1. Ignorance

THE EXPRESSED dissatisfaction of some scientists with the dangerous oversimplifications of commercialized science has encouraged me to hope that this dissatisfaction will run its full course. These scientists, I hope, will not stop with some attempt at a merely theoretical or technical "correction," but will press on toward a new, or a renewed, propriety in the study and the use of the living world.

No such change is foreseeable in the terms of the presently dominant mechanical explanations of things. Such a change is imaginable only if we are willing to risk an unfashionable recourse to our cultural tradition. Human hope may always have resided in our ability, in time of need, to return to our cultural landmarks and reorient ourselves.

One of the principal landmarks of the course of my own life is

Shakespeare's tragedy of *King Lear.* Over the last forty-five years I have returned to *King Lear* many times. Among the effects of that play—on me, and I think on anybody who reads it closely—is the recognition that in all our attempts to renew or correct ourselves, to shake off despair and have hope, our starting place is always and only our experience. We can begin (and we must always be beginning) only where our history has so far brought us, with what we have done.

Lately my thoughts about the inevitably commercial genetic manipulations already in effect or contemplated have sent me back to *King Lear* again. The whole play is about kindness, both in the usual sense, and in the sense of truth-to-kind, naturalness, or knowing the limits of our specifically *human* nature. But this issue is dealt with most explicitly in an episode of the subplot, in which the Earl of Gloucester is recalled from despair so that he may die in his full humanity.

The old earl has been blinded in retribution for his loyalty to the king, and in this fate he sees a kind of justice for, as he says, "I stumbled when I saw" (*King Lear,* The Pelican Shakespeare, IV, i, 19). He, like Lear, is guilty of hubris or presumption, of treating life as knowable, predictable, and within his control. He has falsely accused and driven away his loyal son, Edgar. Exiled and under sentence of death, Edgar has disguised himself as a madman and beggar. He becomes, in that role, the guide of his blinded father, who asks to be led to Dover where he intends to kill himself by leaping off a cliff. Edgar's task is to save his father from despair, and he succeeds, for Gloucester dies at last "'Twixt two extremes of passion, joy and grief . . ." (V, iii, 199). He dies, that is, within the

proper bounds of the human estate. Edgar does not want his father to give up on life. To give up on life is to pass beyond the possibility of change or redemption. And so he does not lead his father to the cliff's verge, but only *tells* him he has done so. Gloucester renounces the world, blesses Edgar, his supposedly absent son, and, according to the stage direction, "Falls forward and swoons" (IV, vi, 41).

When he returns to consciousness, Edgar now speaks to him in the guise of a passer-by at the bottom of the cliff, from which he pretends to have seen Gloucester fall. Here he assumes explicitly the role of spiritual guide to his father.

Gloucester, dismayed to find himself still alive, attempts to refuse help: "Away, and let me die" (IV, vi, 48).

And then Edgar, after an interval of several lines in which he represents himself as a stranger, speaks the filial (and fatherly) line about which my thoughts have gathered:

> Thy life's a miracle. Speak yet again.
>
> (IV, vi, 55)

This is the line that calls Gloucester back—out of hubris, and the damage and despair that invariably follow—into the properly subordinated human life of grief and joy, where change and redemption are possible.

The power of that line read in the welter of innovation and speculation of the bioengineers will no doubt be obvious. One immediately recognizes that suicide is not the only way to give up on life. We know that creatures and kinds of creatures can be killed, deliberately or inadvertently. And most farmers know that any creature

that is sold has in a sense been given up on; there is a big difference between selling this year's lamb crop, which is, as such, all that it can be, and selling the breeding flock or the farm, which hold the immanence of a limitless promise.

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A little harder to compass is the danger that we can give up on life also by presuming to "understand" it—that is by reducing it to the *terms* of our understanding and by treating it as predictable or mechanical. The most radical influence of reductive science has been the virtually universal adoption of the idea that the world, its creatures, and all the parts of its creatures are machines—that is, that there is no difference between creature and artifice, birth and manufacture, thought and computation. Our language, wherever it is used, is now almost invariably conditioned by the assumption that fleshly bodies are machines full of mechanisms, fully compatible with the mechanisms of medicine, industry, and commerce; and that minds are computers fully compatible with electronic technology.

This may have begun as a metaphor, but in the language as it is used (and as it affects industrial practice) it has evolved from metaphor through equation to identification. And this usage institutionalizes the human wish, or the sin of wishing, that life might be, or might be made to be, predictable.

I have read of Werner Heisenberg's principle that "Whenever one treats living organisms as physiochemical systems they must necessarily behave as such." I am not competent to have an opinion about the truth of that. I do feel able to say that whenever one treats

living organisms as machines they must necessarily be *perceived* to behave as such. And I can see that the proposition is reversible: Whenever one perceives living organisms as machines they must necessarily be treated as such. William Blake made the same point earlier in this age of reduction and affliction:

> What seems to Be, Is, To those to whom
> It seems to Be, & is productive of the most dreadful
> Consequences to those to whom it seems to Be . . .
> (Blake, *Complete Writings,* Oxford, 1966, p. 663)

For quite a while it has been possible for a free and thoughtful person to see that to treat life as mechanical or predictable or understandable is to reduce it. Now, almost suddenly, it is becoming clear that to reduce life to the scope of our understanding (whatever "model" we use) is inevitably to enslave it, make property of it, and put it up for sale.

This is to give up on life, to carry it beyond change and redemption, and to increase the proximity of despair.

Cloning—to use the most obvious example—is not a way to improve sheep. On the contrary, it is a way to stall the sheep's lineage and make it unimprovable. No true breeder could consent to it, for true breeders have their farm and their market in mind, and always are trying to breed a better sheep. Cloning, besides being a new method of sheep-stealing, is only a pathetic attempt to make sheep predictable. But this is an affront to reality. As any shepherd would know, the scientist who thinks he has made sheep predictable has only made himself eligible to be outsmarted.

The same sort of limitation and depreciation is involved in the

proposed cloning of fetuses for body parts, and in other extreme measures for prolonging individual lives. No individual life is an end in itself. One can live fully only by participating fully in the succession of the generations, in death as well as in life. Some would say (and I am one of them) that we can live fully only by making ourselves as answerable to the claims of eternity as to those of time.

The problem, as it appears to me, is that we are using the wrong language. The language we use to speak of the world and its creatures, including ourselves, has gained a certain analytical power (along with a lot of expertish pomp) but has lost much of its power to designate *what* is being analyzed or to convey any respect or care or affection or devotion toward it. As a result we have a lot of genuinely concerned people calling upon us to "save" a world which their language simultaneously reduces to an assemblage of perfectly featureless and dispirited "ecosystems," "organisms," "environments," "mechanisms," and the like. It is impossible to prefigure the salvation of the world in the same language by which the world has been dismembered and defaced.

By almost any standard, it seems to me, the reclassification of the world from creature to machine must involve at least a perilous reduction of moral complexity. So must the shift in our attitude toward the creation from reverence to understanding. So must the shift in our perceived relationship to nature from that of steward to that of absolute owner, manager, and engineer. So even must our permutation of "holy" to "holistic."

At this point I can only declare myself. I think that the poet and scholar Kathleen Raine was correct in reminding us that life, like holiness, can be known only by being experienced (*The Inner Journey of the Poet,* Braziller, 1982, pp. 180–181). To experience it is not to "figure it out" or even to understand it, but to suffer it and rejoice in it as it is. In suffering it and rejoicing in it as it is, we know that we do not and cannot understand it completely. We know, moreover, that we do not wish to have it appropriated by somebody's claim to have understood it. Though we have life, it is beyond us. We do not know how we have it, or why. We do not know what is going to happen to it, or to us. It is not predictable; though we can destroy it, we cannot make it. It cannot, except by reduction and the grave risk of damage, be controlled. It is, as Blake said, holy. To think otherwise is to enslave life, and to make, not humanity, but a few humans its predictably inept masters.

We need a new Emancipation Proclamation, not for a specific race or species, but for life itself—and that, I believe, is precisely what Edgar urges upon his once presumptuous and now desperate father:

> Thy life's a miracle. Speak yet again.

Gloucester's attempted suicide is really an attempt to recover control over his life—a control he believes (mistakenly) that he once had and has lost:

> O you mighty gods!
> This world I do renounce, and in your sights
> Shake patiently my great affliction off.
> (IV, vi, 34–36)

The nature of his despair is delineated in his belief that he can control his life by killing himself, which is a paradox we will meet

again three and a half centuries later at the extremity of industrial warfare when we believed that we could "save" by means of destruction.

Later, under the guidance of his son, Gloucester prays a prayer that is exactly opposite to his previous one—

> You ever-gentle gods, take my breath from me;
> Let not my worser spirit tempt me again
> To die before you please
>
> (IV, vi, 213-215)

—in which he renounces control over his life. He has given up his life as an understood possession, and has taken it back as miracle and mystery. And his reclamation as a human being is acknowledged in Edgar's response: "Well pray you, father" (IV, vi, 215).

It seems clear that humans cannot significantly reduce or mitigate the dangers inherent in their use of life by accumulating more information or better theories or by achieving greater predictability or more caution in their scientific and industrial work. To treat life as less than a miracle is to give up on it.

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I am aware how brash this commentary will seem, coming from me, who have no competence or learning in science. The issue I am attempting to deal with, however, is not knowledge but ignorance. In ignorance I believe I may pronounce myself a fair expert.

One of our problems is that we humans cannot live without acting; we *have* to act. Moreover, we *have* to act on the basis of what we know, and what we know is incomplete. What we have come to

know so far is demonstrably incomplete, since we keep on learning more, and there seems little reason to think that our knowledge will become significantly more complete. The mystery surrounding our life probably is not significantly reducible. And so the question 7
of how to act in ignorance is paramount.

Our history enables us to suppose that it may be all right to act on the basis of incomplete knowledge *if* our culture has an effective way of telling us that our knowledge is incomplete, and also of telling us how to act in our state of ignorance. We may go so far as to say that it is all right to act on the basis of sure knowledge, since our studies and our experience have given us knowledge that seems to be pretty sure. But apparently it is dangerous to act on the assumption that sure knowledge is complete knowledge—or on the assumption that our knowledge will increase fast enough to outrace the bad consequences of the arrogant use of incomplete knowledge. To trust "progress" or our putative "genius" to solve all the problems that we cause is worse than bad science; it is bad religion.

A second human problem is that evil exists and is an ever-present and lively possibility. We know that malevolence is always ready to appropriate the means that we have intended for good. For example, the technical means that have industrialized agriculture, making it (by very limited standards) more efficient and productive and easy, have also made it more toxic, more violent, and more vulnerable—have made it, in fact, far less dependable if not less predictable than it used to be.

One kind of evil certainly is the willingness to destroy what we cannot make—life, for instance—and we have greatly enlarged our

means of doing that. And what are we to do? Must we let evil and our implication in it drive us to despair?

The present course of reductive science—as when we allow agriculture to be invaded by the technology of war and the economics of industrialism—*is* driving us to despair, as witness the incidence of suicide among farmers.

If we lack the cultural means to keep incomplete knowledge from becoming the basis of arrogant and dangerous behavior, then the intellectual disciplines themselves become dangerous. What is the point of the further study of nature if that leads to the further destruction of nature? To study the "purpose" of the organ within the organism or of the organism within the ecosystem is *still* reductive if we do so with the assumption that we will or can finally figure it out. This simply captures the world as the subject of present or future "understanding," which will become the basis of further industrial and commercial optimism, which will become the basis of further exploitation and destruction of communities, ecosystems, and local cultures.

I am not of course proposing an end to science and other intellectual disciplines, but rather a change of standards and goals. The standards of our behavior must be derived, not from the capability of technology, but from the nature of places and communities. We must shift the priority from production to local adaptation, from innovation to familiarity, from power to elegance, from costliness to thrift. We must learn to think about propriety in scale and design, as determined by human and ecological health. By such changes we might again make our work an answer to despair.

II. Propriety

My general concern is with what I take to be the increasing inability of the scientific, artistic, and religious disciplines to help us address the issue of propriety in our thoughts and acts. "Propriety" is an old term, even an old-fashioned one, and is not much in favor. Its value is in its reference to the fact that we are not alone. The idea of propriety makes an issue of the fittingness of our conduct to our place or circumstances, even to our hopes. It acknowledges the always-pressing realities of context and of influence; we cannot speak or act or live out of context. Our life inescapably affects other lives, which inescapably affect our life. We are being measured, in other words, by a standard that we did not make and cannot destroy. It is by that standard, and only by that standard, that we know we are in a crisis in our relationship to nature. The term "environmental crisis," crude and inexact as it is, acknowl-

edges that we have invoked this standard and have measured ourselves by it. A civilization that is destroying all of its sources in nature has raised starkly the issue of propriety, whether or not it wishes to have done so.

Propriety is the antithesis of individualism. To raise the issue of propriety is to deny that any individual's wish is the ultimate measure of the world. The issue presents itself as a set of questions: Where are we? (This question applies, with as much particularity as human competence will allow, to all of the world's millions of small localities.) Who are we? (The proper answer to this question depends on where we are and where we have been, and it includes history.) What is our condition? (This is a *practical* question.) What are our abilities? (This also is a practical question. It refers to abilities that are *proven,* not to abilities that are theoretical or potential, such as "aptitude" or I.Q.) What appropriately may we do in our own interest *here?* (And this question submits to the standard of the health of the place.) These questions address themselves to all the disciplines, but they do not call for specialized answers. They cannot, I think, be answered by specialists—or not, at least, by specialists in isolation from one another.

To ask such questions seriously now is not quite absurd, for the questions are valid and urgent, but it is nonetheless to risk a sort of comedy, for the questions are as foreign to our sciences and arts as presently practiced, and to our institutions of government, learning, and religion, as they are to the global corporations whose existence depends upon their (and our) willingness to ignore any such questions.

All of the disciplines are increasingly identifiable as professionalisms, which are increasingly conformable to the aims and standards of industrialism. All of the disciplines are failing the test of propriety because they are failing the test of locality. The professionals of the disciplines don't *care* where they are. Though they are inescapably in context, they assume or pretend that they think and work without context. They subscribe to the preeminence of the mind and (logically from that) of the career. The questions of propriety, calling as they must for local answers, call necessarily for *small* answers. But small local answers are now as far beneath the notice of professionalism as of commercialism. Professionalism aspires to *big* answers that will make headlines, money, and promotions. It longs, moreover, for answers that are uniform and universal—the same styles, explanations, routines, tools, methods, models, beliefs, amusements, etc., for everybody everywhere. And like the corporations, whose appetite for "growth" seems now ungovernable, the institutions of government, education, and religion are now all too likely to measure their success in terms of size and number. All the institutions seem to have learned to imitate the organizational structures and to adopt the values and aims of industrial corporations. It is astonishing to realize how quickly and shamelessly doctors and lawyers and even college professors have taken to drumming up trade, and how readily hospitals, once run according to the laws of healing, mercy, and charity, have submitted to the laws of professionalism, industrial methodology, careerism, and profit.

This is happening to all the disciplines, but because science is the most influential category of the disciplines, and increasingly has set the pattern for the rest, we must be concerned first of all with

science. Stephen Edelglass, Georg Maier, Hans Gebert, and John Davy in their book, *The Marriage of Sense and Thought,* wrote that "Science now functions in society rather as the Church did in the Middle Ages" (p. 16). What kind of religion science is, and how it works as such, are questions we will have to deal with.

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One used to hear a great deal about "pure science." The universities, one was given to understand, were full of scientists who were disinterestedly pursuing truth. "Pure science" did not permit the scientist to ask so crude and pragmatic a question as *why* this or that truth was being pursued; it was just assumed, not only that to know the truth was good, but that, once the truth was discovered, it would somehow be *used* for good. This is a singularly naive view of science (as it would be of any human enterprise), but it survived at least into the early days of space exploration, when a lot of aficionados of so-called high technology assumed that NASA existed to sponsor voyages of pure discovery: to learn whatever might be learned, to take pictures of the earth and other planets, and to provide extremely expensive mystical experiences to astronauts. Some people believed that this enterprise was really a sort of spiritual quest, and would always remain above the gross concerns of, for example, the military-industrial complex. It would promote instead a renewed tenderness toward our "planet" by such devices as pictures of half of said planet, taken at a distance that reduced it to a blue bauble something like a Christmas tree ornament. In our foolish insistence on substituting technology for vision, we forget that we are not the first to have seen "the whole earth" from such a

distance. Dante saw it (*Paradiso XXII,* 133–154) from a higher level of human accomplishment, and at far less economic and ecological cost, several hundred years before NASA.

The possibility of pure science was significantly diminished, surely, by the time early scientists had invented metallurgy and then gunpowder, and it diminished steadily from then on. By now, when the possibilities of application have so enormously multiplied and the greed of corporations has grown so elaborate that they wish to patent discoveries before they have been discovered, it appears safest to assume that all sciences are "applied." Science may at times have been altruistically applied. But even such nominally altruistic sciences as medicine and plant-breeding have now become so deeply interpenetrated with economics and politics that their motives are at best mixed with, and at worst replaced by, the motives of corporations and governments. If nothing else, the increasing costliness of the practice of conventional science, and its consequent dependence on large grants or investments, would mitigate against its purity. One can only assume that pure science now needs to move fast (and beg hard) to keep its skirts from being lifted by the ever randy and handy corporate giants.

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As I have already confessed, I am not at all a scientist. And yet, like every human inhabitant of the modern world, I have experienced many of the effects (costs and benefits) of science; I have received a great deal of hearsay of it; and I know that I am always under its influence and at its mercy. Though I am unable to comment on its methods or the truth of its discoveries, I am nonetheless appropri-

ately interested in its motives—in what it thinks it is doing and in how it justifies itself. I agree with the proposition that science (or "science-and-technology") has now become a sort of religion; I am aware also that in many ways it rules over us. I want to know by what power it has crowned and mitered itself.

I believe it is generally agreed that "science" means knowledge of a special kind: factual knowledge that can be proven by measure, that can stand up to empirical testing. Scientific knowledge is the hard cash of the modern economy of thought; its worth is constant, no matter who has it; its value is not derived from belief or opinion or speculation or desire. Once established, it cannot be argued about.

Science has to do, famously, with theory. "Theory," at root, is related to the word "theater"; it has to do with watching, with observation. A scientific theory is an aid to observation. It involves assumptions that appear to be consistent with known facts. It is not proven; it is useful because it may lead to evidence or to proofs.

Science also involves prediction. Prediction is a highly disciplined concept when it is used in relation to the methodology of proof: A thing is true only if it is *predictably* true; a thing is true, not because it is true now, but because it is true always. But in the hands of such "scientists" as meteorologists and economists, whose putative usefulness depends directly upon their ability to predict and whose predictions are frequently wrong, the meaning of prediction begins to slide from science toward journalism. The same slide occurs when scientists, on the basis of early results, predict the success of a course of experimentation. Alert readers of newspapers will certainly have noticed the frequency of reports

that scientists "may have" discovered something or other, or that new data "may prove" something or other. Journalists, and apparently some scientists also, are partial to news stories beginning "Scientists foresee" or "Scientists predict."

This seems to come from abuse of faith, which is another essential attribute of science. There is a sort of scientific faith that is legitimate. It is hard to see how the work of science could be done if scientists did not have faith in the workability and soundness of their methods. This is not faith of the highest sort, obviously, but is akin to the unproven confidence with which we non-scientists face the unknowns of our own workdays. But under various suasions of profession and personality, this legitimate faith in scientific methodology seems to veer off into a kind of religious faith in the power of science to know all things and solve all problems, whereupon the scientist may become an evangelist and go forth to save the world.

This religification and evangelizing of science, in defiance of scientific principles, is now commonplace and is widely accepted or tolerated by people who are not scientists. We really seem to have conceded to scientists, to the extent of their own regrettable willingness to occupy it, the place once occupied by the prophets and priests of religion. This can have happened only because of a general abdication of our responsibility to be critical and, above all, self-critical.

Why is there not a robust, profoundly questioning criticism of science within the scientific disciplines? One reason, I assume, is that such self-criticism, especially in public, would be considered "unprofessional." Another reason is that the modern sciences,

working always in such proximity to "application," are simply too lucrative or too potentially lucrative to be self-critical. The professions increasingly have adopted the standards and thought patterns of business: If you're making money, what can be wrong? The criticism of science most familiar to ordinary citizens is more than likely to take the form of a public protest against some ruinous local manifestation of applied science. The most ubiquitous and unignorable result of modern chemistry, for example, is pollution, but typically this result is dealt with by ordinary citizens, not by chemists.

In 1959, C. P. Snow spoke of science as having an "automatic corrective" (*The Two Cultures,* Cambridge, 1998, p. 8). At that time, maybe, one could reasonably suppose that "pure" science, safely withdrawn from application, might by its own processes of experimentation and proof more or less automatically correct itself. By now we know that the applied sciences are subject to no such corrective. The scale of experimentation has become too greatly enlarged, for now science may be said to be conducting many of its experiments on the scale of the world. Among the results are Chernobyl, the ozone hole, the acceleration of species extinction, and universal pollution.

If there are critics of science in the governments and the bureaucracies, they are largely inaudible. In the universities, the scientists generally proceed from promotion to promotion and from grant to grant, leaving few recorded moments of conscience or professional self-doubt; and the professors of the humanities seem for the most part merely to be abashed by the sciences, deferring to their certainties, adopting their values, admiring their wealth, and longing

even to imitate their methodology and their jargon. The journalists think it intellectually chic to stand open-mouthed before any wonder of science whatsoever. The media, cultivating their mediocrity, seem quite comfortably unaware that many of the calamities from which science is expected to save the world were caused in the first place by science—which meanwhile is busy propagating further calamities, hailed now as wonders, from which later it will undertake to save the world. Nobody, so far as I have heard, is attempting to figure out how much of the progress resulting from this enterprise is *net.* It is as if a whole population has been genetically deprived of the ability to subtract.

I know that there are some scientists who are speaking and writing sound criticism of science or of scientific abuses of science, but these people seem to have the status of dissidents or heretics; they are not accepted as partners in a necessary dialogue. Typically, their criticisms and objections are not even answered. (If you are making money and have power, why debate?) In short, the scientific critics of science are not effective. That there has been no effective criticism of science is demonstrated, for instance, by science's failure to attend to the possibility of small-scale or cheap or low-energy or ecologically benign technologies. Most applications of science to our problems result in large payments to large corporations and in damages to ecosystems and communities. These eventually will have to be subtracted (but not, if they can help it, by the inventors or manufacturers) from whatever has been gained.