

Goethe, Nature, and Phenomenology

An Introduction

Johann Wolfgang von Goethe (1749–1832) is best known for his poetry and plays, described by many literary critics as some of the most perceptive and evocative imaginative literature ever written. Fewer people realize, however, that Goethe also produced a sizable body of scientific work that focused on such diverse topics as plants, color, clouds, weather, morphology, and geology. Goethe believed that these studies, rather than his literary work, would some day be recognized as his greatest contribution to humankind.¹

In its time, Goethe's way of science was highly unusual because it moved away from a quantitative, materialist approach to things in nature and emphasized, instead, an intimate, firsthand encounter between student and thing studied. Direct experiential contact became the basis for scientific generalization and understanding. Goethe's contemporaries and several following generations, however, largely ignored his writings on nature. These works were seen either as subjective artistic descriptions written by a scientific dilettante or as a form of philosophical idealism that arbitrarily imposed intellectual constructs on the things of nature. Only in the twentieth century, with the philosophical articulation of phenomenology, do we have a conceptual language able to describe Goethe's way of science accurately. Though there are many styles of *phenomenology*, its central aim, in the words of phenomenological

founder Edmund Husserl, is “to the things themselves”—in other words, how would the thing studied describe itself if it had the ability to speak?²

In this sense, phenomenology is the exploration and description of phenomena, where *phenomena* are the things or experiences as human beings experience them. Phenomenology is a science of beginnings that demands a thorough, in-depth study of the phenomenon, which must be seen and described as clearly as possible. Accurate description is not a phenomenological end, however, but a means by which the phenomenologist locates the phenomenon's deeper, more generalizable patterns, structures, and meanings.³ Rephrased in phenomenological language, Goethe's way of science is one early example of a phenomenology of the natural world. He sought a way to open himself to the things of nature, to listen to what they said, and to identify their core aspects and qualities.

The present volume is one contribution toward making Goethe's style of phenomenological science better known. Coeditor Arthur Zajonc and I hope the following essays will help to demonstrate the invaluable assistance that a Goethean science might offer today for better understanding and caring for the natural environment. In this introduction, I review the nature of Goethe's way of science and then overview the essays in the collection. Finally, I briefly discuss the link between Goethean science and environmental phenomenology.⁴

DELICATE EMPIRICISM

One phrase that Goethe used to describe his method was *delicate empiricism* (*zarte Empirie*)—the effort to understand a thing's meaning through prolonged empathetic looking and seeing grounded in direct experience.⁵ He sought to use firsthand encounter directed in a kindly but rigorous way to know the thing *in itself*. “Natural objects,” he wrote, “should be sought and investigated as they are and not to suit observers, but respectfully as if they were divine beings.”⁶ Goethe believed that, too often, the methods and recording instruments of conventional science separate the student from the thing studied and lead to an arbitrary or inaccurate understanding:

It is a calamity that the use of experiment has severed nature from man, so that he is content to understand nature merely through what artificial instruments reveal and by so doing even restricts her achievements. . . . Microscopes and telescopes, in actual fact, confuse man's innate clarity of mind.⁷

Rather than remove himself from the thing, Goethe sought to encounter it intimately through the educable powers of human perception: "The human being himself, to the extent that he makes sound use of his senses, is the most exact physical apparatus that can exist."⁸ Goethe's aim was to bring this potential perceptual power to bear on a particular phenomenon and thereby better see and understand it. "One instance, he wrote, "is often worth a thousand, bearing all within itself."⁹ His way of investigation sought to guide actively these special moments of recognition and thus gradually to gather a more complete understanding of the phenomenon.¹⁰

Goethe emphasized that perhaps the greatest danger in the transition from seeing to interpreting is the tendency of the mind to impose an intellectual structure that is not really present in the thing itself: "How difficult it is . . . to refrain from replacing the thing with its sign, to keep the object alive before us instead of killing it with the word."¹¹ The student must proceed carefully when making the transition from experience and seeing to judgment and interpretation, guarding against such dangers as "impatience, precipitancy, self-satisfaction, rigidity, narrow thoughts, presumption, indolence, indiscretion, instability, and whatever else the entire retinue might be called."¹²

Because accurate looking and seeing are crucial in Goethe's way of study, he stresses the importance of training and education. He believed that observers are not all equal in their ability to see. Each person must develop his or her perceptual powers through effort, practice, and perseverance. "Nature speaks upward to the known senses of man," he wrote, "downward to unknown senses of his."¹³ If we cannot understand a particular phenomenon, we must learn to make fuller use of our senses and "to bring our intellect into line with what they tell."¹⁴

Yet, Goethe argued that it is not enough to train only the outer senses and the intellect. He maintained that, as a person's abilities to see outwardly improve, so do his or her *inner* recognitions and perceptions become more sensitive: "Each phenomenon in nature, rightly observed, wakens in us a new organ of inner understanding."¹⁵ As one learns to see more clearly, he or she also learns to see more *deeply*. One becomes more "at home" with the phenomenon, understanding it with greater empathy, concern, and respect.

In time, he believed, this method reveals affective, qualitative meanings as well as empirical, sensual content. "There may be a difference," he claimed, "between seeing and seeing. . . . The eyes of the spirit have to work in perpetual living connexion with those of the body, for one otherwise risks seeing yet seeing past a thing."¹⁶ This kind of understanding does not come readily, but it can be had, Goethe argued, by anyone who immerses himself or herself in systematic training. "Thus,

not through an extraordinary spiritual gift, not through momentary inspiration, unexpected and unique, but through consistent work, did I eventually achieve such satisfactory results," he wrote about his own scientific discoveries.¹⁷

THE *UR-PHENOMENON*

Goethe argued that, in time, out of commitment, practice, and proper efforts, the student would discover the "ur-phenomenon" (*Urphänomen*), the essential pattern or process of a thing. *Ur-* bears the connotation of primordial, basic, elemental, archetypal; the ur-phenomenon may be thought of as the "deep-down phenomenon," the essential core of a thing that makes it what it is and what it becomes.¹⁸ For example, in his botanical work, Goethe saw the ur-phenomenon of the plant as arising out of the interplay between two opposing forces: the "vertical tendency" and "horizontal tendency."¹⁹ The former is the plant's inescapable need to grow upward; the latter, the nourishing, expanding principle that gives solidity to the plant.²⁰ Only when these two forces are in balance can the plant grow normally.

Goethe believed that the powers of human perception and understanding cannot penetrate beyond the ur-phenomenon. It is "an ultimate which can not itself be explained, which is in fact not in need of explanation, but from which all that we observe can be made intelligible."²¹ The key procedural need in discovering the ur-phenomenon, Goethe argued, is maintaining continuous experiential contact with the thing *throughout* the course of investigation—to intellectualize abstractly as little as possible. "Pure experience," he wrote, "should lie at the root of all physical sciences. . . . A theory can be judged worthy only when all experiences are brought under one roof and assist in their subsequent application."²²

Yet, Goethe saw no inherent conflict between experience and idea or between fact and conception. He believed that genuine understanding entailed a mutual interplay of both fact and theory. Their resolution is to be found in the ur-phenomenon, which marks out the things in the foreground and brings all other phenomena into relation with it.²³ If study is conducted properly, facts and theory can arise smoothly together because each is part and parcel of the other:

The highest is to understand that all fact is really theory. The blue of the sky reveals to us the basic law of color. Search nothing beyond the phenomena, they themselves are the theory.²⁴

THEORY OF COLOR

One of the clearest illustrations of Goethe's way of study is his work on color and light as they are experienced in the everyday world. Skeptical of Newton's theory of color, Goethe began his own studies in the late 1780s and published *Theory of Color* (*Zur Farbenlehre*) in 1810.²⁵ The crux of his color theory is its experiential source: rather than impose theoretical statements (as he felt Newton had), Goethe sought to allow light and color to be displayed in an ordered series of experiments that readers could experience for themselves. Goethe claimed that if one carefully conducts these experiments with "constant and rigorous effort," he or she will discover from his or her own experiences the underlying processes through which all color appears.²⁶

Theory of Color begins with an examination of physiological colors—that is, colors contingent upon the state and activity of the eye, as for example, the orange after-image we see after looking at a blue flame. Goethe first requests the reader to explore the effect of darkness and light in general terms. He asks the student to consider experiences such as the following, to conduct them carefully as experiments: (1) to keep one's eyes open in a totally dark place for a time; (2) to look at a white, strongly illuminated surface, then turn to objects moderately lighted.²⁷ Goethe explains that, in the first experiment, the eye is "in the utmost relaxation and susceptibility"; it feels "a sense of privation" and strives to perceive outwardly into the darkness.²⁸ The results of the second experiment are the reverse of the first: the eye, "in an overstrained state and scarcely susceptible at all," is dazzled and for a time cannot see the moderately lighted objects.²⁹

For Goethe, simple experiments like these intimate an essential aspect of human seeing: darkness in the world instantaneously produces in the eye an inclination to light; light, an inclination to darkness. The working of the eye indicates an active dialectic between darkness and light: The eye "shows its vital energy, its fitness to receive the impression of the object, precisely by spontaneously tending to an opposite state."³⁰

Goethe concluded that this reciprocity between darkness and light points to the ur-phenomenon of color: Color is the resolution of the tension between darkness and light. Thus, darkness weakened by light leads to the darker colors of blue, indigo, and violet, while light dimmed by darkness creates the lighter colors of yellow, orange, and red. Unlike Newton, who theorized that colors are entities that have merely arisen out of light (as, for example, through refraction in a prism), Goethe came to believe that colors are *new* formations that develop through the

dialectical action between darkness and light.³¹ Darkness is not a total, passive absence of light as Newton had suggested but, rather, an active presence, opposing itself to light and interacting with it. *Theory of Color* presents a way to demonstrate firsthand this dialectical relationship and color as its result.³²

For Goethe, tension and its reconciliation are prime forces in nature and can be discovered in countless ways. Light and darkness, colors and their complements, colored objects seen and the resulting after-images, seeing and thing seen, person and world—all point toward an instantaneous, living dialectic that joins the parts in a dynamic, interpenetrating whole. This relationship, says the philosopher Eric Heller, is a “a creative conservation between within and without, a kind of dialectical education through which the individual form becomes in actuality what from the very beginning it had been potentially. For what is within and what is without are . . . merely poles of one and the same thing.”³³

THE ESSAYS

The above introduction to Goethe's way of science is only a sketch, and the essays of this collection demonstrate in a much more rounded way the nature of Goethean science and its great potential for understanding the natural world. Physicist Arthur Zajonc's introductory essay reviews Goethe's scientific studies and their historical context, particularly Goethe's relationship with Enlightenment science and Romanticism. In turn, the four essays of part I discuss the philosophical foundations of Goethean science and clarify its epistemology and methodology. In his essay, German scholar Frederick Amrine demonstrates that Goethe's effort to foster a way of knowledge grounded in qualitative description anticipates several developments in the contemporary philosophy of science. In the next two essays of part I, physicist Walter Heitler and physiologist Herbert Hensel examine the goals of Goethean science and illustrate how its method and discoveries compare and contrast with conventional scientific work. Last, philosopher Ronald H. Brady draws on the phenomenological notion of intentionality to clarify Goethe's understanding of growth and metamorphosis in nature.

Though the essays in part I by Walter Heitler and Herbert Hensel were written in the 1960s, Zajonc and I have chosen to include them because they establish an important conceptual base without which more recent Goethean research would not be possible. Heitler was a major physicist of the twentieth century and helped to develop the quantum theory of radiation. Similarly, Hensel was an expert on sensory physiology and eventually became interested in developing what would be

called today a “phenomenology of sense experience.” During the 1960s, both men gave attention to the relationship between science and the humanities; they envisioned a Goethean science as figuring prominently in the argument. In this sense, both men’s essays set the framework from the standpoint of a 1960s science for a more contemporary engagement with the issues as illustrated by Amrine and Brady in this part of the volume and by the other contributors in parts II and III.

The five essays of part II move beyond conceptual discussions of Goethe’s science to the question of how it is practiced in the real world of nature. Biologist Jochen Bockemühl considers plant growth from a Goethean standpoint, tracing the changes in leaf form as a plant matures. Drawing on Bockemühl’s approach, ecologist Nigel Hoffmann explores the qualitative nature of two specific Australian plants and strikingly demonstrates, through the use of poetry and painting, the importance of an intuitive dimension in Goethe’s way of seeing.

The next two essays of Part II illustrate the value of Goethe’s approach for understanding animal forms. Drawing on the work of zoologist Wolfgang Schad, ecologist Mark Riegner uses a Goethean approach to explore the form of mammals. By observing such qualities as body shape, tooth formation, coloration, and habitat preference, Riegner presents an innovative way of reading the natures of rodents, ungulates, and carnivores. Biologist Craig Holdrege takes a similar approach in his perceptive effort to present a Goethean phenomenology of the horse and the lion. Both his and Riegner’s interpretations demonstrate that, through a Goethean approach, each animal reveals its unique manner of presence in the world. This presence, Holdrege emphasizes, is what the animal is, and any efforts to alter this presence—as with the piecemeal manipulations of genetic engineering—can radically change the whole animal and its relationship with the environment. His example is the rat-sized transgenic mouse made so heavy that it can no longer climb a plant stem to gather the seeds it needs for food.

In the last essay of part II, Mark Riegner and sculptor John Wilkes present Wilkes’ efforts to design what he calls “Flowforms”—fountain-like vessels through which water flows in rhythmic motion. In creating Flowforms, Wilkes was greatly affected by the Goethean studies of water done by German hydrologist Theodor Schwenk, who concluded that the essence of water’s movement is found in the tension between the linear tug of gravity and water’s inherent tendency to draw itself into a sphere. Schwenk demonstrated that water reconciles this tension in three characteristic ways: the meander, the wave, and the vortex.³⁴

In his Flowform research, Wilkes asks how these essential patterns of water can be incorporated in built form so that human made channels and vessels can support and enhance the basic movements of water

rather than force them into unnatural surroundings as, for example, in channelized rivers with straight banks that interfere with the need of water to meander. Instead of forcing water to do what we human beings want, why not help it to maintain its own natural patterns and move the best it can? Riegner and Wilkes demonstrate that this kind of thinking leads to designed environments that work better both ecologically and aesthetically.

The three essays in part III of the volume discuss the future of Goethean science. German scholar Alan P. Cottrell demonstrates how Goethe's approach moves away from the reductionist thinking of positivist science and facilitates an increasing freedom and self-determination both for the researcher and the thing he or she studies. In turn, physicist Henri Bortoft links Goethean science with the search for authentic wholes and a way to study nature in a deeper, more heartfelt way. Bortoft argues that one of the most important values of Goethe's way of science is to foster *understanding*. To understand, suggests Bortoft, is to see the way things belong together and to see why they are together as they are.³⁵

The last essay of the collection, by Arthur Zajonc, sees Goethe's way of understanding as the basis for a science of the future. Zajonc examines how recent experiments in quantum physics call into question the one-track mechanistic model of nature and many of the strictures of classical forms of thought on which that model is based. He believes that we must look toward a new science of nature freed from a mechanistic model that emphasizes measurement and exactitude. As do other contributors to this collection, Zajonc offers, as a prototype, the artist's way of seeing and shows how Goethe's method provides a way to combine intuitive insight and procedural rigor.

GOETHE, PHENOMENOLOGY, AND NATURE

As editor of the State University of New York Press series in Environmental and Architectural Phenomenology, I have sought volumes that offer perceptive interpretations of the natural and built worlds, particularly as they contribute to human well-being. At the same time, I believe that qualitative, descriptive research, because it stimulates a more intimate relationship between student and thing studied, has the power to strengthen individual responsibility and concern toward natural and built environments.

In selecting a book on Goethean science to be included in a series on phenomenology, I am aware that many mainstream scholars, especially philosophers, may be critical or ambivalent for a number of reasons.

First, it may be argued that, historically, Goethe's efforts preceded Husserl's work by over a century and, therefore, cannot be associated with a tradition that came later.³⁶ A second, more difficult, issue is the question of method: Goethe's emphasis on remaining with the experience of the thing throughout the course of study is a crucial point of contrast with Husserl's style of phenomenology, in which the student begins with experience but then, drawing back, examines it cerebrally through reflection, *epoché*, and other tools of intellect.³⁷

On the other hand, some thinkers within the phenomenological movement itself—for example, philosophers Martin Heidegger and Maurice Merleau-Ponty—came to dispute much of Edmund Husserl's method and many of his conclusions. These phenomenological thinkers argued that the invariant, transcendental structures that Husserl sought in the realm of consciousness were questionable because he based their reality on speculative, cerebral reflection rather than on actual human experience taking place within the world of everyday life.³⁸ Over time, these thinkers' critical emphasis on real-world existence led to a phenomenological style most commonly called today "existential phenomenology" (in contrast to Husserl's "pure" or "transcendental phenomenology"). Clearly, Goethe's method is much closer to this form of phenomenology, since his aim was to begin from and *stay with* experience, which becomes the descriptive basis for generalization and interpretation.³⁹

In this sense, existential phenomenologists can find many points of methodological similarity with Goethean science. On the other hand, some existential phenomenologists may feel much less comfortable with Goethe's ontological and metaphysical conclusions, which suggest an interlinkage and harmony among all things of nature, including humankind. As philosopher L. L. Whyte writes, Goethe's central ambition ". . . was nothing less than to see all nature as one, to discover an objective principle of continuity running through the whole, from the geological rocks to the processes of aesthetic creation. Moreover, this discovery of the unity of nature implies the simultaneous self-discovery of man, since man could thereby come to understand himself better."⁴⁰

As an existential phenomenologist, my view about Goethe's holistic vision of nature is that each reader must make up his or her mind as to its truth or error by studying Goethe's scientific works and conducting *personally* the exercises and experiments that he claims brought him to this understanding of nature. For my own part, I have found my encounter with Goethe's work, especially his *Theory of Color*, a rewarding and sometimes revelatory pathway for seeing more sensitively and for feeling a stronger kinship with the natural world.⁴¹

In our postmodern time of fragmentation and relativity, we must somehow find ways to bring our thoughts, feelings, and actions in

harmony both with ourselves and with the world in which we live. I believe strongly that Goethean science provides a rich, intuitive approach to meeting nature and discovering patterns and relationships that are not only stimulating intellectually but also satisfying emotionally and spiritually.⁴² Goethe's method teaches a mode of interaction between people and environment that involves reciprocity, wonderment, and gratitude. He wished us to encounter nature respectfully and to discover how all its parts, including ourselves, belong. In this way, perhaps, we come to feel more care for the natural world, which answers back with meaning. May the essays of this volume help the reader to know this experience.

NOTES

1. The most complete set of Goethe's scientific writings in English is J. W. von Goethe, *Goethe: Scientific Studies*, ed. and trans. D. Miller (New York: Suhrkamp, 1988; reprinted by Princeton University Press, 1994); this work includes a selection of Goethe's writings on morphology, botany, zoology, geology, meteorology, and physics as well as several of his writings on "Methodology and General Scientific Topics." Also useful is J. W. von Goethe, *Goethe's Botanical Writings*, trans. B. Mueller (Woodbridge, Conn.: Ox Bow Press, 1989; originally 1952); this volume includes selections "On General Theory."

Some of the most helpful commentaries on Goethe's science include: F. Amrine, F. Zucker, and H. Wheeler, eds. *Goethe and the Sciences: A Reappraisal* (Dordrecht: D. Reidel, 1987); H. Bortoft, *Goethe's Scientific Consciousness* (Nottingham, United Kingdom: Russell Press, 1986); H. Bortoft, *The Wholeness of Nature: Goethe's Science of Conscious Participation in Nature* (Hudson, N.Y.: Lindisfarne Press, 1996); E. Heller, *Goethe and the Idea of Scientific Truth*, in *The Disinherited Mind* (New York: Meridian Books, 1959); R. Magnus, *Goethe as Scientist*, trans. H. Norden (New York: Henry Schuman, 1949); T. Roszak, *Where the Wasteland Ends* (New York: Harper and Row, 1973), pp. 302–17; and L. L. Whyte, *Goethe's Single Vision of Nature and Man*, *German Life and Letters* 2 (1949): 287–97.

Also important to Goethean science is the valuable contribution made by the Austrian philosopher and spiritual teacher Rudolf Steiner (1861–1925), who developed a method of spiritual development called "Anthroposophy." Goethe's ideas played a major role in Steiner's philosophy, and both he and others touched by his work have written extensively on Goethean science. Works by Steiner on Goethean science include: *Goethe the Scientist*, trans. O. D. Wannamaker (New York: Anthroposophic Press, 1950); *Goethe's World View*, trans. W. Lindeman (Spring Valley, N.Y.: Mercury Press, 1985); and *Goethean Science*, trans. W. Lindeman (Spring Valley, N.Y.: Mercury Press, 1988). For an introduction to Steiner's thinking and the nature of Anthroposophy, see R. A. McDermott, ed., *The Essential Steiner* (New York: Harper and Row, 1984).

Perceptive Goethean studies that draw on Steiner's interpretation of Goethe in various ways include: J. Bockemühl, ed., *Toward a Phenomenology of the Etheric World* (Spring Valley, N.Y.: Anthroposophic Press, 1985); J. Bockemühl, ed., *Awakening to Landscape*, (Dornach, Switzerland: Goetheanum Research Laboratory, 1992); J. Bockemühl and A. Suchantke, *The Metamorphosis of Plants*, trans. N. Skillen (Cape Town, South Africa: Novalis Press, 1995); E. Lehrs, *Man or Matter: Introduction to a Spiritual Understanding of Matter Based on Goethe's Method of Training, Observation and Thought* (London: Faber and Faber, 1958); W. Schad, *Man and Mammals: Toward a Biology of Form* (Garden City, N.Y.: Waldorf Press, 1977); T. Schwenk, *Sensitive Chaos: The Creation of Flowing Forms in Water and Air* (London: Rudolf Steiner Press, 1965).

Perhaps the single most accessible introduction to Goethean science is Henri Bortoft's *The Wholeness of Nature*. For a comprehensive picture of research on Goethean science, see Frederick Amrine's invaluable multivolume study, *Goethe in the History of Science* (New York: Peter Lang, vols. 1 and 2, 1996). Also see Amrine's helpful annotated bibliography in *Goethe and the Sciences*, pp. 389–437. For one recent discussion of contemporary Goethean science in practice, see H. I. Brook, *Goethean Science in Britain*, Ph.D. diss., School of Independent Studies, Lancaster University, Lancaster, United Kingdom, 1994.

2. H. Spiegelberg, *The Phenomenological Movement: An Historical Introduction*, 3rd ed. (The Hague: Martinus Nijhoff, 1982) pp. 78–80; p. 109.

3. The nature of phenomenology is complicated and not easy to master. As phenomenologist Herbert Spiegelberg argues, there are as many phenomenologies as phenomenologists; see H. Spiegelberg, *The Phenomenological Movement*, p. 2. Part five of Spiegelberg's book, "The Essentials of the Phenomenological Method," is a helpful introduction to doing phenomenology. Perhaps the single most accessible introduction, especially for non-philosophers, is D. Stewart and A. Mickunas, *Exploring Phenomenology: A Guide to the Field and Its Literature*, 2nd ed. (Athens: Ohio University Press, 1990).

4. Portions of the following discussion on Goethe's method are based on D. Seamon, "Goethe's Approach to the Natural World: Implications for Environmental Theory and Education," in *Humanistic Geography: Inventory and Prospect* edited by D. Ley and M. Samuels (Chicago: Maaroufa Press, 1978), pp. 238–50.

5. Goethe, *Goethe: Scientific Studies*, p. 307. "There is a delicate empiricism which makes itself utterly identical with the object, thereby becoming true theory."

6. "Cautions for the Observer," in R. Matthaei, ed., *Goethe's Color Theory* (New York: van Nostrand Reinhold, 1971), p. 57.

7. Lehrs, *Man or Matter*, p. 111, p. 106.

8. Goethe, *Goethe: Scientific Studies*, p. 311.

9. Lehrs, *Man or Matter*, p. 125.

10. See Roszak, *Where the Wasteland Ends*, p. 304.

11. Goethe, *Goethe: Scientific Studies*, p. 275.

12. Matthaei, *Goethe's Color Theory*, p. 60.

13. Lehrs, *Man or Matter*, p. 85.
14. Ibid., pp. 84–85.
15. Goethe, *Goethe's Botanical Writings*, p. 235.
16. Ibid., p. 106.
17. Ibid., p. 111.
18. Roszak, *Where the Wasteland Ends*, p. 306. The Romantic poet Johann von Schiller complained to Goethe that his “ur-phenomenon” was synonymous with the Platonic ideal, but Goethe refused to accept that characterization. See R. H. Brady's chapter 5 in this volume.
19. Lehrs, *Man or Matter*, p. 125.
20. P. Salm, *The Poem as Plant* (Cleveland, Ohio: Press of Case Western Reserve University, 1971), p. 27.
21. George A. Wells, “Goethe's Scientific Method in the Light of His Studies in Physical Optics,” *Publications of the English Goethe Society*, edited by E. M. Wilkinson et al. (Leeds: W. S. Maney, 1968), p. 102.
22. Matthaei, *Goethe's Color Theory*, p. 16. In practice, Goethe's method of seeing and understanding is much more complex and multidimensioned than I suggest in my description here. For a clear, extended picture of the method see Nigel Hoffmann's chapter 7 in this volume.
23. Lehrs, *Man or Matter*, p. 125.
24. Matthaei, *Goethe's Color Theory*, p. 76.
25. *Zur Farbenlehre*, in *Goethes Werke, Hamburger Ausgabe*, E. Trunz, ed., vol. 13 (Hamburg: Christian Wegner, 1948–); English editions of this work are: *Theory of Colours*, trans. C. L. Eastlake (Cambridge, Mass.: MIT Press, 1970; originally published in English in 1840); R. Matthaei, ed. *Goethe's Color Theory* (see note 6; this edition uses Eastlake's translation and also includes selections from Goethe's writings on method); and *Theory of Color*, included in *Goethe: Scientific Studies* (see note 1) and translated anew by Douglas Miller.
26. Goethe, *Goethe: Scientific Studies*, p. 163.
27. Goethe, *Theory of Color*, pars. 5–14.
28. Ibid., pars. 8, 6.
29. Ibid., par. 8.
30. Ibid., par. 38.
31. See N. M. Ribe, “Goethe's Critique of Newton: A Reconsideration,” in *Studies in History and Philosophy of Science* 16 (1985): 315–35; Dennis L. Sepper, *Goethe contra Newton: Polemics and the Project for a New Science of Color* (Cambridge: Cambridge University Press, 1988). A useful discussion of the history of light, including Goethe's contribution, is Arthur Zajonc, *Catching the Light: The Entwined History of Light and Mind* (New York: Bantam Books, 1993).
32. Of all Goethe's scientific studies, *Theory of Color* (see note 25) is the work that most directly introduces students to his way of looking and seeing.

Particularly valuable as phenomenological exercises are the many prism experiments that involve the appearance of color when one looks through a prism (see Goethe, *Theory of Color*, pars. 205 and following). One aim of the experiments is to observe carefully how color appears in the prism and, in time, to arrive at a set of statements that describe the appearance accurately. For a lucid discussion of these prism experiments, see Bortoft, *Goethe's Scientific Consciousness*, pp. 13–20 (see note 1).

33. E. Heller, *Goethe and the Idea of Scientific Truth*, p. 11 (see note 1).

34. Schwenk, *Sensitive Chaos* (see note 1).

35. Also see H. Bortoft, *The Wholeness of Nature* (note 1). Other useful discussions of understanding the whole, all similar in spirit to Goethe, though different in their methods, include: C. Alexander, S. Ishikawa, and M. Silverstein, *A Pattern Language* (New York: Oxford University Press, 1977); J. G. Bennett, *Elementary Systematics: A Tool for Understanding Wholes* (Santa Fe, N.M.: Bennett Books, 1993); and I. L. Stefanovic, *Evolving Sustainability: A Rethinking of Ontological Foundations*, *Trumpeter* 8 (1991): 194–200.

36. In fact, few academic thinkers have expressed interest in Goethe's work as it may be representative of "proto-phenomenological" efforts. In his comprehensive historical study of phenomenology, Spiegelberg recognizes parallels between Goethe's method and phenomenology, particularly in regard to the approach of *Theory of Color*. Apparently unaware, however, that Goethe's discoveries in that work have major bearing on such philosophical concerns as perception, epistemology, and conceptualization, Spiegelberg erroneously concludes that "Nevertheless Goethe's primary concern was not philosophy, but merely a natural science of the color phenomena different from Newton's" (Spiegelberg, *The Phenomenological Movement*, p. 23). One of the few mainstream philosophers to recognize the many commonalities between Goethe's way of science and phenomenology was Fritz Heinemann, who concludes that: "Goethe's phenomenology . . . may have some real value for the present situation, for an age whose watchword is 'the return to the concrete,' for the transition from Husserl's abstract phenomenology to the concrete phenomenology which will be needed to prepare the ground for the reformation of philosophical problems" (see F. Heinemann, *Goethe's Phenomenological Method*, *Philosophy* 8 [1934]: 81).

37. On the perspective and methods of Husserlian phenomenology, see Spiegelberg, *The Phenomenological Movement*, chap. 3. *Intentionality* is one concept in Husserl's phenomenological thinking that can be used to clarify Goethe's approach to understanding, though Goethe never used the concept explicitly himself. See R. H. Brady's discussion of phenomenology and intentionality in chapter 5 of this volume.

38. See J. Schmidt, *Maurice Merleau-Ponty: Between Phenomenology and Structuralism* (New York: St. Martin's Press, 1985), chap. 2.

39. For one useful overview of existential phenomenology, see R. S. Valle and S. Halling, eds., *Existential-Phenomenological Perspectives in Psychology* (New York: Plenum, 1989). On the methods of existential phenomenology, see

M. van Manen, *Researching Lived Experience* (Albany: State University of New York Press, 1990). An important effort to conduct "empirical" research in existential phenomenology is the work of the Duquesne School of Phenomenological Psychology; for an introduction, see A. Giorgi, A. Barton, and C. Maes, eds., *Duquesne Studies in Phenomenological Psychology*, vol. 4. Pittsburgh, Pa.: Duquesne University Press, 1983).

For a review of research in environmental phenomenology (which largely draws on the approach of existential phenomenology), see R. Mugerauer, *Interpretations on Behalf of Place* (Albany: State University of New York Press, 1994); D. Seamon, "Phenomenology and Environment-Behavior Research," in *Advances in Environment, Behavior, and Design*, edited by G. T. Moore and E. H. Zube, vol. 1 (New York: Plenum, 1987), pp. 3–27; and D. Seamon, ed., *Dwelling, Seeing, and Designing: Toward a Phenomenological Ecology* (Albany: State University of New York Press, 1993). For helpful examples of how the Goethean approach can be used to understand natural landscapes and built environments, see G. J. Coates, *Erik Asmussen: Toward a Living Architecture* (Stockholm: Byggeförlaget, 1997); M. Riegner, "Toward a Holistic Understanding of Place: Reading a Landscape Through Its Flora and Fauna," in D. Seamon, *Dwelling, Seeing, and Designing*, pp. 181–215; and G. Trevelyan, *The Active Eye in Architecture* (Ross-on-Wye, Herefordshire: The Wrenkin Trust, 1977).

40. L. L. Whyte, *Goethe's Single Vision of Nature and Man*, p. 290.

41. I have explored this possibility in David Seamon, *A Geography of the Lifeworld: Movement, Rest, and Encounter* (New York: St. Martin's Press, 1979), especially in part III.

42. Bortoft argues that, in his way of working, Goethe sets the foundation for a science of intuition: ". . . intuition is connected with a change of consciousness, and moreover in a way which can be made quite precise and not just left vague. It . . . follows that Goethe's procedures are practical exercises for educating the mind to function intuitively instead of intellectually, leading to a science which is intuitive instead of organized intellectually" (Bortoft, *Goethe's Scientific Consciousness*, p. 34).