagined. It was not light itself, but the effects of light on the
environment that counted.

In the short section of three paragraphs on "Proof by Experiments", Goethe offers
perhaps the most radical departure from "good science," arguing that nothing is proved "by
experiences and experiments" (durch Erfahrungen und Versuche, 12). In near Kantian fashion,
he claims here that the entire apparatus of modern science is, in the end, subject to the
"conclusions" (Folgerungen, 12) that the individual scientist selects for emphasis, conclusions
that are all subject to the "prejudice" (Vorurteil, 12) of the scientist. He lightens the disclosure
by noting that it is not his intention to say "that Newton was wrong" (daß Newton unrecht habe,
12), mostly because he, too, like every learned student of science has repeated the first
proposition of Newton's *Opticks*. It is only his goal to get the reader to keep an open mind and to venture "through the death leap" (durch einen Salto mortale, 13), and re-examine Proposition One. He asks the reader to take the plunge, because Proposition One is not as mathematically sound as the learned world has come to believe, and because it is the foundation of a "marvelous construction" (ein bewundernswürdiges Gebäude, 13), of an edifice created by human beings, not nature.

And three hundred later, at the end of his critique of the first part of Book One, he concludes that by ignoring the "external conditions," the environment of light, the learned world has denied "the senses" (Sinne), "sensory perception" (sinnlichen Eindruck), "human understanding" (Menschenverstand), "language useage" (Sprachgebrauch), and everything that "activates someone as a human being, as an observer, as a thinker" (wodurch sich jemand als Mensch, als Beobachter, als Denker betätigt, 112). But further discussion "of the psychological and ethical side" (psychische und ethische Seite, 112) he assigned to his volume on the history of science. And after more than three hundred and fifty more paragraphs of line-by-line critique of the second part of Book one, he concluded his polemics with a short paragraph, apologizing for having written it, but excusing it as a sign of "the violent times" (das Gewaltsame der Zeit, 193), observing at the same time that "in conflicts of opinions and deeds" (im Konflikt von Meinungen und Taten, 194) the opponent really prefers to be conquered rather than flattered from his position. It was a "man's world" into which Goethe took the plunge, and perhaps it is here where he put his prophetic finger, on an alliance between ecology and feminism that has been brewing in the last decades of the twentieth century (Primavesi, 1991:24-43). At any rate, whether prophetic or empathetic, he did question his "leap into death," wondering if he had been "robbed of a happier and more fruitful use of his time" (eine frohere und vorteilhaftere Benutzung
Goethe's politics of organicism began in his Storm and Stress years, most notably as expressed through the anguished cries of Werther. This poetic figure spoke and acted against confinements running the depth of personal and social life, restrictions inherent in the very language of the age, in the "either-or" (entweder-oder) expressions that permit no "shadowing" (schatiren, WA, I, 19, 61), in the pedantry of those like the legate for whom he worked: "No 'and,' no connective may be left out, and he is a mortal foe of all inversions, which I sometimes let slip; if you don't drone out your periods according to the traditional melody, he doesn't understand a word. It is a pain to have to do with such a person." It is against the affected and formal behavior of his society that Werther reacted, one steeped in the binary language of science, one that would permit, to his horror, the local preacher's wife to cut down the beautiful walnut trees because the falling leaves make her yard "dirty" (unrein), rob her of "daylight" (Tageslicht), and because little boys throw walnuts, which disturbs her during her study of biblical critics (Kennisot, Semler, Michaelis, pp. 122-3).

Elsewhere Goethe's politics of organicism reminds us of the environmental platform of the Greens, or like the preamble for organizations like Earthwatch and Friends of the Earth (McCormick, 1989: 137-43). Twice Goethe traced the history of the movement that inspired his view of nature, first in the short essay on the "History of my Studies in Botany" (Geschichte meines botanischen Studiums, LA, I, 9:15-19), and then in the "Confession of the Author" (Konfession des Verfassers, LA, I, 6:412-29). In the former he records how he came to the study
of Linnean schemes of order in plant and animal life, and to his own view of the life sciences, and in the second he documents the encounters with the faculty of the physical sciences, in both areas eventually forming a network of friends and supporters for his view of nature, and science. The account of his work in the life sciences is at times nostalgic, but the one on the physical sciences is bitter and vindictive in tone. It is against this community that he levelled his attack with every literary device at his disposal.

In the poem "Chromatism" (Chromatik, LA, I, 8, 175), he drew the parallel between science and religion, arguing for the privilege of the priestcraft to impart his views, to take pleasure in the parish, to proclaim his views on color "without wounds, without scars" (Ohne Wunden, ohne Narben, 175). Later in life, in 1820, the defense of nature's unity became an offense, especially in the poem "True Enough: To the Physicist" (Allerdings: Dem Physiker, WA, I, 3, 105). Here Goethe gave his defense of nature's unity a broader base by placing it in the context of the sociology of science. Once again the theme of the poem is the relationship of the subject and the object, but this time the subject is Goethe the scientist, and the object is the guild of physicists. He began his poem with the philistine observation that "Into the core of Nature/... No earthly mind can enter"("In's Innre der Natur--'/ O du Philister--/ Dringt kein erschaffner Geist', p. 105), asking that dissenters like he and his kind be spared this assertion, for they believe they are in every place "at the center" (im Innern, p. 105). In the middle of the poem he announces that for sixty years he has been saying that nature has neither "core" (Kern) nor "shell" (schale), that it is unified and is "all things at once" (Alles ist sie mit einemmale, p. 105). In the last line we see one of the central tenets of his politics of organicism: "It's yourself you should scrutinize to see/ Whether you're center or periphery" (Dich prüfe du nur allermeist./ Ob du Kern oder Schale seist, p. 105).
Conclusion

The projects of Goethe's mid-life were designed to restore unity and wholeness to nature, not solely because nature deserved it, but because it was in the best interests of the human being to find connections to nature, to find a methodology that assumed involvement rather than detachment of the scientist and the experiment. But not until the end of our century, after seeing some of the problematic fallout of narrow and specialized programs of science, are we seeing the need for a more anthropocentric science, for a science of environmentalism driven by a need to restore dignity to the earth as an organic whole and as a means toward the preservation of humankind. Only today are we seeing the need for a program that is half science and half politics, for a theory of organicism not unlike the one that Goethe encouraged and the "Naturphilosophen" developed in the two decades following the French Revolution.

Quite often the question of the Goethe-Newton polemics is framed by either-or forms of discourse, a tendency that Heisenberg tried to avoid, but one that is perhaps more easily avoided today under the umbrella of environmentalism. Given Goethe's errors in basic optics, and given the waste generated by basic Newtonian mechanics, both are wrong, but by other measures both are right. Imagine a world today without Newton's program for the exact analysis of light, that is without use of the experiment as conducted by Newton. What would our world be without infra-red and ultraviolet light, without knowledge that came from the discovery of the absorption and emission lines in the spectrum, without spectral analysis of chemicals, without laser beams, star wars, and, ironically, without laser surgery of the eye, that organ of the human body to which Goethe ascribed the highest order of sensory perception.

And now imagine a world without Goethe's program for the exact description of the effects of light on the human being, without knowledge of complementary colors, of afterimages
in the eye, of auras surrounding objects, of distant hues blending light and darkness, including the yellow-brown smog over Los Angeles and the purple hue over the Rocky Mountains. Life without the emotional stimulus of colors is hard to image, but so is it without the laser surgery needed to remove the cataracts that inhibit sight of the red rose that stimulates the green physiological colors in the eye.

We live in exciting times. It will be interesting to see if in the end it is "good science" that solves the problems of those calling for "sensitive science," if traditional specialized projects will restore the clean air over Los Angeles, maintain biodiversity, close the ozone hole, and at the same time close the gap between the two cultures that C. P. Snow saw widen between those who have technology and those who do not have it (1969). "Let there be light."

References


Vol. 1.


Primavesi, Anne. *From Apocalypse to Genesis. Ecology, Feminism and Christianity*. 


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**Endnotes**

1. Goethe, *Die Wahlverwandtschaften*, Ed. M. Waldberg (WA), Pt. I, vol. 20. Quotations in English translations are taken from *Elective Affinities*, F. Ungar, trans. (New York: Ungar, 1967). There is some scholarly opinion that Goethe had reached "an impasse in his creative life" during the two decades after the French Revolution, David B. Richards, *Goethe’s Search for the Muse*, (Amsterdam: Benjamins B. V., 1979), p. 4. But this perspective too narrowly defines the roots of creative writing, for in his novel *Elective Affinities* from the end of the period (1809), Goethe merged earlier Storm and Stress issues of protest with his most creative work in science, including his morphology of plants, his color theory, his history of science and his polemics against Newtonian optics, in a single stroke writing a work that continues to perplex and intrigue literary scholars (Winkelman, 1987: 4).