The Metaphysical Implications of Ecology

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Although ecology is neither a universal nor foundational science, it has metaphysical implications because it profoundly alters traditional Western concepts of terrestrial nature and human being. I briefly sketch the received metaphysical foundations of the modern world view, set out a historical outline of an emerging ecological world view, and identify its principal metaphysical implications. Among these the most salient are a field ontology, the ontological subordination of matter to energy, internal relations, and systemic (as opposed to oceanic) holism. I treat moral psychology as a special case of the metaphysical implications of ecology. Ecology undermines the concept of a separable ego or social atom and thus renders obsolete any ethics which involves the concepts of "self" and "other" as primitive terms.

I

The subject of this paper is the metaphysical implications of ecology. From an orthodox philosophical point of view, not only is value segregated from fact, but philosophy is substantively informed only by the universal and foundational sciences.[1] The idea, therefore, that ecology—a scientific newcomer and a science remote from the more fundamental natural sciences—might have *metaphysical implications* may appear, on the face of it, ridiculous. So here at the beginning let me enter a couple of apologetic caveats.

Although it is not a foundational science like physics or a universal science like astronomy, ecology has profoundly altered our understanding of the proximate terrestrial environment in which we live, move, and have our being. And by "implications" I do not mean to suggest that there are logical relationships between ecological premises and metaphysical conclusions such that if the former are true the latter must also be true. *Imply, implicate,* and *implication* have a wider meaning evolved from the Latin root, *implicare*—to infold, involve, or engage—which I wish to evoke. Ecology has made plain to us the fact that we are enfolded, involved, and engaged within the living, terrestrial, environment—i.e., implicated in and implied by it. (This proposition is itself

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[1] See for example, E. A. Burtt, *The Metaphysical Foundations of Modern Science* (Garden City, N.Y.: Anchor Books, 1954) and Ernest Nagel, *The Structure of Science* (New York: Harcourt, Brace and World, 1961).

among the metaphysical implications of ecology.) Therefore, ecology also necessarily profoundly alters our understanding of ourselves, severally, and human nature, collectively. From this altered representation of the environment, people (personally and collectively), and the relationships in it and between it and ourselves, we may *abstract* certain general conceptual notions. These abstractive distillates are the metaphysical implications of ecology to which I draw attention in this discussion.

Ecology and contemporary physics, interestingly, complement one another conceptually and converge toward the same metaphysical notions. Hence, the sciences at the apex of the hierarchy of the natural sciences and those at the base, the "New Ecology" and the "New Physics," respectively, draw mutually consistent and mutually supporting abstract pictures of nature in its most elementary and universal and in its most complex and local manifestations.[2] A consolidated metaphysical consensus, thus, appears to be presently emerging from twentieth-century science which may at last supplant the metaphysical consensus distilled from the scientific paradigm of the seventeenth century.

II

To bring dramatically to light the metaphysical implications of ecology, let me begin with a foil: the metaphysical ideas, just mentioned, implicated in modern classical science including pre-ecological natural history. Modern classical science adopted and adapted an ontology first set out in Western thought by Leucippus and Democritus in the fifth century B.C.—atomic materialism.[3]

The classical atom is essentially a mathematical entity and its so-called primary qualities may be precisely and quantitatively expressed as aspects or "modes" of geometrical space. An atom's solid mass was thus understood, mathematically, as a positive or "full" portion of negative or "empty" Euclidean

[2] The term *New Ecology* was first used in H. G. Wells, with Julian Huxley and G. P. Wells, *The Science of Life* (New York: Garden City Publishing Co., 1939), p. 961, to characterize ecology after the quantifiable "ecosystem" model was developed by Arthur Tansley in 1935. See Warwick Fox, "Deep Ecology: A New Philosophy of Our Time?" *The Ecologist* 14 (1984): 194–200, and J. Baird Callicott, "Intrinsic Value, Quantum Theory, and Environmental Ethics," *Environmental Ethics* 7 (1985): 257–75, for a discussion of the convergence and complementary characteristics of the New Physics and New Ecology.

[3] John Gribbin, *In Search of Schrodinger's Cat: Quantum Physics and Reality* (New York: Bantam, 1984), claims that while "Newton had [atomism] in mind in his work on physics and optics, atoms only really became a part of scientific thought in the latter part of the eighteenth century when the French chemist Antoine Lavoisier investigated why things burn" (p. 19). But, according to Thomas Kuhn, *The Copernican Revolution: Planetary Astronomy and the Development of Western Thought* (Cambridge, Mass.: Harvard University Press, 1957), whose historical point of view is somewhat broader than Gribbin's, "early in the seventeenth century atomism experienced an immense revival. . . . Atomism was firmly merged with Copernicanism as a fundamental tenet of the 'new philosophy' which directed the scientific imagination" (p. 237).

space, shape its plane limits in a three-dimensional continuum, size its cubic volume, and motion its linear translation from one location (point) to another.[4]

The void and the simple bodies (or atoms) it contains were conceived by Democritus to be uncreated and indestructible. The theistic moderns conceived space, time, and the atoms to have been uniquely created by God as the permanent theater and immutable constituents of the universe.[5]

Composite bodies, the macroscopic things composed of atoms, however, routinely come into being and pass away. The "generation" and "corruption" (or "coming into being" and "passing away") of composite bodies were understood as the temporary association and dissociation of the atoms in the course of their ceaseless jostling and shuffling.[6]

Atomism, thus, is reductive. A composite body is ontologically reducible to its simple constituents. And the career of a composite body—its generation, growth, corruption, and disintegration—is reducible to the local motions of its several constituents.

And atomism, thus, is mechanical. All causal relations are reducible to the motion or translation from point to point of simple bodies or the composite bodies made up of them. The mysterious causal efficacy of fire, disease, light, or anything else is explicable, in the last analysis, as the motion, bump, and grind of the implacable particles. Putative causal relations which could not be so conceived—those postulated in astrology, magic, witchcraft, priestcraft, Newton's gravitational theory, the Faraday-Maxwell representation of magnetism, etc., etc.—were either dismissed as superstitions and their existence denied or regarded as physical problems awaiting a mechanical solution.[7] Only a mechanical solution could be satisfactory, since only a mechanical solution implicated exclusively the fundamental ontology of atomic materialism.[8]

This material, reductive, particulate, aggregative, mechanical, geometric, and quantitative paradigm in physics governed thought in other areas of philosophical interest, for example in moral psychology and biology.

Although Democritus, Lucretius, and Hobbes were thoroughgoing materialists and attempted to treat mind in exactly the same mechanical terms as, say, fire,

[4] "Primary" and "secondary" qualities were terms given to the distinction between putative actual and nonactual qualities of the elements by John Locke, *Essay Concerning Human Understanding* (New York: E. P. Dutton and Co., 1961). Locke attempted to ground the distinction empirically rather than theoretically, the futility of which was subsequently demonstrated by Berkeley. The revealing terms, "the full" and "the empty," are attributed to the fifth-century atomists by Aristotle, *Metaphysics* 985b4.

[5] See G. S. Kirk and J. E. Raven, *The Presocratic Philosophers: A Critical History with a Selection of Texts* (Cambridge: Cambridge University Press, 1962), and Burtt, *Metaphysical Foundations of Modern Science*.

[6] Ibid.

[7] See Ernst Nagel, *Structure of Science*.

[8] Ibid.

light, and heat, dualism as espoused by Pythagoras, Plato, and Descartes became more characteristic of the dominant psychology of modern classical science.[9]

Mind, nevertheless, was derivatively and analogously conceived by the dualists in atomistic terms—as a psychic monad. Each mind, in other words, was a discrete psychic substance insulated within an alien (to its own nature) material cladding.[10] The mind was passively bedazzled and deluded by the bodily senses which were mechanically excited by the local "external" world. But minds were not otherwise informed by interaction with matter. That is, the rational structure of the human mind together with its passions and volitions was regarded as an independent given. By carefully sifting and sorting the raw, confused data afforded by sensation, disciplined rational minds could figure out the mechanical laws of the foreign material world and apply that knowledge to practical problem solving.

Given a monadic moral psychology, there are two fundamental options for ethics. For example, as represented most clearly by Hobbes, ethics might consist in finding the most felicitous rules to harmonize the inertia-like appetites of individual egos (or social atoms).[11] Or, a conceptual talisman to overcome the appetitive egoism of the discrete psychic monads might be posited. The concept of reason functions as such a transcendental principle in Kant's ethic.[12]

In biology, an even more subtle "conceptual atomism" prevailed. To explain the existence of natural kinds or species had been a major burden of Plato's theory of forms.[13] For each species or natural kind there was a corresponding eternal form or idea. Individuals acquired their "essences," their specific, discrete natures, by "participation" in the forms. Thus, lions were lions and differed from panthers because lions participated in the form lion, and panthers in the form panther. And so for horses, cows, and all other living specimens, each acquired the specific characteristics they to one degree or another possessed through their association as token to type with specific forms.

Although Aristotle (whose relationship to subsequent Western biology is comparable to Pythagoras' relationship to subsequent Western mathematics)

[9] For Democritus' materialistic psychology see W. K. C. Guthrie, *A History of Greek Philosophy*, (Cambridge: Cambridge University Press, 1965), vol. 2; for Lucretius' position see Titus Lucretius Carus, *De Rerum Natura*, trans. Robert Latham (Harmondsworth: Penguin, 1951); and for Hobbes' views see Thomas Hobbes, *Leviathan* (New York: Collier Books, 1962). For Pythagoras' dualism see W. K. C. Guthrie, *A History of Greek Philosophy*, (Cambridge: Cambridge University Press, 1962), vol. 1; for Plato's see especially the *Phaedo;* and for Descartes' see *Meditations on First Philosophy*, in E. S. Haldane and G. R. T. Ross, trans., *The Philosophical Works of Descartes*, (Cambridge: Cambridge University Press, 1911), vol. 1.

[10] There is remarkable unanimity of thought on this head among Pythagoras, Plato, and Descartes, the West's most influential dualists.

[11] See Hobbes, *Leviathan*.

[12] See Immanuel Kant, *Foundations of the Metaphysics of Morals* (New York: Bobbs-Merrill Co., 1959).

[13] See especially Plato, *Parmenides* and *Phaedo*.

rejected Plato's theory of independently existing forms, he retained the more insidious Platonic doctrine of essences. According to Aristotle, a thing's essence was its definition, given in terms of a classificatory hierarchy.[14] The universals of this hierarchy (later modified and refined by Carl Linnaeus)—species, genes, family, order, class, phylum, and kingdom—were not real or actual; only individual organisms fully existed. Nevertheless, for Aristotle, a species acquires its peculiar characteristics, not through interaction with other species, but through the place it occupies in a logically determined classificatory schematism.

Aristotle's teleological conception of nature introduced into biology a hierarchy of another sort. Some species were "lower," others "higher" on the scale of ends. Lower organisms existed for the sake of higher ones.[15] This habit of calling evolutionarily more venerable beings "lower organisms" persists today as an Aristotelian residue in modern biology much as the habit of referring to certain numbers as "square" or "cubic" persists as a Pythagorean residue in modern mathematics. The former, however, seems, somehow, more than a quaint and harmless terminological legacy of classical antiquity; it seems to impute a distinct pecking order to nature.

In sum, then, the endemic Western picture of living nature prior to its transformation by ecology might be characterized (or caricatured) as follows. The terrestrial natural environment consists of a collection of bodies composed of molecular aggregates of atoms. A living natural body is in principle a very elaborate machine. That is, its generation, gestation, development, decay, and death can be exhaustively explained reductively and mechanically. Some of these natural machines are mysteriously inhabited by a conscious monad, a "ghost-in-the-machine." Living natural bodies come in a wide variety of types or species, which are determined by a logico-conceptual order, and have, otherwise, no essential connection to one another. They are, as it were, loosed upon the landscape, each outfitted with its (literally God-given) Platonic or Aristotelian essence, to interact catch-as-catch-can.

Anthony Quinton has recently characterized the modern classical world view similarly, but even more graphically. According to Quinton:

> In that conception (the Newtonian) the world consists of an array of precisely demarcated individual things or substances, which preserve their identity through time, occupy definite positions in space, have their own essential natures independently of their relations to anything else, and fall into clearly distinct natural kinds. Such a world resembles a warehouse of automobile parts. Each item is standard in character, independent of all other items, in its own place, and ordinarily unchanging in its intrinsic nature.[16]

[14] See Aristotle, *De Partibus Animalium* and *Politicus*.

[15] Ibid.

[16] Anthony Quinton, "The Right Stuff," *New York Review of Books*, 5 December 1985, p. 52.

III

Ecology was given its name in 1866 by Ernst Haeckel, but the concept of an "economy of nature" had been current in natural history since Linnaeus had devoted a treatise to it a century earlier.[17] Although the idea of an orderly economy of nature was an improvement over the Hobbesian picture of nature as a chaotic free-for-all, Linnaeus and his exponents explicitly represented it in mechanical terms. Living nature is, as it were, a mechanical Leviathan, a vast machine which is itself composed of machines. "Like a planet in its orbit or a gear in its box, each species exists to perform some function in the grand apparatus."[18] The grand apparatus and its functions, to which each species is fitted, were, like the component species, believed to be designed by God. So, all natural relations and interactions remain external.

The subsequent Arcadian and Romantic intellectual countercurrents to eighteenth-century rationalism and mechanism, however, gave the proto-ecological notion of a natural economy a more integrative and holistic cast. Ecology as it eventually emerged as a distinct subdiscipline of natural history was shaped by a complex of governing metaphors derived from these minority traditions. Natural relations among species were portrayed, for example, by Gilbert White in the late eighteenth century, as a "harmony" and as a felicitous "balance"—balance both in the physical sense of a dynamic equilibrium and in the distinctly aesthetic sense of a tension and resolution of opposites, as in beautiful painting, poetry, and music.[19]

In contrast to the Linnaean designed, reductive, mechanical Leviathan, John Burroughs in the late nineteenth century posited an evolving and animated organic Leviathan, an idea later given theoretical definition and articulation by William Morton Wheeler.[20] Wheeler's exemplar was a beehive, a superorganism composed of multicelled organisms—the bees—which were in turn composed of single-cell organic units. Populations of bees, other insects, plants, avifauna, mammals, and so on are to biocoenoses as cells to multicelled organisms and bees to hives. The whole Earth's living mantle might similarly be represented as a vast "comprehensive" organic being. In Wheeler's representation, each higher level of organization is "emergent"; thus, the whole cannot be reduced to the sum of the parts.

[17] See Ernst Haeckel, *Generelle Morphologie der Organismen*, 2 vols. (Berlin: Reimer, 1966); and Carl Linnaeus, "Specimen Academicum de Oeconomia Naturae," *Amoenitates Academicae II: Holmae* (Lugdoni Batavorum: Apud Cornelium Haak, 1751).

[18] Donald Worster, *Nature's Economy: The Roots of Ecology* (Garden City, N.Y.: Anchor Books, 1979).

[19] See Gilbert White, *The Natural History of Selborne* (New York: Harper, 1842).

[20] See John Burroughs, "The Noon of Science" in *The Writings of John Burroughs*, vol. 17: *The Summit of the Years* (Boston: Houghton Mifflin and Company, 1913), and William Morton Wheeler, *Essays in Philosophical Biology* (New York: Russell and Russell, 1939).

The original notion of an economy of nature was itself a metaphor which at the turn of the century ecologists began to unpack to construct an important theoretical model. Plant and animal associations might be studied as "biotic communities." Phytographers Eugenius Warming and Frederick Clements introduced the idea of competitive dynamic "succession" in plant communities which typically evolved from "pioneer" to "climax" stages.[21] In the 1920s and 1930s, zoologist Charles Elton developed the community analogy further, with a greater emphasis on structure than process. Each species occupies a "trophic *niche*" in the biotic community which is, as it were, a "profession" in the economy of nature.[22] There are three great guilds—producers (the green plants), first and second-order consumers (herbivorous and carnivorous animals respectively), and decomposers (fungi and bacteria). In biotic communities the myriad specialists in each great group are linked in "food chains" which when considered together constitute tangled "food webs." Certain common structures characterized all biotic communities, however different their component species, and peculiar professions. For example, the producers must be many times more numerous than the consumers and the prey many times more numerous than predators; nor might any two species share precisely the same ecological niche.

Oxford University ecologist Arthur Tansley coined the term *ecosystem* in 1935 deliberately to supplant the more metaphorical characterizations of biocoenoses as "communities" of plants and animals or as "super-organismic" entities.[23] Tansley's ecosystem model of biotic processes was intended to bring ecology as a science out of a qualitative, descriptive stage, with anthropomorphic and mystic overtones, and transform it into a value-free, exact quantitative science. Hence, Tansley suggested that measurable "energy" contained in food coursed through the ecosystem and was at the foundation of its structure.

The scientific exemplar to which Tansley looked was physics. Of the so-called "New Ecology," for which Tansley's ecosystem model was the critical ingredient, Donald Worster writes:

> It owed nothing to any of its forebears in the history of science . . . . It was born of entirely different parentage: that is, modern thermodynamic physics, not biology.[24]

Hence, it is no wonder that the New Physics and the New Ecology should be conceptually complementary and convergent. Tansley's exemplar for a new

[21] See Eugenius Warming, *The Oecology of Plants*, rev. ed. (Oxford: Clarendon Press, 1909); and Frederick Clements, *Plant Succession: An Analysis of the Development of Vegetation* (Washington, D.C.: Carnegie Institution of Washington, 1916).

[22] See Charles Elton, *Animal Ecology*, (New York: Macmillan, 1927).

[23] See Arthur G. Tansley, "The Use and Abuse of Vegetational Concepts and Terms," *Ecology* 16 (1935): 292–303.

[24] Worster, *Nature's Economy*, p. 303.

paradigm in ecology was, it turns out, the new paradigm emerging in physics. The ecosystem model was expressly designed to be the "field theory" of modern biology.

However, as Worster emphatically points out, the quantitative, thermodynamic, biophysical model of nature which is the hallmark of the New Ecology was immediately turned to economic advantage as a powerful new weapon in mankind's age-old campaign to conquer nature. With the quantitative precision of which Tansley's energy circuit model was capable, ecosystems could be made more "productive" and "efficient" so as to "yield" a higher caloric "crop." But just as the philosophical interpretation of the New Physics, the Copenhagen Interpretation and its variations and alternatives, is quite another thing from its economic and military applications—from TV to laser weaponry—so the philosophical interpretation of the new ecology is quite another thing from its agronomic and managerial applications—from Ducks Unlimited to the green revolution. As Worster prophetically remarks: "Organicism has a way of gaining a foothold on even the most unpromising surface."[25]

IV

At mid-century ecologist and conservationist Aldo Leopold strove to erect a secular environmental ethic on evolutionary and ecological foundations.[26] In his land ethic one finds traces of Burroughs' organic image of nature, although Leopold himself seems to have gotten the idea from the Russian philosopher P. D. Ouspensky.[27] And certainly crucial to the conceptual foundations of the land ethic is Elton's community concept. However, when Leopold turns more deliberately to the construction of a "mental image" of the natural environment in relation to which he urged new ethical sensibilities he sketches, in poetic terms, the physics-born ecosystem model. According to Leopold, *land*, his shorthand term for the natural environment

> is a fountain of energy flowing through a circuit of soils, plants, and animals. Food chains are the living channels conducting energy upward [*sc.*, to the apex of the trophic pyramid] . . . . The velocity and character of the upward flow of energy depend on the complex structure of the plant and animal community . . . . Without this complexity normal circulation would presumably not occur.[28]

[25] Ibid., p. 332.

[26] See Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1949).

[27] See Aldo Leopold, "Some Fundamentals of Conservation," *Environmental Ethics* 1 (1979): 131–48.

[28] Aldo Leopold, *A Sand County Almanac*, p. 216.

Ecologist Paul Shepard, a decade or so later, developed more consciously the metaphysical overtones of this field theory of living nature adumbrated by Leopold. According to Shepard, from the modern classical perspective

> nature is epitomized by living objects rather than the complex flow patterns of which objects are temporary formations. . . . [T]he landscape [from the classical point of view] is a room-like collection of animated furniture. . . . [B]ut it should be noted that it is best describable in terms of events which constitute a field pattern.[29]

Shepard, thus, more abstractively than Leopold, suggested that an object ontology is inappropriate to an ecological description of the natural environment. Living natural objects should be regarded as ontologically subordinate to "events" and/or "flow patterns" and/or "field patterns." As reflectively represented at mid-century, from the point of view of a mature ecological science, the biological reality seems to be, at the very least, more fluid and integrally patterned and less substantive and discrete than it had been previously represented.

In the early seventies Yale University biophysicist Harold Morowitz still more deliberately and emphatically set out the field ontology suggested by Leopold and Shepard as a more ecologically informed portrayal of the natural environment. According to Morowitz:

> Viewed from the point of view of modern [ecology], each living thing is a dissipative structure, that is, it does not endure in and of itself but only as a result of the continual flow of energy in the system. . . . From this point of view, the reality of individuals is problematic because they do not exist per se but only as local perturbations in this universal energy flow. . . . An example might be instructive. Consider a vortex in a stream of flowing water. The vortex is a structure made of an ever-changing group of water molecules. It does not exist as an entity in the classical Western sense; it exists only because of the flow of water through the stream. If the flow ceases the vortex disappears. In the same sense the structures out of which the biological entities are made are transcient, unstable entities with constantly changing molecules dependent on a constant flow of energy to maintain form and structure.[30]

Later in the same decade, Norwegian philosopher Arne Naess attempted to persuade the community of academic philosophers that ecology might have important and sweeping metaphysical implications. Naess entered a caveat similar to the one registered at the outset of this discussion, *viz.*, that metaphysi-

[29] Paul Shepard, "A Theory of the Value of Hunting," *Twenty-Fourth North American Wildlife Conference* (1957), pp. 505–06.

[30] Harold J. Morowitz, "Biology as a Cosmological Science," *Main Currents in Modern Thought* 28 (1972): 156.

cal conclusions "are not derived from ecology by logic or induction."[31] Rather, according to Naess, ecology "suggests" or "inspires" a "relational total field image [in which] organisms [are] knots in the biospherical net of intrinsic relations."[32] Naess called this metaphysical dimension of ecology "deep ecology," and the nebula of normative and public policy tendencies associated with it, "the deep ecology movement."

Let me sum up and attempt to express more precisely the abstractive general concept of nature distilled from the New Ecology in the tradition of Leopold, Shepard, Morowitz, and Naess. First, in the "organic" concept of nature implied by the New Ecology as in that implied by the New Physics, energy seems to be a more fundamental and primitive reality than material objects or discrete entities—elementary particles and organisms respectively.[33] An individual organism, like an elementary particle is, as it were, a momentary configuration, a local perturbation, in an energy flux or "field."

The metaphysical ecologists here quoted, however, if pressed, would seem hardly prepared to deny outright a primary reality to atomic and molecular matter per se in addition to energy and its "flow." Organisms, though conduits of and configured by energy, remain *composed* of molecules—solid material substances. Rather, ecological interactions, primarily and especially trophic relationships, constitute a macrocosmic network or pattern through which solar energy, fixed by photosynthesis, is transferred from organism to organism until it is dissipated. Organisms are moments in this network, knots in this web of life.

However, if we combine quantum theory with ecology, as well as compare them, and resolve the erstwhile solid and immutable atoms of matter which compose the molecules, which in turn compose the cells of organic bodies, into the ephemeral, energetic quanta, then we may say quite literally and unambiguously that organisms are, in their entire structure—from subatomic microcosm to ecosystemic macrocosm—patterns, perturbations, or configurations of energy.

Deep ecology poet and philosopher Gary Snyder captured this vertical integration of metaphysical ideas in a poem: "Eating the living germs of grasses / Eating the ova of large birds . . . / Drawing on life of living / *clustered points of light*

[31] Arne Naess, "The Shallow and the Deep, Long-Range Ecology Movement. A Summary," *Inquiry* 16 (1973): 98.

[32] Ibid., p. 95.

[33] Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science* (New York: Harper and Row, 1958), remarked "[W]e may say that all elementary particles consist of energy. This could be interpreted as defining energy as the primary substance of the world. . . . The elementary particles are certainly not eternal and indestructible units of matter, they can actually be transformed into each other. . . . Such events have been frequently observed and offer the best proof that all particles are made of the same substance: energy" (pp. 70–71).

spun / out of space / hidden in the grape."[34] In these lines the "clustered points of light, spun out of space" apparently allude to the dynamic configurations of the microcosm, the patterns of energy in the subatomic world and, obviously, eating grains, eggs, and fruit, unambiguously calls attention—especially by the persistent use of progressive verb forms ("eating," "drawing")—to the dynamic, patterned energy flux at the core of ecological relationships as conceived on the ecosystem model.

Second, the concept of nature emergent from the New Ecology, as that emergent from the New Physics, is holistic. It is impossible to conceive of organisms—if they are, as it were, knots in the web of life, or temporary formations or perturbations in complex flow patterns—apart from the field, the matrix of which they are modes. Contrary to the object ontology of classical physics and biology in which it was possible to conceive of an entity in isolation from its milieu—hanging alone in the void or catalogued in a specimen museum—the conception of one thing in the New Physics and New Ecology necessarily involves the conception of others and so on, until the entire system is, in principle, implicated.

Naess points out another sense in which ecology implies a holistic conception of the organic world, the import of which only an academic philosopher would be likely to notice. He claims, in effect, that ecology revives the metaphysical doctrine of internal relations.[35] This suggestion, remarkably, had been advanced even earlier by comparative philosopher Eliot Deutsch who also connected it with the Vedantic concept of *karma*.[36]

The doctrine of internal relations is, of course, associated with nineteenth and early twentieth-century German and English idealism—with the philosophies of Hegel, Fichte, Bradley, Royce, and Bosanquet. The basic idea is that a thing's essence is exhaustively determined by its relationships, that it cannot be conceived apart from its relationships with other things. Whatever the motives of the idealists (coherency theories of truth, the omniscience and omnipresence of spirit or whatever) and notwithstanding the inevitable entanglement of the doctrine of internal relations with other concurrently fashionable topics by mid-century neo-scholastic, academic philosophers (with "bare particulars," nominalism, the analytic-synthetic distinction, and so on) internal relations are straightforwardly implicated in ecology.

From the perspective of modern biology, species adapt to a *niche* in an ecosystem. Their actual relationships to other organisms (to predators, to prey, to parasites and disease organisms, etc.) and to physical and chemical conditions

[34] Gary Snyder, "Song of the Taste," reprinted in Bill Devall and George Sessions, *Deep Ecology: Living as if Nature Mattered* (Salt Lake City: Peregrine Smith Books, 1985), p. 12.

[35] See Naess, "The Shallow and the Deep, Long-Range Ecology Movement."

[36] Eliot Deutsch, "Vedanta and Ecology," in T. M. P. Mehederan, ed., *Indian Philosophical Annual* 7 (Madras: Center for Advanced Study in Philosophy, 1970): 1–10.

(to temperature, radiation, salinity, wind, soil and water pH, and so on) literally sculpt their outward forms, their metabolic, physiological, and reproductive processes, and even their psychological and mental capacities. A specimen is, in effect, a summation of its species' historical, adaptive relationship to the environment. This observation led Shepard to claim that "relationships of things are as real as the things."[37] Indeed, I would be inclined to go even further. To convey an anti-Aristotelian thought in an Aristotelian manner of speech one might say that from an ecological perspective, relations are "prior" to the things related, and the systemic wholes woven from these relations are "prior" to their component parts. Ecosystemic wholes are "logically prior" to their component species because the nature of the part is determined by its relationship to the whole. That is, more simply and concretely expressed, a species has the particular characteristics that it has because those characteristics result from its adaptation to a *niche* in an ecosystem.

It is necessary to add immediately, however, that the holistic concept of nature implied, analogously, by the New Ecology and the New Physics at the macro- and micro-levels of organization is a holism of a different stripe than that associated with classical Hindu metaphysics. Eliot Deutsch and Fritjoff Capra both have drawn this, perhaps natural, but unfortunate comparison in either domain, respectively. According to Capra, in the "Eastern world view" (which he seems to regard as a monolithic body of wisdom encompassing the independent indigenous traditions of thought from the Indian subcontinent to Japan) and in "modern [quantum] physics, all things are seen as interdependent and inseparable parts of this cosmic whole; as different manifestations of the same ultimate reality. The Eastern traditions constantly refer to this ultimate, indivisible reality which manifests itself in things. . . . It is called *Brahman* in Hinduism. . . . "[38] And according to Deutsch, "What does it mean to affirm continuity between man and the rest of life [as in ecology]? Vedanta would maintain that this means the recognition that fundamentally all life is one, that in essence everything is reality; . . . that *Brahman*, the oneness of reality, is the most fundamental ground of all existence."[39]

There is a crucial conceptual distinction, however, in the very different ways in which things are thought to be one in classical Indian thought, on the one hand, and in contemporary ecology and quantum theory, on the other. In classical Indian thought all things are one because all things are phenomenal and ultimately illusory manifestations or expressions of *Brahman*. The unity of things is, thus, substantive and essential and the experience of it homogeneous

[37] Paul Shepard, "Ecology and Man: A Viewpoint" in Paul Shepard and Daniel McKinley, eds., *The Subversive Science: Essays Toward an Ecology of Man* (Boston: Houghton Mifflin, 1967), p. 3.

[38] Fritjoff Capra, *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism* (Boulder, Colo.: Shambala, 1975), pp. 30–31.

[39] Eliot Deutsch, "Vedanta and Ecology," p. 4.

and oceanic. In both contemporary ecology and quantum theory at their respective levels of phenomena the oneness of nature is systemic and (internally) relational. No undifferentiated Being mysteriously "manifests" itself. Rather, nature is a *structured, differentiated* whole. The multiplicity of particles and living organisms, at either level of organization, retain, ultimately, their peculiar, if ephemeral, characters and identities. But they are systemically integrated and mutually defining. The wholes revealed by ecology and quantum theory are unified, not blankly unitary; they are one more as organisms are one, than one as an indivisible, homogeneous, quality-less substance is one.

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Ecology has rather signal implications for moral psychology which we may treat here for convenience as part of metaphysics. Since individual organisms, from an ecological point of view, are less discrete objects than modes of a continuous, albeit differentiated whole, the distinction between self and other is blurred. Hence, the central problem of modern classical moral philosophy as elegantly exposed by Kenneth Goodpaster in a recent discussion—the problem of either managing or overcoming egoism—is not solved by the moral psychology implicated in ecology so much as outflanked.[40]

Paul Shepard has remarked that

> In one aspect the self is an arrangement of organs, feelings, and thoughts—a "me"—surrounded by a hard body boundary: skin, clothes, and insular habits. . . . The alternative [aspect] is a self as a center of organization, constantly drawing on and influencing the surroundings. . . . Ecological thinking . . . requires a kind of vision across boundaries. The epidermis of the skin is ecologically like a pond surface or a forest soil, not a shell so much as a delicate interpenetration. It reveals the self ennobled and extended . . . as part of the landscape and the ecosystem.[41]

He then goes on to endorse a notion earlier crystallized by Alan Watts (whose inspiration came from oriental philosophies)—that "the world is your body."[42]

Environmental philosopher Holmes Rolston has alluded to and extended Shepard's notion of the "relational self" as implied by ecology. Meditating by the shores of a Rocky Mountain wilderness lake, Rolston asks:

[40] See Kenneth Goodpaster, "From Egoism to Environmentalism," in Kenneth Goodpaster and Kenneth Sayre, eds., *Ethics and Problems of the 21st Century* (Notre Dame: University of Notre Dame Press, 1979), pp. 21–35.

[41] Paul Shepard, "Ecology and Man: A Viewpoint," p. 2.

[42] See Alan Watts, *The Book on the Taboo Against Knowing Who You Are* (New York: Pantheon Books, 1966).

> Does not my skin resemble this lake surface? Neither lake nor self has independent being. . . . Inlet waters have crossed this interface and are now embodied within me. . . . The waters of North Inlet are part of my circulatory system; and the more literally we take this truth the more nearly we understand it. I incarnate the solar energies that flow through this lake. No one is free-living . . . *Bios* is intrinsically symbiosis.[43]

As one moves, in imagination, outwardly from the core of one's organism, it is impossible to find a clear demarcation between oneself and one's environment. The environing gases and fluids flow continuously in and out. The organisms outside (and inside!) one's osmotic envelope continually, albeit selectively, are transubstantiated into and through oneself. In the time-lapse cinematography of imagination one can see oneself arising from the earth, as it were, a pulsating structure in a vast sea of other patterns large and small—some of them mysteriously translating through oneself—finally to be transmuted into the others. The world is, indeed, one's extended body and one's body is the precipitation, the focus of the world in a particular space-time locale.

This idea is very old, even in the West, expressed abstractly and philosophically by Heraclitus in the Greek tradition and concretely and poetically—with the phrase, "for dust thou art, and unto dust shalt thou return"—by the author(s) of Genesis-J. In the West, however, there still lingers the image of the substantive *nephesh*, *psyche*, soul, or conscious mind—the more vulnerable and self-pitying, the more diaphanous and insubstantial its organic cladding is perceived to be. Paul Shepard, however, has pointed out that the relational concept of self extends to consciousness as well as organism, to mind as well as matter. According to Shepard:

> Internal complexity, as the mind of a primate, is an extension of natural complexity, measured by the variety of plants and animals and the variety of nerve cells—organic extensions of each other.
>
> The exuberance of kinds [is] the setting in which a good mind could evolve (to deal with a complex world). . . . The idea of natural complexity as a counterpart to human intricacy is essential to an ecology of man.[44]

In a subsequent discussion Shepard elaborates this insight.[45] The more primitive elements of animal consciousness—palpable hunger and thirst, fear and rage, pleasure and pain—are as clearly evolutionary adaptations to an ever more

[43] Holmes Rolston, III, "Lake Solitude: The Individual in Wildness," *Main Currents in Modern Thought* 31 (1975): 122.

[44] Paul Shepard, "Ecology and Man: A Viewpoint," p. 4.

[45] See Paul Shepard, *Thinking Animals: Animals and the Development of Human Intelligence* (New York: Viking Press, 1978).

elaborate ecosystem as fur and feathers, toes and digits, eyes and ears. The distinctive mark of human consciousness and the material of human reason are the systems of concepts embodied by human languages. Shepard has suggested that conceptual thought evolved as the taxonomical array of animals and plants was mapped by the emergent consciousness of primate hunter-gatherers. In a very direct way, therefore, human consciousness, including abstract rational thought, is an extension of the environment, just as the "environment" becomes fully actual in the mind-body unity of the New Physics, only as it interacts with consciousness.[46]

Shepard has constructed on this basis an interesting argument for species conservation: if we simplify and impoverish the Earth's ecosystems, we risk rendering future generations of human beings mentally degenerate. Lacking a rich and complex natural environment to support—as correspondent, analogue, and stimulus—a rich and complex intelligence, human intelligence may atrophy.

The relational view of self—both self as bodily organism and self as conscious, thinking thing—transforms egoism into environmentalism, to borrow Kenneth Goodpaster's felicitous phrase. As I have elsewhere pointed out, egoism has been regarded as axiologically privileged.[47] The intrinsic value of oneself is taken as a given. How to account for the value of "others"—human others and now nonhuman natural others—has been the principal problematic of non-egoistic ethics.[48]

However, if the world is one's body and one's consciousness not only images in its specific content the world around, but the very structure of one's psyche and rational faculties are formed through adaptive interaction with the ecological organization of nature, then one's self, both physically and psychologically, gradiently merges from its central core outwardly to the environment. One cannot, thus, draw hard and fast boundaries between oneself, either physically or spiritually, and the environment.

For me this realization took concrete form, as I stood two decades and an ecological education later, on the banks of the Mississippi River where I had roamed as a boy. As I gazed at the brown silt-choked waters absorbing a black plume of industrial and municipal sewage from Memphis and followed bits of some unknown beige froth floating continually down from Cincinnati, Louisville, or St. Louis, I experienced a palpable pain. It was not distinctly located in any of my extremities, nor was it like a headache or nausea. Still, it was very real. I had no plans to swim in the river, no need to drink from it, no intention of buying real estate on its shores. My narrowly personal interests were not affected, and yet somehow I was personally injured. It occurred to me then, in a

[46] See Jonathan Powers, *Philosophy and the New Physics* (London: Methuen, 1982).

[47] See Callicott, "Intrinsic Value, Quantum Theory and Environmental Ethics."

[48] See Goodpaster, "From Egoism to Environmentalism."

flash of self-discovery, that the river was a part of me. And I recalled a line from Leopold's *Sand County Almanac:* "One of the penalties of an ecological education is that one lives alone in a world of wounds."[49]

Australian conservationist John Seed, musing on his efforts on behalf of rain forest preservation in Queensland, has come to a similar conclusion:

> [A]s the implications of evolution and ecology are internalized . . . there is an identification with all life. . . . Alienation subsides. . . . "I am protecting the rain forest" develops to "I am part of the rain forest protecting myself. I am that part of the rain forest recently emerged into thinking."[50]

Ecology, thus, gives a new meaning as well as new substance to the phrase, "enlightened self-interest."

[49] Aldo Leopold, *A Sand County Almanac with Essays on Conservation from Round River* (New York: Ballantine Books, 1966), p. 197.

[50] John Seed, "Anthropocentrism," Appendix E, in Bill Devall and George Sessions, *Deep Ecology*, p. 243.

Taoism and the Nature of Nature

Roger T. Ames*

The problems of environmental ethics are so basic that the exploration of an alternative metaphysics or attendant ethical theory is not a sufficiently radical solution. In fact, the assumptions entailed in a definition of systematic philosophy that gives us a tradition of metaphysics might themselves be the source of the current crisis. We might need to revision the responsibilities of the philosopher and think in terms of the artist rather than the "scientific of first principles." Taoism proceeds from art rather than science, and produces an *ars contextualis:* generalizations drawn from human experience in the most basic processes of making a person, making a community and making a world. This idea of an "aesthetic cosmology" is one basis for redefining the nature of the relatedness that obtains between particular and world—between *tao* and *te*.

I. INTRODUCTION

In this essay, my intention is to interpret and articulate certain insights of Taoist *ars contextualis* as an alternative set of categories for rethinking some of the issues of environmental ethics. Let me begin by trying to make clear why I choose this pretentious neologism rather than the more familiar term, *metaphysics*.

J. Baird Callicott, in a recent article in the *American Philosophical Quarterly*, seeks to distinguish the concerns of environmental ethics from the new and popular field of applied ethics with which it is often confused:

> Environmental ethics may be understood to be but one among several new sorts of applied philosophies, the others of which also arose during the seventies. That is, it may be understood to be an *application* of well-established conventional philosophical categories to emergent practical environmental problems. On the other hand, it may be understood to be an *exploration* of alternative moral and even metaphysical principles, forced upon philosophy by the magnitude and recalcitrance of these problems. If defined in the former way, then the work of environmental ethics is that of a philosophical yeoman or underlaborer (to employ Locke's self

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