stimuli that reach us from the environment. In other words, we constantly are being modified by the stimuli that reach us from nature and also from what we have done to the earth. To a great extent, we therefore come to reflect what we create. As Winston Churchill said:

"We shape our buildings and afterward our buildings shape us."

This means that everything we create, good and bad, affects our development and, more importantly, affects the development of children. In his notes of a *Native Son* James Baldwin expressed even more vividly the influence of our environment on our biological and mental characteristics. Here are three phrases:

"We cannot escape our origins however hard we try, those origins which contain the key, could we but find it, to all that we later become."

"It means something to live where one sees space and sky, or to live where one sees nothing but rubble or nothing but high buildings."

"We take our shape within and against that cage of reality bequeathed us at our birth."

In the light of the remarks that I have presented to you, I have come to a sort of general philosophy about the meaning of the word "conservation"; and it is with a brief statement of this philosophy that I end. Conservation programs, whether for wilderness or for man-made environments, usually are formulated and conducted as if their only concern were to the human species and its welfare. Yet they can be effective only if they incorporate another dimension, namely, the earth and her welfare. This is not sentimentality but hard biological science. Man and the earth are two complementary components of an indivisible system. Each shapes the other in a wonderfully creative symbiotic and cybernetic complex. The theology of the earth has a scientific basis in the simple fact that man emerged from the earth and then acquired the ability to modify it and shape it, thus determining the evolution of his own future social life through a continuous act of creation.

## NOTES

1. From T. S. Eliot, *Four Quartets*. Used by permission of the publisher, Harcourt Brace Jovanovich, Inc.

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# CONTINUING THE CONVERSATION

LYNN WHITE, JR.

The roots of my personal theology of ecology go back to a time before I had heard the word *ecology*. It was 1926, and I was in Ceylon. British colonial officials were making new roads in the jungles so that the crop of the great tea plantations could go to market more efficiently. In the red cuts slashed through the dark green vegetation I saw cones of earth left standing and asked what they were for. "Those are snakes' nests," I was told. They were spared not because the workmen were afraid of snakes—everybody in Ceylon learns to live with snakes—but because of a feeling by the workers that the snake had a right to its house so long as it wanted to stay there. Ceylon's is a Hinayana Buddhist culture believing in metempsychosis, and any given snake may well be one's late great uncle. With all the noise and activity of road building, the snake would soon decide to move to a more desireable neighborhood. After that the cone of earth would be removed. There was no particular hurry, and the officials let the diggers handle the digging in their own way.

Many of the officials seemed to be Scots, and it occurred to me that if the men with the shovels in their hands likewise had been Presbyterians the snakes would have fared less well. Only later, after I had read Max Weber, did I begin to wonder whether autonomous Buddhist Singhalese would ever have laid out those tea plantations and consequently built those roads. It was not that they lacked energy or imagination: their temples and ceremonial dancing surpassed Edinburgh's kilted dancers. Different cultures expend

Lynn White, Professor of History at the University of California, Los Angeles, has written especially for this volume a reply to the critics of his earlier article, "The Historical Roots of our Ecologic Crisis."

their capital, energy and imagination in very different proportions upon different sorts of creativity.

Scholars who rummage into the reasons for these remarkable variations talk about contrasting "value structures" that presumably guide the priorities of groups of people. The study of value structures, however, is slippery business because a society's own verbal formulations of its values may be unconsciously deceptive for two reasons. First, assumptions universally held may be so axiomatic that everybody forgets to mention them. Second, every complex society—including our own—reveres a more or less amorphous body of writings and certain modes of expression inherited from the past, with the result that efforts to verbalize contemporary values are normally obscured by a prestige-carrying veneer of obsolete ideas and words. The understanding of a society's value structure must be based less on what that society says about itself than on what it actually does, and on what it expresses in pictures and other symbols less involved in formal education than words are.

New exigencies, however, may occasionally compel people to formulate novel ideals that are crushed by the baggage of old values. America today is deep in ecologic crisis. I have not discovered anyone who publicly advocates pollution. Everybody says that he is against it. Yet the crisis deepens because all specific measures to remedy it are either undercut by "legitimate" interest groups, or demand kinds of regional cooperation for which our political system does not provide. We deserve our increasing pollution because, according to our structure of values, so many other things have priority over achieving a viable ecology.

The gap between our words and our deeds is not hypocrisy. It is something more dangerous: self-deception. We shall not cope with our ecologic crisis until scores of millions of us learn to understand more clearly what our real values are, and determine to change our priorities so that we not only wish but also are able to cope effectively with all aspects of pollution.

This means far more than simply rethinking and revising our economic and political systems. Organizations for making and implementing decisions, whether about producing and distributing goods or about governing, are human artifacts in the same sense that a skyscraper, a symphony orchestra, or a mathematical equation is an artifact. Human societies produce artifacts in quite different



styles for many reasons. Their geographic and climatic contexts range widely; but groups in similar environments often adapt to them in strangely different ways. They inherit different materials from predecessor groups; but what living societies decide to do with their legacies from the past is incredibly variable. The artifacts of a society, including its political, social and economic patterns, are shaped primarily by what the mass of individuals in that society believe, at the sub-verbal level, about who they are, about their relation to other people and to the natural environment, and about their destiny. Every culture, whether it is overtly religious or not, is shaped primarily by its religion.

There has long been a tendency—of which Marxist theory is only one of the manifestations—to assume that the economic-social-political component of human relationships is basic to all the rest of what a society does and produces: its art, religion, literature, science, technology and so on. This does not explain why changes in economic-social-political relationships take place. World Communism was produced not by Karl Marx's social analysis but by his immense moral indignation at injustice and oppression. He changed the values of millions of people. Marx stood in the prophetic tradition, and Marxism believes that an irresistable destiny, a cosmic rightness, is leading our world toward the socialist millennium. This faith has produced vast numbers of martyrs who have died in its mission. The history of Marxism demonstrates that what can only be called religious values are fundamental in the dynamics of cultural and social change.

Professional historians, delving into the complexity of the human past, seldom use the word *cause.* The search for causes is like peeling the proverbial onion: there is always a deeper cause. What is more, it seems that for any change of great magnitude there is usually more than one cause. It is this sense of pluralism, and the various strata of historical "causation," that lead me to prefer the metaphor of *roots.* As I have peeled onions and grubbed for roots, I have more and more converged upon religion, including crypto-religion, as a source for historical explanations.

No sensible person could maintain that all ecologic damage is, or has been, rooted in religious attitudes. It is doubtful whether the dinosaurs had even a crypto-religion; nevertheless a disastrous crumbling of their ecology reduced them to token survival. A cloud

of grasshoppers denuding a field is not theologically minded. Silver from Laurion helped to build the Parthenon; smelting that silver and timbering the mine shafts helped to produce the deforestation of Attica that Plato lamented. Religion in Greece affected ecology, yet that deforestation can scarcely be blamed in any direct way on the cult of Athene. And so one might comment indefinitely. But in the end one returns to value structures.

Today's ecologic situation is the by-product of a forward surging technology that first emerged during the Middle Ages in the area of the Latin church and has continued to the present. Since both the Hellenistic-Roman world and China also witnessed vigorous technological advances, Christianity obviously is not the necessary base for a dynamic technology. All that can be said—but it is not a negligible thing to say—is that Christianity *in its Latin form* (which includes Protestantism, as any Eastern Orthodox theologian can easily demonstrate) provided a set of presuppositions remarkably favorable to technological thrust. Since America's religion, and also its crypto-religion, are still Latin Christianity rather than its Greek version, let me mention a few of the items illustrating the distinctively Western medieval value structure that fostered technology.[1]

In the ninth century a picture drawn near Reims shows mankind divided into two contending camps: the righteous and the unrighteous. In each camp a sword is being conspicuously sharpened. The ungodly are content to use a large whetstone, whereas the godly possess the first rotary grindstone (or sharpener) known anywhere, and it is being turned by the first crank outside China. Since the replacement of reciprocating motion by continous rotary motion is at the heart of modern machine design, this illumination is a major monument in the history of technology. But even more instructive is the clear statement by the Benedictine monk who drew the picture that technological advance is morally good.

Similarly, in the middle of the fifteenth century the artists of northern France and Burgundy invented a novel iconography for the seven Virtues. For intricate reasons, by that time Temperance (or Moderation) had displaced Charity as the supreme Virtue. In the new iconography Temperance—and she alone—is associated with the new technology. On her head she wears a mechanical clock (invented in the 1330s), the most significant and elaborate



recent bit of automation; in her right hand she holds eyeglasses (invented in the 1280s), the greatest boon to the mature intellectual; on her heels she wears rowel spurs (of about 1290); and she stands on a tower windmill (of about 1390), the most spectacular new power machine of the age. The message could scarcely be more emphatic: technological advance is superlatively virtuous.

No such statements were produced from the area of Eastern Christianity. Quite the contrary. Before the mechanical clock, the pipe organ was the most complex machine. Continuing Hellenistic-Roman traditions, organs were used in Byzantium for secular festivities. The Greek church, however, rigorously excluded all instruments from its worship: only the unaccompanied human voice could rival the cherubim in God's praise. Since the maintenance of organs demands a continuity of craftsmanship impossible in chaos, organs vanished from the West during the very early Middle Ages. In the ninth century they were reintroduced to the West for secular music, but with amazing speed they penetrated into Latin churches. The first giant organ was built by the Benedictines of Winchester in the late tenth century: its 400 pipes were blown by 26 bellows pumped by 70 men. At first organs accompanied processions, sequences and the like, but by the thirteenth century their music was used with the canon of the Mass itself.

Justinian had put sundials and clepsydras on and in a separate building adjacent to Hagia Sophia, but the Eastern church has strongly resisted putting any time-measuring device on or in its shrines themselves: to place them there would contaminate eternity with time. Mechanical clocks were invented in the West primarily to serve the needs of medical astrologers, with the result that many of them were not only timekeepers but also immensely intricate planetaria. The Latin church, far from being repelled, immediately seized upon the clock for its homiletic value; within a few decades astronomical clocks were found in and on churches all over Europe, placed there partly to tell the time but more particularly to illustrate the orderliness of God's Creation. The metaphor of the clockmaker God was invented by a great French bishop who died in 1382.

Clearly, Latin Christianity came to feel that an advancing technology was an aspect of high spirituality. The medieval Greeks did not. Men commit their lives to what they consider good. Because Western Christianity developed strong moral approval of

technological innovation, more men of talent in the West put more resources, energy and imagination into the advancement of technology than was the case among Greek Christians or indeed in any other society, including the Chinese. The result was an unprecedented technological dynamism of which our present technological movement (with its attendant consequences) is the unbroken extension. There may have been other factors contributing to this advance, but the novel Western medieval value structure is central and essential to our understanding of it.

The iconography of Genesis 1:28, in which God gives dominion over nature to man, underscores my point. The Greek pictures are in marked contrast to the Latin. In Byzantine manuscripts Adam is shown at repose in his Garden; the animals are dispersed at random; sometimes God's hand appears from a cloud blessing the situation. The mood is relaxed, idyllic. The Western manuscripts show a very different scene. With his left hand God has seized Adam's wrist, and he is shaking his right index finger at Adam with great earnestness, giving detailed instructions as to his ruling of the fief that has been given him. There is a mood of imminent action, urgency. At one side the animals are huddled, looking a bit frightened. Considering the outcome, they have every right to be.

Not only modern technology but also the unhesitatingly exploitative approach to nature that has characterized our culture are largely reflections of value structures emerging from the matrix of Latin Christianity. When I published this hypothesis in 1967,[2] a bishop wrote to me: "I agree with you completely, and I am deeply troubled by it." Others were less acquiescent. I was denounced, not only in print but also on scraps of brown paper thrust anonymously into envelopes, as a junior Anti-Christ, probably in the Kremlin's pay, bent on destroying the true faith. The most common charge was that I had ignorantly misunderstood the nature of "man's dominion" and that it is not an arbitrary rule but rather a stewardship of our fellow creatures for which mankind is responsible to God.

In its doctrine of the Holy Spirit, Christianity fortunately makes provision for continuing revelation. Or, to phrase the matter in a more orthodox way, it recognizes the progressive unfolding of truths inherent in an original deposit of revelation. The Christian wants to know what Scripture says to him about a puzzling problem. The historian wants to know what Christians in various times and places



have thought Scripture was saying to them. The history of Biblical exegesis is sometimes troubling. It would be hard to find a Christian of any species at present defending slavery on Scriptural grounds; yet until about two hundred years ago the overwhelming body of Christians accepted slavery as a part of God's economy. So, if one points to the fact that historically Latin Christians have generally been arrogant toward nature, this does not mean that Scripture read with twentieth-century eyes will breed the same attitude. Perhaps the Holy Ghost is whispering something to us.

In every complex religious tradition there are recessive genes which in new circumstances may become dominant genes. In my 1967 discussion I referred to St. Francis's abortive challenge to the anthropocentric concept of God's world. Scattered through the Bible, but especially the Old Testament, there are passages that can be read as sustaining the notion of a spiritual democracy of all creatures. The point is that historically they seem seldom or never to have been so interpreted. This should not inhibit anyone from taking a fresh look at them.

The most remarkable by far is the *Benedicite, omnia opera domini, domino* (O All ye Works of the Lord, bless ye the Lord) found in the Vulgate because it appears in the Septuagint version of Daniel 3:57–90. Lamentably it was eliminated from Protestant Bibles because it is not part of the Hebrew text of Daniel. It survived, however, in the Anglican prayerbook because from early times it had been used liturgically. Yet it contradicts the historically dominant Judeo-Christian anthropocentrism. It is a jubilant exhortation to all created things to glorify their Maker. It makes no distinctions between categories of creatures: the angels, the heavenly bodies, winds and rain, ice and snow, fire and heat, night and day, seas and rivers, mountains and hills, whales and birds and beasts, men and the souls of the dead, and finally the singers themselves, are urged to praise him and magnify him forever.

After my 1967 article appeared, a distinguished professor of forestry wrote to me: "We save redwood groves because people enjoy them. If St. Francis thought we should save them for squirrels, then he was preaching a religion for squirrels, not for men." I could only reply that St. Francis worshipped a God who was the God both of squirrels and of men. The author of the *Benedicite* seems to have had the same faith. There being, it seems, no present consensus

among Biblical scholars about who wrote it, we may speculate that it was composed in the second century before Christ by a Hellenized Alexandrian Jew—of the community that produced the Septuagint —who felt that there were spiritual values in Greek animism that should be reconciled with the rigid monotheism of his ancestral tradition. The result smelt a bit of heresy, so both the rabbis and the more rigorous Reformers rejected it. Catholicism, both Greek and Latin, has been more patient of paradoxes so that the recessive genes of the *Benedicite* survived even though they have not thus far moderated Christian ruthlessness toward our environment. The *Benedicite* may have more of a future than a past.

Yet a man-nature dualism is deep-rooted in us, as the letter from the professor of forestry shows. Until it is eradicated not only from our minds but also from our emotions, we shall doubtless be unable to make fundamental changes in our attitudes and actions affecting ecology. The religious problem is to find a viable equivalent to animism.

During the past few generations, kindness to animals (as distinct from pets) has become a virtuous sentiment in Western culture. It is now widely regarded as Christian, although there is little or no basis for it in the Christian tradition. The Save the Redwoods League and similar groups have been extending kindness from animals to vegetables. Albert Schweitzer's concept of "reverence for life" continues to spread. But is it only to living creatures that we should be kind?

My late friend Wendell Stanley was properly honored with a Nobel Prize for crystalizing the tobacco mosaic virus: in doing so he smashed the artificial conceptual frontier between organic and inorganic matter. Stanely had religious concerns deeper than he often cared to show. Fearing that his work might start a battle as futile as that over Darwinism had been, he consulted several reputable theologians. They told him not to worry: until the time of Pasteur most people had thought that toads were generated spontaneously from mud: all he had done was to erase a recent and faulty distinction between the living and the non-living parts of God's creation.

Unfortunately most people are not very good theologians. And perhaps not all the theologians have thought their way into the ethical implications of such ideas. Do people have moral obligations



towards sea otters, even though these latter eat some abalones, or to the integrity of the ecologic system of a tundra threatened by a pipeline? (Incidentally, it is amusing that the romantic brand of ecologic buff often sets up a mirror-image of the old man-nature dualism by insisting that men have no "rights" at all against those of caribou.) More and more of us are inclined to think that we should have a decent respect for our living fellow creatures, although the arguments are usually prudential: if we damage the biotic system, won't it produce a backlash that will hurt *us*? We should ask whether a prudential ethic can rightly be called an ethic. Isn't it simply a rule of enlightened self-interest to be junked if feared results cannot be shown to occur?

The problem grows if we ask "Do people have ethical obligations toward rocks?" To an ancient Greek, to an American Indian, or perhaps to certain kinds of Buddhists, the question would have meaning. For quite different reasons they would probably reply "Yes," and the replies would reflect not prudential ethics but their ideas about the nature of reality. But today to almost all Americans, still saturated with ideas historically dominant in Christianity (although perhaps not necessarily so), the question makes no sense at all. If the time comes when to any considerable group of us such a question is no longer ridiculous, we may be on the verge of a change of value structures that will make possible measures to cope with the growing ecologic crisis. One hopes that there is enough time left.

The auguries are not encouraging. Nothing touched the American spirit more deeply than our astronauts' reaction to this planet seen from outer space: it was "Spaceship Earth." The metaphor is, in fact, ecologically terrifying. A spaceship is completely a human artifact, designed to sustain human life and for no other purpose. It is no accident that some of our space men read from Genesis while on their voyage to the moon: the traditional Judeo-Christian view of the creation is precisely that it was planned in every detail for man's use and edification, and for no other purpose. This indifference to the possibility of autonomy in other creatures has much facilitated our style of technology and thus has been a major force in polluting our globe.

The spaceship mentality is the final sophistication of this disastrous man-centered view of the nature of things and the things

of nature, and it has the present allurement of seeming to offer ecologic solutions without sacrifice of the old presuppositions. We are in worse danger than we seem.

## NOTES

1. For details of the following, see my "The Iconography of *Temperantia* and the Virtuousness of Technology" in *Action and Conviction in the Early Modern Europe: Essays in Memory of E. H. Harbison,* ed. T. K. Rabb and J. E. Seigel (Princeton: Princeton University Press, 1969), pp. 197–219, and "Cultural Climates and Technological Advance in the Middle Ages," *Viator* 2 (1971). I have not yet published the materials on the iconography of Man's Dominion. See also my *Machina ex Deo: Essays in the Dynamism of Western Culture* (Cambridge, Massachusetts: M.I.T. Press, 1968).
2. The first detailed statement of such a view was made, so far as I know, by Ernst Benz, the great medieval historian at the University of Marburg, in his "Fondamenti cristiani della tecnica occidentale" in *Tecnica e casistica,* ed. E. Castelli (Rome, 1964), pp. 241–263. As may be seen in my *Viator* article (see above), I do not agree in all respects with Benz.