

# Life, Liberty and the Defense of Dignity

The Challenge for Bioethics

Leon R. Kass, M.D.



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## ✧ CHAPTER TEN

# The Permanent Limitations of Biology

**H**ow far can biology take us? Are there limits on what it can know or on what it may enable us to do? According to many a prophet in the temple of science, biology has no permanent limitations. Instead, it faces an endless frontier—eagerly, gladly, confidently. Firmly founded on the concepts and methods of objective science, supported by the century-old doctrine of evolution, and armed with new discoveries and techniques in biochemistry and molecular genetics, biology and medicine go forward into a golden age. They promise, among other things, a full understanding of those age-old “mysteries” of embryogenesis and differentiation; an unlocking of the “secrets” of perception, memory, imagination and desire; new biotechnologies and new cures for disease; the provision of psychic peace through a true psychophysics; and perhaps even the conquest of mortality through mastery of the genetically determined processes of aging.

Not being a prophet myself, I cannot dispute these claims; indeed, I am rather inclined to believe them. But there is another meaning to the question of “permanent limitations,” something quite independent of future events: Does biology have limitations that properly could be called permanent because they are intrinsic or inherent, unavoidably imbedded in the idea and practice of biology as such, regardless of how much more it comes to know? Are there activities of life, living things, or human living things that biology, *in principle*, cannot come to understand?

The answer depends in part on what we mean by “biology.” What is biology? Is it primarily a kind of knowledge or a kind of power? If knowledge, knowledge of what? Of living things, or of “life,” or of vital processes? Of what things *are*, or of how they

*work*? If power, power to do what, to whom, and why? Power to predict and control, or power to cure disease and prolong life, or power to do and to make ourselves whatever we please?

The word itself provides some interesting leads. In its earliest English usage (1813), “biology” did not mean (as it does today) “the science of life,” but rather “the study of human life and character.” This meaning is faithful to the Greek root, *bios*, which is not “life” as such, nor animate or animal life—for these, the Greeks used *zoe*—but “a course of life” or “a manner of living,” “a *human* life as lived,” describable in a *bio*-graphy. When the term “biology” entered the English language, the study of what is now covered by biology was divided between phycology (1658) or botany (1696) and zoology (1669), the study, respectively, of plants and animals. Or else it was conducted under the singular rubric of physiology, the *logos* of *phusis*, a term which at first meant the study of nature (*phusis*) altogether (1564), but soon (1615) became “the science of normal function and phenomena of living things,” those beings held to be paradigmatically natural because they sprout (*phuein*), come to birth (*natus sum*), come into being and pass away—on their own, regularly, recurrently.

The point of this etymologizing is to frame the following questions: Does biology today, defined as the science of *life*, do justice to the *beings* that live, to the plants and animals that come to *be* and pass away, one by one, and that reproduce themselves after *their* kind? What happens to our understanding of life once science evicts living beings from the center of the natural world; once they *come* to be understood largely through the concepts of modern physics (and chemistry), which studies nature regarded fundamentally *as* dead matter-in-motion? Does biology today, as the science of *life*, do justice to *human* life, which is always lived in formed lives, *bioi*, shaped not only by genetics and physiology but by human aspirations, choices and beliefs, and by cultural institutions, practices *and* norms? Does biology—*can* biology—teach us anything important about the *nature* of human life or the manner in which it might *best* be lived?

My conclusion can be simply stated in advance: there are indeed profound and permanent incapacities and restrictions of biology. Moreover, these incapacities follow directly from biology’s defects

precisely in the matter of limits or boundaries: (1) in modern practice, it foolishly pursues limitless goals; (2) in modern theory, it proceeds by methods and concepts that impose artificial boundaries that are not true to life; and (3) at any time, it faces insuperable limitations posed both by the deficiencies of human reason and by the mysteries of its subject, life itself.

### *Practical Limitations: The Limitations of Limitless Goals*

Though it is commonplace to distinguish *applied* from *pure* science—and it makes some sense to do so—it is important to grasp the essentially practical, social and technical character of modern science as such, modern biology included. Ancient biology had sought knowledge of *what living things are*, to be contemplated as an end in itself, satisfying to the knower. In contrast, modern biology seeks knowledge of *how they work*, to be used as a means for the relief and comfort of all humanity, knowers and non-knowers alike. Though the benefits were at first slow in coming, this practical intention has been at the heart of all of modern science right from the start. In order to make thought useful for meeting human needs, Descartes (in his *Discourse on Method*) proposed a new kind of thinking. He permanently turned his—and science's—back on the speculative or theoretical questions, questions about the being or nature or goodness of things, questions also about first or ultimate causes. Instead, in order to become practical, science will study nature-at-work, nature-as-craftsman; a new kind of physics, solving problems about force and action, will yield power and will ultimately lead to human mastery and ownership of nature.

The purposes of a science-based mastery are humanitarian, served by a boundless medicine capable of curing “an infinitude of maladies both of body and mind,” capable perhaps of conquering aging, and even mortality itself. Moreover, because the new medicine will know precisely the mind's dependence on the disposition of the bodily organs, it will be able to provide psychic peace and new mental powers, including a new kind of practical wisdom. *Physics*, here meaning “natural science,” will issue in *mastery* of

nature (*phusis*), via a new *physick*, an omniscient and comprehensive medicine of body and mind.

Descartes' prophecy began to be realized only in our century, and especially for biology and medicine, in the last fifty years. We are showered on all sides by benefits from biomedical technology, including prevention and cures for diseases of mind and body, and considerable increases in overall life expectancy. But though we expect many more benefits yet to come, we are learning, painfully, that these benefits are not unmixed. We are beginning to notice that power over nature is power that can be restricted and withheld from some, misused and abused by others; that even the benevolent uses of humanitarian technologies often have serious unintended and undesired consequences; that as old diseases are conquered, new and often worse ones spring up to take their place; that longer life does not necessarily mean better life; that the ability to intervene technologically in the human body and mind brings vexing dilemmas, anxious fears and sorrowful consequences—about abortion, genetic manipulation, organ transplantation, euthanasia, and use and abuse of drugs; and, worst of all, that the conquest of nature for the relief of man's estate could lead to severe dehumanization—in C. S. Lewis's words, to "the abolition of man."<sup>1</sup> We learn to prevent all genetic disease, but only by turning procreation into manufacture. We have safe and shame-free sex, but little romance or lasting intimacy. We find a perfect "soma" that can cure depression and relieve anxiety, but its unpreventable spread produces people who know and want only chemically induced satisfactions. We live much longer, but can't remember why we wanted to.

The new biology that brings us these dilemmas can, by its very value-neutral self-definition, provide us neither knowledge nor guidance for dealing with them. Worse, the scientific teachings themselves challenge and embarrass the existing prescientific or religious notions of better and worse, and of human life more generally, on the basis of which we have made—and still make—moral judgments; on the basis of which we have lived—and still live—our lives. The project for the mastery of nature, even as it provides limitless powers, leaves the "master" lost at sea. Lacking knowledge of ends and goals, lacking standards of good and bad, right and wrong,

we know not who we are nor where we are going. Yet we travel fast and freely, progressively achieving our own estrangement—from our communities, from our nature, from our very selves.

Despite these obvious practical and moral threats to our humanity, scientists and others often refuse to recognize the danger, and even object to the term “dehumanization.” For how, they ask, can science or technology be dehumanizing when these activities are themselves the expression of our highest humanity—of our curiosity and courage, our cleverness and dexterity, our energy and industry, our rationality and perfectibility? But not everything of human *origin* is humanizing in *effect*. Man does not live by rationality alone. Indeed, the foundations of our humanity—our sentiments, loves, attitudes, mores and character, as well as the familial, social, religious and political institutions that nourish and are nourished by them—are not laid by scientific reason or rational technique, and may, in truth, be undermined by them, especially if our much-vaunted scientific rationality is—as I hope next to show—philosophically unsound and finally unreasonable.

### *Philosophical Limitations: Lifeless Concepts*

I have abbreviated my treatment of the practical limitations of biology, partly because they are better known and because they are treated in the previous chapters, but mainly to concentrate instead on the *philosophical* limitations, which are, I believe, less recognized yet also more profound. We can perhaps adjust to our Brave New Worldly biomedical technologies; we may even be able to muddle through without clear and well-grounded moral notions of better and worse. But we will still face, in mind and in spirit, the disquieting disjunction between the vibrant living world we inhabit and enjoy as human beings, and the limited, artificial, lifeless, objectified re-presentation of that world as we learn it from modern biology.

The disjunction between the world-as-experienced and the world-as-known-by-science is, of course, an old story. For example, according to obvious experience a table is hard and solid, but according to atomic physics it is mainly empty space. Most of us say, “so

what?” About rocks and tables, this discrepancy is rarely bothersome. But when it reaches to life and to our *human* lives, it is—and will be—increasingly disorienting, troubling, self-alienating.

We need not look far to discover why our biological concepts and approaches are so divorced from life as lived. The divorce was produced deliberately, knowingly, and for a reason. For the adoption of the objectified view of nature (and life) is intimately connected with, and indispensable for, the practical goals of the new science.

To conquer nature-in-its-ordinary-course, we had to find and follow the regularities of a hidden nature reconceived beyond experience. People generally believe that the new science taught us how to find the truth about nature, in the firm hope that solid knowledge would then be useful: Seek knowledge, and knowledge will give you power. But as Richard Kennington has powerfully argued,<sup>2</sup> it would be more accurate to say that the new science sought *first* power over nature, and *derivatively* found a way to reconceive nature that yielded the empowering kind of knowledge: Seek power, and you will be able to devise a way of knowing that gives it to you. The result can be simply put: knowledge permitting prediction and (some) control over biological *events* has been purchased at the cost of deep ignorance, not to say misunderstanding, of *living beings*, ourselves included. It is these limitations—permanently inherent in our reigning biology—that I would now like to clarify.

The first theoretic limitation of modern biology is, ironically, its blindness to the importance of natural boundaries or distinctions. Let us call this distorting tendency *homogenization*, a tendency implicit already in the notion that biology is a universal science of “life.” I put quotation marks around this word because it is an abstraction; what lives are individual plants and animals. Moreover, each living individual is a particular one of some specific kind. The differing visible “looks” announce, so to speak, the differences among the various kinds; indeed, within certain species, the looks reveal *individual* differences, as well as different *stages* of the life cycle and different *hierarchical* ranks within a social group. These distinctive “looks,” we suspect, reflect distinctive ways of being alive and experiencing life.<sup>3</sup>

Yet virtually all of modern biology abstracts from the manifest heterogeneity of living beings, and instead studies vital processes

considered homogeneously. Specific organisms are, of course, selected for study, but they are examined not for their own sake but because they are especially suitable and useful for, say, the search for the universal genetic code and its translation, or the uniform mechanisms of natural selection and speciation, or the universal biochemical processes of metabolism and energy transfer. Largely indifferent to differences in ways of life, biology declares all beings to be in the same business—survival, adaptation, reproduction. Varieties of form and activity are thought not to be revealing and are finally deemed unimportant. But is all this homogeneity true to life?

Homogenization of form, individuality and rank is tied to the second distorting tendency, *analysis and reduction*. Whole organisms are confusing; it is easier to study their parts. Even the visible parts are too confusing. For greater precision, one works with cells or cell-free systems or, ideally, with isolated and purified molecules. Organisms are explained in terms of genes; vital functions are “explained” by the motions and interactions of nonliving molecules. This is, up to a point, a perfectly reasonable strategy; but we must not forget that we are getting a *partial*—both biased and incomplete—view. The functions of the “parts” (for example, the genes and the proteins) studied in isolation often differ from what they are normally, that is, when they are, indeed, parts of the whole. Further, the wholes have powers and activities not found in the parts alone. Why, even the very existence of the whole *as a whole* is inexplicable on reductionist grounds. What accounts for the special unity and active wholeness of each living being, and the effort it makes, instinctively, to preserve its integrity? Analysis will never be able to say.

Drunk on the success of biochemical analysis and molecular genetics, some scientists are predicting, for example, that human love will soon have a chemical explanation. Biologists will isolate that putative small molecule, located in the hypothalamus, whose concentration soars when someone falls in love. Or, again, the national campaign to sequence the entire human genome is virtually complete, and we are told that knowing the chemical sequence will reveal the “secret” of human life. Extreme reductionists go still further. They not only explain the being and workings of wholes in terms of parts; they claim that the whole exists only to serve the



parts. They hold, for example, that the real secret of life is that life serves the genes, that all the activities of a differentiated organism are really in the service of turning one genome into two—that the chicken is just an egg's—or its genes'—way of making more eggs or genes.

But is this true to life as lived? These reductionists speak loosely and not well: they mistake knowledge of the part for truth about the whole. Even if a peptide is found that, when injected into the brain, stimulates something like the sensation of falling in love, would that really be an *explanation* of love? Would anyone who ever loved accept, as adequate to the phenomenon, that love *is* (nothing but) an elevated concentration of “erotogenin” in the blood?

Reduction is all the more misleading because of the third distorting tendency, *materialism*, the prejudice that seeks to explain the structure and activity of organized bodies solely in terms of their materials. For example, the activity of transporting substances across cell boundaries is explained by specific transport proteins located in the cell surface; or, again, sight is explained by light-absorbing pigments located in the retina. True, the proteins and the pigments are indispensable, but their physiological function depends also on their placement and integration into larger organized units—the cell membrane, or the eye and visual nervous system. Not the materials as such, but the materials as *organized* are efficacious—and the organization or form is, by definition, *immaterial*. Further, organization of simpler materials makes possible properties and powers not found in the materials alone; the light-absorbing chemicals do not *see* the light they absorb. And powers—capacities for activity—are not themselves material, even though they “reside in” and are inseparable from material. Aristotle made the point ages ago: an organ—for example, the eye—has magnitude, has extension, takes up space; you can hold the eye (or the brain) in your hand. But the *power of sight*—or the *activity of seeing*—has neither magnitude nor extension; one cannot touch or hold or point to “sight.”<sup>4</sup> A blind neuroscientist could give precise quantitative details regarding electrical discharges in the eye produced by the stimulus of light, and a blind craftsman could with instruction build a good material model of the eye; but sight can be known only by one who sees. Is it true to life to identify it solely with its material substratum?

Modern biology is not only materialistic but also *mechanistic*; indeed, it delights in nothing so much as working out “the mechanism of action” of innumerable vital phenomena. Not “what is it?” or “what is it for?” but “how does it work?” is the basic question. The mechanical model in modern biology goes back at least to Descartes. In the *Discourse on Method*, Descartes treats all vital activity of animals and all human activity, except for speech and will, in terms of heat and local motion: not only the life-giving motion of the heart and blood, but also wakefulness and sleep, sensing, remembering, imagining, suffering passions, and many bodily motions—all these are at bottom just different forms of local motion. And all motion, including vital motion, is understood mechanically, like the motion of a clock or automaton.

Descartes does not say the organism is, in fact, a machine, but that we do well to *consider* it as a machine—for the sake of certain and useful knowledge (know-how). But is this mechanical account—or any mechanical account—sufficient, even for these limited purposes? Granted, vital processes occur in an orderly way, but does that make them fundamentally mechanical? The mechanical account leaves no room for spontaneity or self-initiated action. It ignores all inwardness of the agent: interested awareness, felt lack, appetite, intentionality and, hence, the purposiveness of lived movement—all are ignored. However useful as a heuristic concept, the mechanical account is not true to life.

The emphasis on mechanism is an expression of the *nonteleological* character of modern biology, a fifth feature not true to life. As I have argued elsewhere,<sup>5</sup> living things must be regarded as purposive beings, as beings that cannot even be looked at, much less properly described or fully understood, without teleological notions. Organisms come-into-being through an orderly, self-directed process of differentiation that reaches an internally determined end or completion. At each stage, but most fully when mature, each is an organic and active whole, a unity of structure and function, the parts contributing to the maintenance and working of the whole. Wholeness is preserved through remarkable powers of self-healing, each organism acting unconsciously from within to restore its own integrity—which it somehow both “knows” and “wants.” Other characteristic activities of each organism stretch above and beyond mere self-

maintenance. Living things display directedness, inner “striving” toward a goal, activities that transcend confinement to the here and now:

A seedling sprouting beneath a large rock will bend and grow around the rock to reach the light. A young bird will continue to struggle to coordinate wing and tail motions until it finally learns to fly. A beaver will make many trips to build a dam, or a bird a nest, or a spider a web. . . . And for many animals there is an elaborate pattern of behavior leading up to mating. *In none of these cases is the activity planned or conscious or intended, yet it is just the same a directed and inwardly determined activity to an end for a purpose.*<sup>6</sup>

To be sure, one can study the *how* of these activities mechanistically; but one ought not conclude therefrom that purposiveness is an illusion.

Some biologists are quite willing to admit purpose into biology, but only in the case of human beings. Because they believe there can be no purposive behavior without conscious intention or choice, they deny purposiveness to animals but allow it for themselves. (A good thing, too; otherwise, their own purposive and goal-directed behavior as biologists would refute them.) For these scientists, the mechanistic outlook of modern biology leads to a dualistic view of man—a view expressed even among some leading neurophysiologists who now concede that consciousness and free will cannot be reduced to or explained by the physiological mechanics of the brain. They have returned to something like the basic dualism of Descartes: man, alone among living things, has “soul,” or a principle of “reason-will-consciousness,” but in other respects he can be understood mechanistically, like other plants and animals.

The relation of this “mind-soul” to the soulless body machine—the so-called mind-body problem—remains an embarrassment for materialists and mechanists, and it is premature to guess how future biological findings may change the shape of the debate. But we notice, with suspicion, two problematic implications: First, the mind-body dualism unreasonably sunders consciousness from bodily life. Much of that of which we become conscious penetrates “upward” from “below”; the unimpeded, unconscious activity of the living-body-in-

action—say, in dancing—lights up the soul with feelings of pleasure. Conversely, psychosomatic interactions going the other way—such as the involuntary blush of conscious embarrassment—also cast doubt on any assertion of strict dualism. Second, the theory of evolution, connecting man to the rest of animate nature, casts doubt both on the dualistic account of man, and also on the adequacy of mechanism for understanding the rest of life. Either man, too—his felt sense of inwardness, freedom, mind, consciousness and purposiveness notwithstanding—is to be assimilated to the blind and dumb world of mechanism, or the rest of living nature must again be seen more in the light of what common sense has always taken to be naturally and purposefully human. Though no major philosopher since Descartes has attributed soul to animals and plants, these reflections would reopen the possibility that “soul”—and inwardness and purposiveness—is, in truth, found everywhere among the living.<sup>7</sup>

The subject of evolution prompts one or two brief observations, merely in passing, for evolutionary biology has limitations of its own. Though there is today a growing debate about the mechanisms of evolution, the reigning orthodoxy still credits accidental mutation and natural selection as the major means of evolutionary change. Yet very few people have noticed that this nonteleological explanation of change not only assumes but even depends upon the immanent teleological character of all living organisms. The desire or tendency of living things to stay alive and their endeavor to reproduce, both of which are among the minimal conditions of Darwinian theory, are taken for granted and unexplained. It is only part of an explanation to say that those beings with no tendency to maintain and reproduce themselves have died out. Why are the other ones, the self-maintaining and reproducing beings, here at all? They are not teleological *because* they have survived; on the contrary, they have survived (in part) because they are teleological. Can evolutionary biology tell us why a nonteleological nature would generate and sustain teleological beings? Or why, over time, it would give rise to higher organisms, with a fuller range of powers of awareness, desire and action? Do we really understand what we are claiming when we accept the view that a mindless universe gave rise to mind? One begins to wonder whether permanence, stability and perpetuation exhaust the goals of living things. As Whitehead put it:

In fact life itself is comparatively deficient in survival value. The art of persistence is to be dead. . . . A rock survives for eight hundred million years; whereas the limit for a tree is about a thousand years, for a man or an elephant about fifty or one hundred years, for a dog about twelve years, for an insect about one year. The problem set by the doctrine of evolution is to explain how complex organisms with such deficient survival power ever evolved.<sup>8</sup>

Our current evolutionary orthodoxy has, in fact, little to say about the true origin of life or about ultimate causes, not only of life but of all major biological novelty. It cannot account for the emergence of higher organisms, who often seem more engaged with mediated activity than with the necessities of survival and reproduction; think, for example, of the play of kittens and monkeys or the frolicking of otters and sea lions. Orthodoxy requires us to believe that these free and enjoyable activities must be *useful*, must have some selective advantage in the struggle to survive or to leave more progeny. Tyrannically rejecting all other explanations of change, the theory of natural selection sometimes even blinds us to the existence of certain phenomena that would be very difficult to attribute to natural selection (for example, the descent of the testes in mammals); we learn to see only what orthodoxy can explain. If its favorite theory constricts our vision, how can modern biology present a full view of life?

But there remains one special feature of modern biology, itself a cardinal premise of modern science altogether, that seems to be both most powerful in yielding new knowledge of biological events and, at the same time, *most* untrue to life: the principle of *objectification*. Because of its centrality, I shall treat it at somewhat greater length.

The term “objective” has both a common colloquial meaning and a precise philosophical meaning, the former descending from the latter but without our knowing what distortions we have swallowed in the process. In common speech, we are inclined to use “objective” as a synonym for “true” or “real.” Not only a scientist but any fair-minded person is supposed “to be objective”: unprejudiced, disinterested, rational, free from contamination of merely personal—that is, subjective—bias or perspective, and able therefore

to capture so-called “objective reality.” “Objective reality” is the domain especially of the sciences, because the methodical pursuit of reproducible and shareable findings guarantees their objective status.

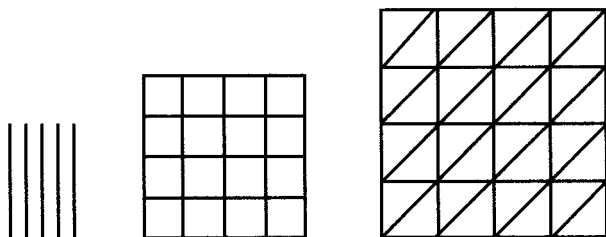
This common view is, in fact, somewhat misleading, for it is a mistake to regard “the objective” as synonymous with “the true” or “the real.” Pursuit of the error discloses, surprisingly, an unbridgeable gap between science and reality, and, in our case, between the science of biology and the living nature it studies. *For the so-called objective view of nature is not nature’s own, but one imposed on nature, imposed by none other than the interested human subject.*

Here’s how this works. An “object,” literally, means that which is “thrown-out-before-and-against” us—thrown by, thrown-before-and-against, and existing for and relative to the human subject who “did the throwing.” Not the natural world, *but the self-thinking human subject*, is the source of objectivity. The interested subject’s demand for clear and distinct and certain “knowledge” leads him to *re-present* the given world before his mind, in an act of deliberate projection, through concepts (invented for the purpose) that allow him to operate mentally on the world with utmost (usually quantitative) precision. What cannot be grasped through such conceptual *re-presentation* drops from view. Only those aspects of the world that can be “objectified” (or quantified) become objects for scientific study. The given, visible and tangible world of our experience is banished into the shadows; the shadowy world of “concepts” gains the limelight and reconfigures everything in sight, giving them an “objectified” character that is at best only partially true to what they *are*.

The classic example of this objectification of the world has in fact to do with the world as visible and, by implication, with ourselves as viewers. In a revolution-making passage in the *Rules for the Direction of the Mind*, Descartes sets the program for all of modern science by radically transforming how we should approach the study of color:

Thus whatever you suppose color *to be*, you cannot deny *that it is extended* and in consequence possessed of figure. Is there then any *disadvantage*, if, while taking care not to admit any new entity uselessly, or rashly to imagine that it exists . . . but merely abstracting from every other feature except that it

possesses the nature of figure, we conceive the diversity existing between white, blue, and red, etc., as being like the difference between the following similar figures?



The same argument applies to all cases; for it is certain that the *infinitude of figures* suffices to *express* all the differences in sensible things.<sup>9</sup> [Emphasis added.]

To see more clearly what is involved in “objectification” and how it distorts the very phenomena in the course of coming to “understand” them, let us go slowly through the passage, noting the following crucial points:

1. We are told to ignore the *being* or *nature* of color, and concentrate instead only on the “fact” that, because colored *things* are extended (that is, take up space), all *color* has figure or shape. (“Never mind,” say Descartes, “what color really *is*. You cannot deny that *it* has figure.”)\*

2. We then must *abstract* from every feature of color *except* that it has the nature of *figure*. Why? For an advantage in knowing, yet a kind of knowing that is indifferent to existence, to what something really *is*. The knowledge acquired by objectification is indifferent or neutral to the *being* or *reality* of things.

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\*Compare the relation of color and shape (*schema*) suggested by Socrates in Plato’s *Meno*: “Shape is that which, alone among all things, always accompanies color.” (75B6) Appealing to our primary experience of the visible world, this account integrates shape and color as the two most evident and always related aspects of any visible body, whose shaped surface we come to see only because of color differences between it and its surroundings. To put it crudely, Socrates’ philosophizing deepens lived experience; Descartes’ turns its back on lived experience.

3. The act of this reconception is a willful act of mind. Descartes *decides* or *chooses* to conceive the truth about color under the concept of figure. We do not, as knowers, try to catch the *natural* looks of *visible things*; instead, by decision, *we choose* to *conceive* (literally, “to grasp together”) or represent before our grasping minds only *certain* aspects of the world.

4. Which aspects? Not the natures of colors, not the being of colors, but the *differences* among them (“the *diversity* existing between white, blue, and red”). We do not seek to know *things* through and through, but only their external—and measurable—*relations*.

5. The *natural* differences are “translated”—or, rather, *symbolized*—by *mathematical* ones. The differences of color are represented by differences among similar figures. Why? Because if we con-figure things, we can then take their mathematical measure, using the radically new mathematics of quantity (featuring the number line and analytic geometry) that Descartes has invented for this purpose, a mathematics that introduced terms of arithmetic (traditionally the study of *discrete* multitudes) into the study of geometry (the study of *continuous* magnitudes). The analytic geometry of Cartesian space is the perfect vehicle for precise measurement of anything—space, time, mass, density, volume, velocity, energy, temperature, blood pressure, drunkenness, intelligence or scholastic achievement that can be treated as an extent or quantity or dimension.

6. Descartes’ geometrical figures may be poor and passé as standing for the differences among the colors white, blue and red, but the principle he proposes is not: today we still treat color in terms of “wavelengths,” purely mathematical representations *from which all the color is sucked out*. This tells the whole story: *the objective is purely quantitative. All quality disappears*.

7. Objectification can be universalized: says Descartes, *all the differences* (that is, changes or relations) in sensible things—that is, in every being that exists in the natural world—can be expressed mathematically. The world—or more accurately, *changes* in the world—can be represented objectively, as differences among figures (or, eventually, in equations). The multifaceted and profound world of things is replaced by a shadowy network of mathematized relations. Objectified knowledge is ghostly, to say the least.



In this classic example, we have the touchstone of all so-called objective knowledge. The objectified world is, by deliberate design, abstract, purely quantitative, homogeneous, and indifferent to the question of being or existence. "Things" are "known" only externally and relationally. Moreover, the symbolic representations used to handle the objectified world bear absolutely no relation to the thing represented: a wavelength or a mathematical equation neither resembles nor points to color.

No one gets very excited about the objectification of color, but we become suspicious when science tries to objectify the *viewing* of color or, worse, the *viewer*. And now we see why. By its very principle, "objective knowledge" of sight and seeing will not be—because it *cannot* be—true to lived experience; for lived experience is always qualitative, concrete, heterogeneous, suffused with the attention, interest and engaged concern of the living soul. Real seeing can never be captured by wavelengths, absorption spectra of retinal cells, or electrical depolarizations and discharges in the objectified brain. Likewise also the inwardness of life, including awareness, appetite, emotion, and the genuine and interested relations between one living being and others, both friend and foe; or the engaged, forward-pointed, outward-moving tendencies of living beings; or the uniqueness of each individual life as lived in living time, from birth to death; the concern of each animal (conscious or not) for its own health, wholeness and well-being—none of these essential aspects of nature alive fall within the cramped and distorting boundaries of nature objectified.

Honesty compels me to interrupt this critique and tell you one last and, indeed, astounding part of this tale, one which, I suspect, you already know. Objectification works! For some reason, the many-splendored world of nature allows itself to be grasped by the anemic concepts of objective science. Never mind that it is partial, distorted, shadowy, abstract; the quantitative approach has put men on the moon, lights on the ceiling, and pacemakers in our hearts. Somehow, it must be capturing well at least one aspect of being. It is, to speak unscientifically, a miracle!

To sum up this major part of the argument: modern biology has carefully defined its conceptual and methodical boundaries in such a way that it is inherently incapable of understanding life as

lived—not only by human beings, but by any living being. It is inherently incapable of understanding that (and why) living beings are ordered and active wholes, particular ones of a particular kind; individually unique, time-bound, and experiencing a nuanced journey between birth and death; perishable and needy and, therefore, aspiring and energetically self-concerned. It is incapable of understanding that (and why) living beings are self-developing, self-maintaining, self-moving beings, each with a relation to its own world, mediated always by “inwardness,” however rudimentary, comprising awareness of and appetite for things beyond their boundaries. It is incapable of understanding that (and why) they are purposive, serving both themselves and their descendants; that (and why) their patterned surfaces are on display, often revealing—in part—various communicable aspects of the state of the soul within; that (and how, and why) there is a hierarchy of capacities and powers—within a given life, within social groupings of the same species, and in the entire kingdom of living things overall. True, our biology promises and can deliver a limitless string of intriguing and useful discoveries, within the boundaries it has set for itself, about many diverse vital phenomena. But the nature and meaning of living beings, and of life altogether, will forever lie out of reach. Modern biology will never be able to tell us what life *is*, what is *responsible* for it, or what it is *for*. It will never be able to say, about even the simplest plant or animal, what it is, what its life is truly like, or what its flourishing or well-being might be.

### *Alternative Biologies: Ultimate Limits*

To be fair, I must now confess that not all of modern biology adheres fully to the orthodox view I have presented and whose limits I have tried to show. Recently, there have been increasing objections to reductionism, with new suggestions that each “level of organization”—that is, molecules, organelles, cells, tissues, organs, organisms, social groupings, and such—must be treated on its own terms. There are challenges to the sufficiency of materialism, at least with respect to explaining the human mind and consciousness. In evolutionary theory, there is opposition to the orthodox view that all

evolutionary novelty is the result of small and accidental random mutations, and some people are flirting with suggestions (vaguely Lamarckian) that lived experience can effect changes in heritable genotype. Yet though welcome, none of these challenges are likely to burst through the conceptual barrier, precisely because they accept the "objectified" view of the world on which modern biology is grounded.

But there are unorthodox biologists, some of them contemporary, who present truly alternative approaches to life. For example, there is the late Adolf Portmann, who did remarkable studies on the communicative and aesthetic meaning of animal appearance, and its relation to genuine social life;<sup>10</sup> the late Erwin Straus, who developed a rich phenomenological psychology and a nonobjectified understanding of sensing;<sup>11</sup> Oliver Sacks, who has emphasized the acquired individuation of each "nervous system";<sup>12</sup> E. S. Russell, who explored the purposive directedness of vital activities;<sup>13</sup> and (the philosopher) Hans Jonas, who has elaborated a coherent and hierarchic account of life around the notion of "needful freedom," held always precariously in the face of the threat of extinction.<sup>14</sup> Recently making a comeback among students of natural philosophy, there is Goethe, a connoisseur of morphology who, well before Darwin, explored the immanent creative powers of life and who understood, perhaps better than anyone else, how the purposive yet innovative mind of man might both mirror and embody the purposiveness and creativity of nature itself.<sup>15</sup> And hiding off-stage, but still accessible to us, is that first biologist of nature-in-its-ordinary-course, Aristotle, who emphasized questions of being over becoming, form over matter, purposiveness over moving causes, and wholes over parts; for whom the soul was not an ethereal spirit or a ghost-in-the-machine but an immanent and embodied principle of all vital activity; and for whom science was a refined and ever-deepening reflection on the natures and the causes of the beings manifest to us in ordinary experience, requiring neither abdication of our human point of view, nor an artificial reconception of the world, nor the neglect of phenomena that theory cannot explain.<sup>16</sup> These all commend themselves to our attention, at least for their questions and concerns, if we are interested in enlarging the boundaries and reducing the limitations of a richer biology closer to its living subject. Yet

I wish to insist that there may be permanent limitations for the study of life, even for the most natural of biologies—even for a biology that again learned to speak of living form or *telos* or soul. There are at least four limitations that may well be insurmountable, two having to do with the limitations of speech and reason, two having to do with the enigmas of our subject.

First, study, as such, dissolves the unity of the living being. Although soul-and-body or form-and-matter are, in being, concrete, grown-together, and as inseparable as the concave and the convex, speech divides them and cannot bespeak their true unity. The point was made already by Aristotle. What, he asks, is anger? The dialecticians say it is the desire for revenge, to give pain for slight; the physiologists say it is a warming of the blood around the heart. Who is right? Answer: Both together.<sup>17</sup> But not even Aristotle, the master of *logos*, can speak them truly together; he can speak them only side by side. Aristotle, for all his hylomorphism and talk of psychosomatic unity, has as much trouble as we do restoring unity once the dissection of discursive speech begins.

Second, science as such abstracts and homogenizes. Science seeks generalizations, living beings are particular. How can even the most natural of biologies do justice to the ineffability of individuality if science, by definition, is about the necessary and the universal, while individuality, though real, is contingent and particular? Science, as the search for causes, tends to abstract from real differences, not only among individuals but even among species. This question, too, already troubled Aristotle. He knew that each species had a separate nature or *eidōs*—lions give birth only to lions, and porcupines only to porcupines; and this suggests that science—knowledge of the separate *natures* of things—should proceed species by species. Yet because explaining the functioning of the parts of animals would require him repetitiously to say much the same thing about all similar higher animals, he (reluctantly, it seems) took a more generalizing approach.<sup>18</sup> And when he came, in *De Anima*, to the discussion of the powers of the soul, it turned out that there were really only three or four basic soul types—the vegetative soul, the (proto)sensitive soul and (its higher form) the appetitive soul, and the rational soul. From the viewpoint of “souling”—that is, the activities of nourishing, sensing, desiring—panthers and leopards

and cheetahs and tigers and lions are roughly equivalent. The *science* of life always violates life's living particularity.

Third, life and soul are irreducibly mysterious. Science, whether objective or natural (modern or premodern), seeks to clarify what is obscure, seeks to explain what is perplexing or wondrous. Today's science is overconfident of its ability to do so; it treats "mystery" as simply that which has not *yet* been understood. To insist, today, that nature contains *real* mysteries—things *incapable* of being understood—is generally to plead guilty to scientific heresy; for this, one gets called a mystic and is encouraged to transfer to the theology department. Yet the greatest scientists have sometimes openly confessed their sense not only of wonder but also of awe, as they confronted phenomena that defy full capture by reason. In all times and places, the biologist confronted with living beings has privileged access to the truly awesome and mysterious: the emergence of a new life, never seen before; the extinction of a life in death, lost and gone forever; the question of how life first emerged, and why; the enormous possibilities for existences different from his own, manifest in nature's prodigality throughout the living world; and, mystery of mysteries, the nature of his own soul—entwined with his body, here and now, as the integrated powers of his perishable life; and yet sufficiently free from the constraints of body, place and time to freely biologize, to think any thought, receive any idea, be transported in mind to faraway times and places, contemplate truly timeless truths. If he allowed himself to wonder at his own mindful life, a truly open biologist would be brought to the brink of the unfathomable: Can the same "thing" be both cause of life or change and cause of awareness? How, indeed, if the soul is that which moves (us), can it also be that which knows?\*

Finally, there is the insufficiency of nature for ethics. This last observation points up the difficulty in looking to biology—even to

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\*This is the ancient conundrum about the soul. It informs the discussion of the soul in Plato's *Phaedo*, and probably accounts for the unavoidably inconclusive character of the argument for the soul's immortality. Jacob Klein has pointed out that never does the famous Socratic "What is" question get raised about the soul, though all the dialogues are somehow about the soul. According to Klein, this suggests that, for Plato, the soul is *not* an *eidos*, not a simple or single *idea* or thing.

a more natural science more true to life—for very much help in answering the questions about how we are to live. It is, to be frank, a path worth following, and I myself have been pursuing it for nearly thirty years. The hope can be simply stated: if we really understood human nature and human wholeness, we would be better able to discern human flourishing and the human good. A noble aspiration—and not utterly fruitless.<sup>19</sup> But there are obvious difficulties, especially if the human being turns out not to be simple, that is, turns out to have more than one good or *telos*—as, it seems, he clearly does. Why, even among the animals, there is a tension between self-love (or self-preservation) and the urge to reproduce. To reproduce means voting with your feet for your own demise. To be a sexual being is to be self-divided and incomplete—as we learn from the story of Adam and Eve, whose discovery of their nakedness was the first insight of an awakened human self-consciousness. Worse, for the thinking animal, the very desire for knowledge is, in principle, at odds with the demands of life. In truth, the loves of life, especially human life, do not sing the same song. True, a richer biology might clarify what these longings really seek. It might contribute to a richer understanding of a healthy soul. But the task of harmonizing competing goods, both for any individual and especially *among* individuals who seek them variously, will always remain the work of a largely autonomous ethical and political science, helped, where possible, with insights mysteriously received from sources not under strict human command. Biology may do some of its finest work when it is brought to acknowledge and affirm the mysteries of the soul and the mysterious source of life, truth and goodness.

## Chapter 10: The Permanent Limitations of Biology

<sup>1</sup> C. S. Lewis, *The Abolition of Man* (New York: Macmillan, 1965). See especially Chapter 3.

<sup>2</sup> Richard Kennington, unpublished lecture on Francis Bacon, The Committee on Social Thought, The University of Chicago, 1986.

<sup>3</sup> See Adolf Portmann, *Animal Forms and Patterns*, trans. Hella Czech (London: Faber and Faber, 1964; paperback, New York: Schocken

Books, 1967). See also my "Looking Good: Nature and Nobility," in Leon R. Kass, M.D., *Toward a More Natural Science: Biology and Human Affairs* (New York: The Free Press, 1984).

<sup>4</sup> Aristotle, *De Anima* II, 12, 424a25–29.

<sup>5</sup> Leon R. Kass, M.D., "Teleology, Darwinism and the Place of Man: Beyond Chance and Necessity?" in *Toward a More Natural Science*, Chapter 10.

<sup>6</sup> *Ibid.*, p. 256.

<sup>7</sup> See Leon R. Kass, M.D., *The Hungry Soul: Eating and the Perfecting of Our Nature* (New York: The Free Press, 1994; paperback, with a new forward, Chicago: University of Chicago Press, 1999).

<sup>8</sup> Alfred North Whitehead, *The Function of Reason* (Boston: Beacon Press, 1962), pp. 4–5.

<sup>9</sup> René Descartes, *Rules for the Direction of the Mind*, in *The Philosophical Works of Descartes*, ed. Elizabeth S. Haldane and G. R. T. Ross (Cambridge, England: Cambridge University Press, 1981), p. 37.

<sup>10</sup> Portmann, *Animal Forms and Patterns*. See also *Animals As Social Beings*, trans. Oliver Coburn (New York: Viking Press, 1961).

<sup>11</sup> Erwin Straus, *Phenomenological Psychology* (New York: Basic Books, 1966) and *The Primary World of Senses*, trans. J. Needleman (New York: Free Press of Glencoe, 1968).

<sup>12</sup> Oliver Sacks, *Awakenings* (New York: Dutton, 1987).

<sup>13</sup> E. S. Russell, *The Directiveness of Organic Activities* (Cambridge, England: Cambridge University Press, 1945).

<sup>14</sup> Hans Jonas, *The Phenomenon of Life: Toward a Philosophical Biology* (Chicago: University of Chicago Press, 1982).

<sup>15</sup> J. W. Goethe, *Metamorphosis of Plants* and other essays, in *Goethe's Botanical Writings*, trans. Bertha Mueller (Woodbridge, Connecticut: Ox Bow Press, 1989).

<sup>16</sup> Aristotle, *History of Animals, Parts of Animals, Generation of Animals, Locomotion of Animals, Physics B, De Anima*.

<sup>17</sup> Aristotle, *De Anima* I, 1, 403a25–b17.

<sup>18</sup> Aristotle, *Parts of Animals* I, 1 & 5, 639a16–b5, 645b1–14.

<sup>19</sup> Kass, *Toward a More Natural Science*, Chapter 13.