



THE WORLD TOMORROW

What Price Progress?

presented by David Hulme

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FROM THE EDITORS...

The following pages contain a transcript of the *World Tomorrow* television program titled "What Price Progress?" The program was first broadcast on April 9, 1989, and was presented by David Hulme. The program included excerpts from interviews with Norman Cousins, T. George Harris, Jeremy Rifkin and Nicholas Wade. The full interviews contained much more information than we could include on *The World Tomorrow* so we have included further excerpts from those interviews, along with a short biography of each of the four men, after the transcript of the program.

What Price Progress?

David Hulme:

In a *new* beginning, man is *recreating* the earth.

A great boom in genetic research has given us several newly created, genetically altered life forms. And one has actually been patented. For the first time, mankind has the technology to transform the world into its *own* vision of the Garden of Eden, complete with new plants and animals—and perhaps even new human beings.

Can we be trusted to wield such godlike powers? And who will make the resulting moral decisions—decisions formerly reserved for the Creator?

This week on *The World Tomorrow*, we'll examine the crucial question, "What Price Progress?"

Announcer:

This week on *The World Tomorrow*: David Hulme.

Mr. Hulme:

Science and technology—twin dynamos of the modern world. No question about it—science and technology have made our lives easier in so many ways. And that pattern seems set for the immediate future—a future increasingly dominated by science. But will technology take us where we want to be?

This week we look at science and technology and ask some penetrating questions about their impact on morality and the environment.

We've titled the program "What Price Progress?"—because more and more it seems that in the hands of man, technology is a two-edged sword.

We'll hear from four guests: author and editor Norman Cousins; Jeremy Rifkin, president of the Foundation on Economic Trends; Nicholas Wade, science writer at the *New York Times*; and T. George Harris, editor-in-chief and chairman of *Psychology Today* and *American Health*.

We'll hear about some of the pluses and minuses of technological progress. And more importantly, we'll look at some of the critical ethical and moral choices we'll all face in the '90s and beyond.

First, some striking facts.

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Today, we can travel from one part of the earth to another at unprecedented speeds. Supersonic aircraft leave New York and arrive in Paris or London 3 1/2 hours later. Higher up, spacecraft explore the heavens and the planets reveal their long-kept

secrets. Back on earth, many human beings live longer because of advances in medical science.

Science and technology *have* conferred undreamed-of benefits on mankind.

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And there's more to come. According to many opinion leaders, progress in technology will account for the greatest changes in society by the year 2000. Those changes could well be greater than any caused by international tensions, economic factors or overpopulation.

So technology is something we should seriously consider. Of course, with all of the great advantages science and technology bring, there are some disadvantages.

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Technological nightmares hit the headlines with increasing frequency: Bhopal, where several thousand died in a cloud of noxious gas; Three Mile Island, with its near total nuclear meltdown; Chernobyl, spewing its radioactive debris over Europe. We wonder if drinking water is safe. What about the air we breathe, the food we eat and the pills we take?

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In the face of problems such as these, it's no wonder some feel we've taken the wrong path at some point. Others say it's the price of progress, but technology will still save us and bring us unharmed into the bright light of the next century.

The 1990s certainly promise to be an era of great scientific achievement. One area that's generating a lot of excitement is biotechnology, especially because of its promise in genetic engineering. It involves applying the principles of engineering to living matter. This restructuring of life forms—including plants and animals and maybe humans—will have commercial and other applications. Whole new species are a real possibility. The U.S. patent office already allows the registering of new living creatures.

While some regard genetic engineering as one more step in man's amazing technological progress, others see it as a potential Frankenstein monster.

One man who's very concerned where all of this is leading is author and environmentalist Jeremy Rifkin

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Jeremy Rifkin:

Now this technology poses fundamental environmental, ethical, moral and social issues beyond any technology revolution in history. For example, who among us is wise enough to determine how humans, plants and animals should be redesigned? Should the President of the United States be given the ultimate authority over redesigning the genetic code of life? Should the Congress of the United States have ultimate authority over the design, the blueprint, of living creatures? Or the scientific community—should we entrust them with this responsibility? Or the corporations in the marketplace?

End Video Clip Interview

Mr. Hulme:

Now those are all profoundly important questions. Who exactly should decide such critical moral issues? We'll come to some answers as we proceed.

Right now, let's focus on some of the background of biotechnology. As you may know, genetic engineering is now possible because of the discovery of life's blueprint, known as DNA.

Begin Video Clip Man has known for hundreds of years that living organisms pass on certain characteristics to their offspring. What we didn't know was exactly how this happened. Then, in the 19th century, it was discovered that chromosomes contained the blueprint for these characteristics.

In the 1940s, a Canadian doctor, Oswald Avery, discovered that genes were made of deoxyribonucleic acid, commonly known as DNA. But there were still many unanswered questions.

In 1953, two scientists at Cambridge University, James Watson and Francis Crick, began looking for answers. Their theories led to the detailed understanding of the chemical blueprint of life we now have.

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As a result of that amazing discovery, you could say the lid has been torn off Pandora's box and we're beginning to face some awesome choices and unprecedented dilemmas—morally and ethically.

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Mr. Rifkin:

From my point of view, the ethical questions here are profound and disturbing and that this might be one technology that we ought to say no to because in the end we could see ourselves in a brave new world where life is reduced to the status of an engineered product.

End Video Clip Interview

Mr. Hulme:

Now if life becomes viewed as *just* a set of chemical blueprints, then we're in for some interesting times. Genetic privacy, for example, may become *the* civil rights issue of the '90s. Your potential employer may

require your genetic map before hiring you. After all, if you're predisposed to develop Alzheimer's disease at age 50, then you may not be hired.

Schools may want a genetic analysis of our children to better know what academic programs they should pursue. Insurance companies might like that genetic information, too; then there's the police department and the government.

As I say, *your* genetic privacy could well become an issue.

Nicholas Wade is science writer at the *New York Times*. I asked him who's to be the authority when science and morality cross over.

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Nicholas Wade:

Well, that's a very difficult question. I suppose the quick answer to it is scientists themselves. After all, and we like most of our professional groups to be autonomous and independent and self-regulating. So I think we look to scientists to provide their own morality. And by and large I think they serve us quite well in that respect.

End Video Clip Interview

Mr. Hulme:

It's true that in 1975, members of the scientific community did set limits on genetic engineering. They drew up rules for handling gene splicing. But since then, commercial involvement has grown. And as Nicholas Wade also pointed out, the bioengineers of today are no longer just disinterested parties.

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Mr. Wade:

For the very reason you mention, society is going to need a lot of advice about these moral problems. And where will we look, but to universities, hoping to receive disinterested advice from biologists. But there are no disinterested biologists now. All of them have a commercial interest in seeing biotechnology proceed in one way or another.

End Video Clip Interview

Mr. Hulme:

But you may be wondering how we arrived at this crossroad where science, technology and ethics meet. Why the dilemma?

Let's refresh our memories about our industrial world and how it got started.

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Prior to the 18th century, the economies of the world were largely commercial and agrarian. In Britain and Europe, industry was simple and small-scale.

Then came the Industrial Revolution—radically changing everything—transforming the British economy into one dominated by heavy industry and machine manufacture. This model soon spread to other parts of the world.

And so technology began its rapid rise. Materials

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like iron and steel went into mass production; coal, steam and electricity were new sources of energy, driving newly invented machines.

Meanwhile, science, too, was making great strides. Influential in both industry and agriculture, it was also changing people's values and ways of thinking.

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It makes you wonder whether modern scientists got off on the wrong foot. How else can we explain the production of atomic and hydrogen bombs?

Three years after Hiroshima and Nagasaki, General Omar Bradley said this: "Our knowledge of science has already outstripped our capacity to control it."

The dark side of human nature, as well as human curiosity, has played its part in the downside of technology's use.

In a recent conversation, Norman Cousins, a prolific writer on ethics and morality in science, commented on the nuclear problem.

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Norman Cousins:

We may wish that the nuclear genie could be put back in the bottle again. That would certainly make one part of the problem a little simpler. But it doesn't really address itself to the fact of how progress comes about or the fact that progress represents problems. Atomic energy could represent vast liberation for the human species, as can other aspects of scientific progress.

So I think the place to put our emphasis is on how we think about things, how we govern ourselves.

End Video Clip Interview

Mr. Hulme:

How we govern ourselves is becoming the issue, and that means an agreed code of conduct. It means standards, ethics, morality.

Many today would agree that we're stumbling into spiritual darkness, armed with the ability to destroy ourselves by our own hand—victims of our own folly. We need rules to *live* by.

The world *is* becoming a smaller and smaller place. People in so many different walks of life are beginning to recognize that something has to be done about how we think and act. Here's Jeremy Rifkin again:

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Mr. Rifkin:

If we take an assessment of the record of the modern world view, the European-American world view, our world view of science and technology and its effects it's had on the planet—though short run beneficial; in the long run, devastating.

And so it's no wonder that other peoples are beginning to question the particular sojourn that we led them on, are saying: "Maybe we need to reappraise the kind of world we want to move into in the 21st century. Maybe we need to rethink our philos-

ophy of science and technology, our economic initiatives."

End Video Clip Interview

Mr. Hulme:

Jeremy Rifkin isn't the only one who's called for a radical reevaluation of our motives, general direction and modern way of thinking.

The author of this highly respected book—*High-Tech Holocaust*—is a well-known futurist, and a former member of the Hudson Think Tank. James Bellini concludes his book this way: "What is certain is that if the scale of the assault on our bodily well-being is not reduced, but instead continues to accelerate at the speed witnessed over the past quarter century, then humanity will itself become the species facing a slow, but inexorable journey to extinction. We have, perhaps, five years to make the choice."

So once again, we come face-to-face with moral choices.

And that seems to be emerging as *the* question of the '90s in many disciplines.

How do science and technology and morality interface? Who decides what's right and what's wrong in scientific endeavor? Where do we get some guidance? I asked Nicholas Wade about ethics in bioengineering:

Begin Video Clip Interview

Mr. Wade:

I don't think that means we should cut off biotechnology and say these problems are so hard we can't handle them. I think we probably should be glad of the opportunity it gives us to combat disease, at least, and maybe to increase people's parental choices. I think you just have to hope that we'll muddle through it, and be wise enough as a society to make these choices correctly.

End Video Clip Interview

Mr. Hulme:

But is it enough to hope we can muddle through? When it comes to ethical and moral issues, can we somehow take the chance of somehow vaguely making it? Can we rely on our technological resources, or do we need to look to a higher source for guidance?

Begin Video Clip Interview

Mr. Rifkin:

What's happening here is we are trying to substitute for God. We're trying to become gods. We're trying to use our science and technology and our prowess to literally fashion the world in our own image.

And I think when civilization reaches that point, it's time to stop and begin to reflect about the real meaning of life and go back and listen to the prophetic voices in Judeo-Christian theology, go back and look at what they have been saying about what our mission here is on this planet.

End Video Clip Interview

Mr. Hulme:

Those biblical voices are a vital part of our discussion. What the Bible teaches about morality and environment turns out to be fundamental.

Now there are others who've also come to think that we've arrived at a watershed in human affairs—a time when radically different thinking is necessary. T. George Harris is editor-in-chief and chairman of the magazines *Psychology Today* and *American Health*. I asked him what effect technology in the '90s would have on morality.

Begin Video Clip Interview**T. George Harris:**

You know, David, what's happening now is, science is presenting us, indeed pushing on us, questions that are almost godlike, that we never had to answer before. The obvious ones are control of nuclear weapons. . . .

So that we're confronted with the necessity to be our brothers' keepers in ways that were never there before. And we're beginning to understand some of the problems of it.

End Video Clip Interview**Mr. Hulme:**

Being our brother's keeper—looking out for others—going beyond our own selfish concerns *is* a basic moral and biblical concept. It says we cannot successfully live in this world without that kind of concern for others.

Today, we're faced with major and unprecedented issues. They require ethical choices in our relationships with others like never before.

Begin Video Clip Interview**Mr. Harris:**

On the individual level, we're confronted with even tougher choices. You and I know about retarded kids. I have a mongoloid daughter. If amniocentesis had been available at the time when she was born—came in just afterward—I don't know what my choice would've been, had I known she was going to be a mongoloid. She has taught me more than I could possibly have gotten out of another normal child. And yet, I don't know what I would choose today if I knew that.

End Video Clip Interview**Mr. Hulme:**

It seems that by our own technology we're forcing decisions on ourselves that we're ill-equipped to make.

There's an undeniable momentum that builds in scientific inquiry. It's as if experimentation goes of itself. There's a great temptation attached to it, and human curiosity can't hold itself back, it seems. That's a weakness we humans have to control.

So while science and technology have brought us many benefits, we have also caused ourselves many problems.

Begin Video Clip Interview**Mr. Rifkin:**

What's happening in a wide sweep of our science technology is substitution. We're attempting to play God as we never have before—create our own Eden, our own paradise, to become the architects of creation.

From artificial intelligence in computer technology to genetic splicing of the human species, there is a new push, if you will, toward becoming the architects of life itself.

End Video Clip Interview**Mr. Hulme:**

Our problems seem to arise when we forfeit our access to the Creator's wisdom in these matters. This is especially true whenever we become arrogant about our power over nature.

Begin Video Clip Interview**Mr. Cousins:**

The most important thing is to keep it from becoming a toy. The moment we discover that something can be done, then we want to do it. Nations have atomic bombs. So long as there is such a thing as the atomic bomb that can be made, they want to make it. But there are those who feel that if it's going to be made, you've got to use it. They can't stand to have that power lying around unused.

End Video Clip Interview**Mr. Hulme:**

So perhaps the time *has* come to reevaluate our reliance on technology—to discover where we're going in the crucial overlap of science and technology, God and morality. The '90s are almost upon us, and we're going to have to devise a more caring and responsible system.

Begin Video Clip Interview**Mr. Rifkin:**

We need to move beyond this and create a whole new philosophy of science and a whole new philosophy of technology. We need a post-modern world view that begins to bring together our long theological tradition with our scientific and technological prowess, because our science and technology now are totally at odds with the spiritual dimensions of Western civilization as we've known it over the centuries.

End Video Clip Interview**Mr. Hulme:**

That spiritual side of Western civilization was based on a strong value system and a commitment to standards, ethics and morality. Yet so many today grow up without such a core of standards. Education by parents and school has failed to provide children with an adequate moral foundation.

Begin Video Clip Interview

Mr. Harris:

Kids grow up with a Ph.D. in physics and in biology or English or something else, and they have a kindergarten education in religion, that they haven't read the great mystics, that they are not grounded in the Bible; they're not grounded in a kind of dialogue that they have in every other part of life.

End Video Clip Interview

Mr. Hulme:

The questions we've raised today about genetic engineering's legacy of difficult choices will have to be answered. Essentially there are two views of the future. One is based on growth without limits, on plundering the planet and reorganizing nature. And the other is concerned with getting into a responsible relationship with nature as it exists.

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Mr. Rifkin:

Well, I think there are two broad approaches to the age of biological resources—one is genetic engineering; and the other is a new ecological vision based on stewardship and the Judeo-Christian concept of caretaking the planet. They're very different visions of the future.

End Video Clip Interview

Mr. Hulme:

I wonder if you've noticed how much biblical tradition and the Judeo-Christian ethic—or value system—has been mentioned today. One of our guests spoke of the need to be our brother's keeper. Another talked about playing God. Are we trying to substitute for God's powers of creation without his wisdom? What about those God-like decisions?

As we've seen, we *are* facing a decade of unprecedented choices and a new way of making responsible decisions has become imperative. The one constant in this period of near moral anarchy is a time-honored system found right here in this ancient book—the Bible. The idea of stewardship appears in its very first few pages. And that's the idea

of caring for the environment. In the story of Adam and Eve, we're told of their relationship with their surroundings. Adam is put into the Garden of Eden and told to *dress and keep it*—that's to say maintain and care for it within its natural limits.

The original Hebrew word translated *keep* includes the idea of preserving and protecting the environment. Adam was told not to exploit, but to nurture and care for the environment. So stewardship is not such a new idea.

And what about a code of ethics? Jesus Christ said the greatest commandments are, first: "You shall love the Lord your God with all your heart"; and second, "You shall love your neighbor as yourself" [Matthew 22:37-39, New King James Version]. If we kept the first one and really loved God, then we'd recognize that his creation is not something to take for granted. We'd also recognize the need to take care of it. If we'd love our neighbor as ourself, then we'd be a lot more careful about our moral and ethical choices. Our decisions would be based on concern for others equal to our concern for ourselves.

Has anyone yet improved on the Ten Commandments—regarded by many as the heart and core of Western civilization? Oh, we freely admit our indebtedness to such principles in some of our legal systems, but how many of us actually practice them? How much would a deep understanding of these laws change the world?

Really loving our neighbor would put a lot of the Ten Commandments into living action. "You shall not steal," for example—imagine a world without locks and bars and white-collar thieves. No more Wall Street scandals. No more bank corruption.

"You shall not lie"—imagine a world where trust is complete. Where a person's word is their bond. Where honesty in business dealings is "par for the course."

Then there's "You shall not covet"—imagine a world free from personal and national greed.

These vital principles all have a part to play in how we deal with life's dilemmas.

Interview with Norman Cousins

Norman Cousins is adjunct professor in the School of Medicine, University of California at Los Angeles. He is the author of 25 books including *The Pathology of Power*, *The Healing Heart* and *Anatomy of an Illness* as well as many essays and editorials.

Mr. Cousins was born in New Jersey and attended Teachers College, Columbia University. He worked as a journalist for several years and then joined the faltering *Saturday Review* in 1940 as executive editor. Over the next 36 years he built it into a widely respected weekly with a circulation of nearly one-half million.

He campaigns tirelessly for such humanitarian causes as world government, disarmament and peace. He also served as unofficial ambassador for President John F. Kennedy in negotiating the nuclear test ban treaty.

In his capacity as adjunct professor he now gives his attention to what he calls "the medical humanities," working to "mobilize the human being's resources—spiritual, physical, biological—in order to get a good [healing] result."

The World Tomorrow: You've said that the big news of the 21st century will be that the world as a whole will be managed, and not just its parts. What did you mean by that?

Norman Cousins: I suspect that we're living at a very primitive time in human history—primitive in the sense that we've tended to separate ourselves from cause and effect. Civilization is built on cause and effect and you advance because you have the verifiable knowledge that something will work or not work.

Well, right now we're denying cause and effect, in terms of the way the world has to work. The world is now totally interrelated. It is as compact a geographic unit as any of the smaller units were in the past. But the requirements that proceed out of a single unit are being ignored.

No one denies that the world has become a single geographic entity in almost a total sense. But the significance of that compression has not been acted upon. The result is that we live in anarchy. We're thrown all the way back to primitive, tribal customs, where we tend to put the needs of the tribe and the philosophy of the tribe ahead of everything that lies outside the tribe.

Well, today there is no outside. And yet, the world is divided into self-worshipping, units. But the fact that it is a single unit, in terms of its basic nature, creates certain needs.

I think that we're in the process now of moving into a new stage in history, in which these needs will not only be recognized but acted upon, and that it will be possible, I think, before too long to recognize that the world is not just one but has to be made whole.

And that will have to do with the need for governance on the world scale, the need to tame the nation, the need to take away the violent toys from nations, the need to recognize that the very existence of separate units produces almost automatically combustible antagonisms.

And so we've got this challenge in front of us to try to propel ourselves into, not just a new century, but into new habits of thought, and into new structures, into an acceptance of old responsibilities, not new responsibilities.

The World Tomorrow: Are you talking about a world government of some kind or a global confederation?

Norman Cousins: Yes. I didn't use the word *government* deliberately because that has specific connotations. We tend to think of the capitol of Washington, D.C., a building where legislators meet, of laws that are passed of a certain kind. That not only may not be desirable in a George Orwellian sense, but it's not what is necessary.

But if you can separate the word *government* from governance, which is to say, to ask: "What is necessary to bring about rules of the game that nations can obey? How do you create machinery to bring

about compliance? What is the due process to make sure that the authority will not be abused?"

In short, what are the aspects of governance that apply to this particular situation, some of the elements of which are really new? Then I think we're closer to what we have to think about.

Of course, some people may say that a government by any world government, by any other name is still world government. Perhaps that is true, but it does represent a need to think in terms of requirements and then put opposite each requirement a proper response.

The World Tomorrow: What body would you see building such a system?

Norman Cousins: I think that what we may want to be able to do is to stitch together authorities in specific areas. For example, there's a clear and present danger to the world's environment, not just to the environment of any one country. The pollution of the seas affects all nations. The death of the rain forests in the Amazon affects all countries.

And so we have to think in terms of what is necessary with respect to each particular problem. What is necessary to protect the seas? What is necessary to protect the world's environment?

Now when you go from area to area, when you go from that to control over world arms, the world arms race—I'm not thinking just about the danger of the proliferation of arms—I'm also thinking about the sale of arms, the traffic in arms, the totality of the arms problem.

You naturally come up, as you do in the former case of the environment, with a concept of adequacy. How do you get at this?

Next, when you think of the problem of the way nations behave outside their borders—well, that action is caused by genuine security requirements or supposed security requirements—you're dealing with a violation of a world ethic. So it's necessary to address ourselves to that. So we bring together all these problems and say, what do they all have in common?

Even as you create areas of, or agencies of adequacy, it becomes necessary to relate them to one another. And it's that relationship I think that will eventually take a comprehensive form of governance.

The World Tomorrow: What do you say to people who would accuse you of being a millennialist or a utopist?

Norman Cousins: I would thank them very cordially and congratulate them on their perceptions. But I would also say that when you have a forest fire raging behind you, and there's a gap in front of you, and you know you have to jump eight feet to the other side, and if someone said to me, "Don't be an idealist, don't try to make it," I would say, I have no idea how far I can jump when I've got a fire behind me. And the confidence that I can make it converts

millennialism or idealism into stark practicality.

The World Tomorrow: Who lit the fire?

Norman Cousins: I suspect that what happened at Hiroshima and Nagasaki constitutes a blaze that's strong enough to get us where we have to go.

The World Tomorrow: Science and technology are often thought of as the engines of progress. Now there are some people who would say that our definition of progress is all wrong, and that's where we should stop.

Norman Cousins: There's a tendency on the part of those who operate the technology to regard it as a god. And the trouble with that approach, it seems to me, is that the science and the technology are really no better than the people who create them. And the over-reliance on technology can be very dangerous.

I see this all the time in medicine where the doctor delegates his function to technology. The patient comes into the office, and the doctor feels that he doesn't want to listen to the patient. That's all extraneous. Get the patient into technology; look at the real news.

But that technology can be skewed, because the impact of the technology on the patient can change the reading or the result on a treadmill machine, for example, or on any one of these scanning tests where the effect on the patient of what is being done produces a profound emotional disturbance which has physiological effects.

And so what you are actually reading is the effect of the technology on the patient, and not the ability of the patients to sustain an experience. If the test is supposed to measure the ability of a human heart to sustain exercise, but if the performance of that heart is affected by the fear of the procedure you're going to get a disastrous reading.

And so you say: "This patient must not be subjected to any exercise. Don't even allow him to brush his own teeth." Well, even a damaged heart needs a certain amount of exercise. So the doctor cannot substitute judgment for the verdict of technology.

The ideal situation, it seems to me, is where the technology will be used to confirm and not to establish. And I suspect that this is true not just in medicine but in other fields as well.

The World Tomorrow: You've said that the world is facing certain serious problems which pertain to the whole. What are some of those problems?

Norman Cousins: First the false definition of security by nations, which is to say they define security in their own terms. Well, you can't have more than one nation defining security in its own terms without creating insecurity for both. And most of all, insecurity for the human species. Their insecurity grows in direct proportion to the size of the stockpiles. So that's the number one danger: the ungoverned use of force in the name of security

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which produces a collective insecurity.

Second, the insistence by nations or parts of nations on using the sky as an open sewer, or the sea as a garbage heap, poisoning the elements on which life depends. This is a form of arrogance and ultimate crime, it seems to me.

Third, the existence of hunger and squalor in the world which cheapens life and disfigures it.

Fourth, economic chaos—the very clear interrelationship of economies, but the lack of acceptance of any rules of the game that can reduce the chaos. All these problems, it seems to me—the questions with respect to security or war; the question with respect to the air we breathe and the water we drink; the question with respect to the conditions of life, squalor and hunger; questions that emerge out of the economic chaos. All these are aspects of life in the 20th and now the 21st century which require sensible solutions. But you can't have sensible solutions unless you have sensible structures, or sensible agencies to deal with that. Nor can you have separate agencies function except out of an integrated whole.

But I am reasonably optimistic. I don't think I know enough to say that something can't be done. And I have to believe that what is necessary is also possible.

The World Tomorrow: Is it the case that the Industrial Revolution set us out on the wrong path, that's produced the kinds of problems we now face? Is there something wrong with our science and technology as perceived from that point on?

Norman Cousins: No, I don't think so. I think that it's the use of technology, the use of science, the philosophy that governs both, that represents the problem. We may wish that the nuclear genie could be put back in the bottle again. That would certainly make one part of the problem a little simpler. But it doesn't really address itself to the fact of how progress comes about or the fact that progress represents problems. Atomic energy could represent vast liberation for the human species as can other aspects of scientific progress.

So I think the place to put our emphasis is on how we think about things, how we govern ourselves—a concept of collective responsibility, and also the need to make the planet itself safe and fit for human habitation. I don't think we can get along without a managed planet.

The World Tomorrow: Let's turn to biotech. Some people are saying this is a marvelous new step forward for man; others are saying this is a Frankenstein we should control. You've talked about needing to consider the whole. How does biotech—genetic engineering—fit into that concept of responsibly considering the whole?

Norman Cousins: The question is: Whether the magic or the evil of biotech has come upon us before we're ready to operate it. Whether the context in which it has emerged presents problems—as

indeed it does. But the problem of control of biotech is no different from any of the problems that we've considered whether with respect to atomic energy or the state of the nation or the state of the individual. And again, I don't think we can put that genie back in the bottle, either. I think that if we can put half the energy that we use in debating the question into an attempt to devise responsible methods of control, the time will not be wasted.

The World Tomorrow: Are science and religion antithetical?

Norman Cousins: No. Whether they realize it or not, they tend to flow into each other. Science begins where religion leaves off, which is to say religion can begin where science leaves off.

In the first case, science may provide answers to accessible questions, but then you get the infinity that lies beyond that. And religion becomes operative at that point. Or religion goes so far and then science takes over. You do have this mixture.

The World Tomorrow: Is it possible then that science and religion could contribute together to the wholeness that you suggest we need?

Norman Cousins: Yes.

The World Tomorrow: How does morality and ethics fit into this?

Norman Cousins: Morality, I suspect, is demonstrated practicality. We become moral about those things we're pretty sure won't work. And the fact that they won't work's been demonstrated often enough to create patterns of thought which we like to call morality. And it's not to be resisted necessarily, nor should it frighten us.

The World Tomorrow: What about some of the ethical issues presented to us by modern medicine? The use of fetal tissue, genetic engineering. How do we get some resolution on some of these things in the public arena?

Norman Cousins: The most important thing is to keep it from becoming a toy. The moment we discover that something can be done, then we want to do it. Nations have atomic bombs. So long as there is such a thing as the atomic bomb that can be made, they want to make it. But also there are those who feel that if it's going to be made, you've got to use it. They can't stand to have that power lying around unused. And I think the same thing happens in these other areas. The fact that you can save a life by developing information is an enormous step forward. But when that becomes routine it brooks the danger of becoming a toy, and that's to be resisted.

Interview with T. George Harris

T. George Harris is editor-in-chief and chairman of the magazines *Psychology Today* and *American Health*. As well as writing articles and editorials for these magazines, Mr. Harris also contributes to magazines and newsletters such as *Newsweek*, *Marketing Communications*, *Gentlemen's Quarterly* and *Success*.

Mr. Harris also holds a number of advisory and consultative positions. He is president of the American Health Fitness Institute, editor-in-chief of the *American Health Fitness Bulletin*, on the board of directors for the American Health Institute and is on the Medical Advisory Committee for the YMCA of the United States.

Among the many awards presented to Mr. Harris he has received the Science and Art Health Award from the Institute for the Advancement of Health and has been named the Healthy American Fitness Leader by the United States Jaycees.

Born in Kentucky, Mr. Harris attended the University of Kentucky before going on to further studies at Yale and Oxford.

The World Tomorrow: Some authors are promoting the idea of stewardship today. From your perspective as editor of *Psychology Today*, what is your view?

T. George Harris: The notion that the earth is a living organism is to me much more convincing than any way of looking at it I've seen. It makes sense out of my farm, makes sense out of the fact that the great pollutants or the sewage systems interrupt the natural cycle, and put everything in water so that the anaerobic bacteria keep right on being sealed in water and unable to move out into the air. The normal purifying processes of the forest get lost in that. And so we really interrupt the things that should happen.

Only by understanding that—and here's where science becomes absolutely critical—it allows us to

be deeper in our understanding of nature, and thus less destructive to it. And that's happening in many forms.

The realization that lime and fertilizer on my farm have destroyed the microorganisms that allow it to generate itself—the regenerative agriculture idea—is really promising. And if we need to do some tinkering with some of the organisms to help that happen faster, that's a risk we have to take.

God was here before we were. Nature built, in centuries of evolution—however you want to describe that evolution, whether you use the word or not—there was something that preceded us—even the biblical account allows that—and that we were blessed with an extraordinary environment.

And therefore, we have to see ourselves as not necessarily the managers of that environment, but at

least its recipients, and that's part of the blessing for which we are responsible and must be responsive, rather than simply treating ourselves as the automatic boss of all other organisms.

The World Tomorrow: Some have said that science is morally bankrupt. What relevance does that view have?

T. George Harris: When you look at the sort of crisis of belief today, there's a lot of talk about it being a religious crisis, of referring back to the death-of-God arguments from Nietzsche and three young theologians, whom I used to spend time with about 15 years ago.

As far as I can see it, that's not what's really happening, that crisis happened earlier, there was almost a dying away of religious concerns. There was the rise of trust in science, of man's own tools as the new salvation.

But it's the belief in science as the answer to everything that is now in radical disarray, that the failure of faith today is a failure of faith in scientific materialism. Because among other things, it turns out that the big tools cut both ways.

The first inkling was the nuclear capacity to wipe out life itself—in other words, to wipe out death—totally different sense from simply dying. If you wipe out all the traces, including the bacteria, that's kind of final.

I spent a good part of the early '50s with a number of people who were in that nuclear field. I went to Los Alamos. I spent time trying to understand what that really meant, because I couldn't see how we were going to live the next 20 years.

I'm still astonished that nobody hit a button. It seems to me one of the most providential things that's ever come along, that giant powers with the button under fingers, did not make a mistake or in some kind of political trap wipe each other out. You know, that's enough to believe in providence.

And I spent a lot of time in those years trying to see what that literally meant. It still baffles me, but it is less urgent to us because it has, you know, that kind of ends the argument. The things that really push us today are things like ozone and the prospect of a kind of a smoldering agony here, and all of the other signs of the environment being in jeopardy. Those have become really urgent issues.

The World Tomorrow: Are we reaping the effects of a mechanistic model that is no longer working for us?

T. George Harris: I think so. And I think the way we see it most is in ourselves that the mechanistic model that's most being rejected is the mechanistic model of you and me, of the person, that the really exciting things that are happening are of the new spiritual searches, the new ways in which people are recognizing that sort of the idea of mechanical or pneumatic man, to T. S. Eliot's line, just doesn't fit, that we are not like that, that we're aware that there is something more going on.

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And the most fundamental change, I think, is in our redefinition of ourselves, that we've kind of concentrated over the last few years on trying to do what we now call the new American dream, understanding what people's expectations are. And the shift in those expectations are really fascinating because they are no longer what kind of car you're going to drive, or how you're going to show off. We've been through that.

And the abundance of goods has made the goods cheaper and less central to people's lives. Startling, that affluence breeds its own end in a very interesting kind of way as an obsession.

And our polls show that people now work less for survival or for goods, and much more for the excitement of the job, the growth, the opportunity to do things that count. It's sort of money plus. They assume good pay now, and they expect the other things in their lives.

And the new American dream, then, has to do with what I expect of me. And there's a very strong spiritual dimension in that. We may not have a clear understanding of how to get there, but there is, in the American heart at any rate, that keen feeling that there's something more here than just a computer inside me, and that that must have its play in a way that we haven't expected in a long time.

We've been ready to take the externals as adequate answers to human need. We're no longer ready to do that.

The World Tomorrow: What implications do you think that the whole thrust of technology in the '90s is going to have on the moral sphere?

T. George Harris: It presents us with questions we never before had to answer.

You know, what's happening now is, science is presenting us, indeed pushing on us, questions that are almost godlike, that we never had to answer before. The obvious ones are control of nuclear weapons. Instead of being able to irresponsibly throw it all on total war, a roll of the dice, and let it work out itself, we can't do that anymore. We have to live with each other, no matter how cursed we find our fellow nations.

The same kind of thing is happening to us as a result of the environment—that if somebody in this country can create the ozone effect, or we do it to everyone else, or we wipe out the forests that leave us all deprived, we can't live on this living cell of a universe. So that we're confronted with the necessity to be our brothers' keepers in ways that were never there before. And we're beginning to understand some of the problems of it.

On the individual level, we're confronted with even tougher choices. You and I know about retarded kids. I have a mongoloid daughter. If amniocentesis had been available at the time when she was born—came in just afterward—I don't know what my choice would've been, had I known she was going to be a mongoloid. She has taught me more than I could possibly have gotten out of an

other normal child. And yet, I don't know what I would choose today if I knew that.

I know that's an extraordinary choice to have to make. Look at how many more, though, if we do the gene plotting that we're now doing. We'll be able to know well in advance what diseases a future child might be susceptible to and what not.

The result is, we'll be having to make choices, one way or another. The decision not to choose is itself a choice. So that the anti-abortion decision is itself a way of making a decision. It seems less painful, but it's there.

So it seems to me that what we're being confronted with in every way are choices that we've not had to make before, that we left to God or providence or whatever your language was.

In a much more interesting way, we have now redefined what it means to be ourselves. And those are terrifying times. The last big one was during the Reformation, when Luther helped us redefine our relationship with God.

Today it's clear that we no longer see the human being—us—the self—as simply a sort of given organism with a lot of instincts, and stimulated by things. We see ourselves as co-creators of the self. We know that the kind of life we live will literally shape our minds. We know the moods we live in

will be the template of our intellectual life, in a way that we didn't know before.

The World Tomorrow: Values and norms have changed radically since the early 1960s. How and why have these perceptions changed?

T. George Harris: Much of that has been a part of understanding that new problem in a way that we were not looking at through scientific materialism. And we're now trying to grasp a way to do that.

Interestingly enough, the epidemic of depression in the baby boomer generation, the kids of the baby boomer, who are now up to 40, have ten times as much depression as their parents did. Why?

The work we've done on it at the University of Pennsylvania makes it very clear—that it is our rising expectations of ourselves that push us to try to be better people, or to be better professionals, or more effective at what we do, maybe better in health sense, beyond our limits, or beyond what we can now accomplish.

That creates a learned helplessness that's reactive depression, so that the very worst symptoms of a spiritual loss—depression among people—are themselves a mark of our rising expectations of what we would be. So that what we're confronted with is an extraordinary time in history.

Interview with Jeremy Rifkin

Jeremy Rifkin is president of the Foundation on Economic Trends in Washington, D.C. He is also an author, activist and philosopher who has been called "America's social conscience" as we enter the age of high technology and genetic engineering.

In 1986, the *National Journal*, a leading public policy journal in the nation, selected Mr. Rifkin as one of 150 people in the United States that have the most influence in shaping federal government policy. Mr. Rifkin has testified before numerous Congressional committees, and was selected by President Carter's Commission on the Agenda for the 1980's as one of two social scientists to provide expert testimony on future options for the U.S. economy.

Mr. Rifkin's unique perspective and social commentary has been featured on numerous television programs in the United States including: *Face the Nation*, *The Today Show*, *Good Morning America*, *The Phil Donahue Show*, *Nightline*, *The MacNeil/Lehrer Newshour* and William Buckley's *Firing Line*.

Mr. Rifkin's critically acclaimed books, including *Entropy*, *Algeny*, *Time Wars*, *Who Should Play God?* and *The Emerging Order*, cover topics ranging from politics to philosophy and science. They have been translated into 12 languages and are used in hundreds of college courses.

Mr. Rifkin has become one of the most popular speakers in America, lecturing at over 300 colleges and universities in the past decade.

The World Tomorrow: Why do you say we're at the end of the age of fire?

Jeremy Rifkin: Well, essentially we have been burning, soldering, forging, melting and heating the inner crust of the planet for several thousands of years, and we've been turning it into all sorts of interesting utilities—like glass, cement, cinnabar, synthetics. We've literally refashioned the planet using fire against inner material.

So we have been living in a fire technology civilization, or pyrotechnology civilization—that's a term coined by a late friend of mine, Theodore

Wertime, who was a historian of energy material in civilization at the Smithsonian. So we've been living in a pyrotechnology civilization. We are making a fundamental transition now out of pyrotechnologies into biological technologies.

The Industrial Age is the infrastructure built from fossil fuels in fire technology. Now that we've exhausted our reserve of fossil fuels—oil and natural gas, and to a lesser extent, coal—we're being forced to move out of a nonrenewable resource base into renewable or biological resources.

So we're moving out of industrial technologies

into biological technologies, just as we're moving out of fossil fuels into genetic resources. That's a very big shift in the way we organize the environment in our economic activity.

This whole idea of the age of growth is more than a misnomer, it's an illusion. We don't grow anything.

For example, most of the molecules on your face will be replaced in seven or eight months from now with a whole new set of molecules. Your entire body and mine will be by and large replaced physically in seven or eight years from now. The actual physical being—our organs, our tissue—is constantly being replaced.

Everything about our civilization is borrowed. Our physical being, the accoutrements of civilization are all borrowed. They start off in nature as resources. We borrow them to make them part of ourselves or the tools of civilization. And then eventually everything we borrow goes back to nature.

So we don't grow anything; we borrow. The Bible says quite cogently, from dust to dust. Essentially, all of civilization is borrowing from the creation, from the environment. We use it temporarily and then it goes back to the environment.

It's important to make a distinction between borrowing and growing. You know, in the modern world we like to talk about growth, but we never like to use the word *borrow* because there's a lot of ethics in the word *borrow*. When you borrow, you have to pay back.

So built into the word is relationship, mutual responsibility and indebtedness to the planet, to the creation. In the word *grow*, there's no ethics. It's an amoral term.

Now if I could wave a magic wand, and in every textbook, every secular textbook in the world, we eliminate the word *growth*, and we put in the word *borrow*, that would change our whole way of thinking about our responsibility to each other and the planet that we live in. It would literally resurrect the idea that we are truly stewards of a creation.

And this earth is not just matter for manipulation that we're constantly rechanging in order to grow and create our own Eden. Instead, we're constantly borrowing from the creation, and therefore we have a stewardship responsibility to continue to pay back and work with nature rather than against it.

So I think borrowing, the age of borrowing, is what we ought to be moving into. The age of growth was an illusion all along.

The World Tomorrow: What choices do we have?

Jeremy Rifkin: Well, I think there are two broad approaches to the age of biological resources—one is genetic engineering; and the other is a new ecological vision based on stewardship and the Judeo-Christian concept of caretaking the planet. They're very different visions of the future.

Let's concentrate on gene splicing. Scientists are learning how to map and program the genes of life. As you know, genes are the building blocks for life.

And right now, over the past decade, scientists are learning how to map genes, program genes, turn on and off genes, and actually splice genes between unrelated species. Scientists are learning how to become the architects of the genetic code of life itself.

Now this technology poses fundamental environmental, ethical, moral and social issues beyond any technology revolution in history. For example, who among us is wise enough to determine how humans, plants and animals should be redesigned? Should the president of the United States be given the ultimate authority over redesigning the genetic code of life? Should the Congress of the United States have ultimate authority over the design, the blueprint, of living creatures? Or the scientific community—should we entrust them with this responsibility? Or the corporations in the marketplace?

I've been asking this question for at least 11-12 years, and I find that by and large people are unwilling to give this responsibility, this ultimate authority, over life to any institution. Because somehow, in our rational mind and in our soul, in our hearts, we know there's something fundamentally wrong, from an ethical point of view, in allowing any set of individuals or institutions to have control over the blueprints of life itself.

So when we talk genetic engineering we obviously have to acknowledge that there are some tremendous short-term benefits—new plants and animals to feed a hungry world; new forms of living energy that can substitute for oil and natural gas when the spigot runs dry in the next century; new ways to arrest crippling diseases.

But every technology comes with a price. Are these short-term benefits worth it if it means a civilization in the 21st century in which life itself is reduced to an engineering proposition?

Remember, genetic engineering means engineering genetics—taking engineering principles that we used during the long stages of fire or pyrotechnology against inanimate materials, and now taking those engineering principles and applying them directly to the genetic code of plants, animals and humans.

Engineering principles—quality control, being able to predict outcomes with certainty, reducing all phenomena to quantifiable mathematical standards of analysis, utilitarianism and efficiency. Those are all engineering principles that we've applied to inanimate materials.

But do we have a right to apply engineering principles to the genetic code of microbes, plants, animals and humans?

From my point of view, the ethical questions here are profound and disturbing, and that this might be one technology that we ought to say no to because in the end we could see ourselves in a brave new world where life is reduced to the status of an engineered product, where our children's generation, and their children, grow up in a world thinking of life as no different than inanimate materials.

That's a dangerous precedent, and I think it goes against the grain of our role as a steward of this planet.

We were placed here to be caretakers. We weren't placed here to create our own Eden, to basically take it upon ourselves to play God. And genetic engineering in its full sweep is the final hubris, an attempt by the human race to become God and to create our own second vision of what the world should be like. I think that's fraught with tremendous ethical problems.

The World Tomorrow: In the earlier part of this century, there was a concept known as eugenics. In biotechnology, are we seeing this now in a rarified form?

Jeremy Rifkin: Yes, absolutely. Eugenics is the philosophy of using genetic manipulation to improve an organism, or a species, or a race.

Modern *eugenics* was coined by Francis Galton, who was Charles Darwin's cousin. It has a long history, though, going back to Plato and the Greek republic. When we think of eugenics today, we normally think of Nazi Germany. Most Americans would be surprised, however, to know that we had a very virulent eugenics movement in this country at the turn of the century all the way to the Depression. And so—in fact, much of the German experience was built upon the American eugenics movements, which is not well known.

Now am I saying we're going to have a new eugenics movement? Absolutely. Am I saying that it bears any resemblance to what happened in Nazi Germany? No—a very remote possibility.

You see, the German experience was social eugenics and they attempted to use genetic manipulation to eliminate those who they felt were biologically inferior.

The Hitlerian eugenics movement was a social eugenics movement to create the Aryan perfect race that would rule the world for a millennium. Actually, their regime didn't last more than 15 years.

The new eugenics movement is quite different. The scientific community is not, they're not evil. The corporations aren't evil. They want to make a dollar, and some profit. The scientists aren't evil. They want to try and make a better, healthier world for us. Policy makers aren't trying to force us into a Hitlerian scenario; they simply want to do their best to ensure a better economy.

The new eugenics is commercial eugenics. No one's talking about the master race; we are talking about being able to design perfectly healthy babies, and develop perfectly efficient plants and animals, so that the new eugenics is commercial, not social eugenics. It's very mundane. It's very banal. It's not even exciting.

But in the end, it creates a same kind of frightening brave new world civilization that a Hitlerian movement might have conceived of. Even though there's no evil intent in this form of eugenics, in the end the final goal is to bring all of life, and human

life, under the principles of engineering so that we are reduced literally to matter for manipulation.

And of course, the goal is to improve our lives, but in the end our lives become more profane, and we lose the sacredness of life, as it's reduced to utilitarianism and efficiency and expediency.

And so I do think that we are on the cusp of a new eugenics movement. Let me give you an example from, from an area—genetic screening.

The first human genetic engineering experiment is going to happen this year [1989]. The national institutes of health are about to approve the first experiment, which will literally change the genetic instructions of a human being.

So this is not science fiction; this is happening this year. And it creates tremendous ethical questions for civilization.

In addition, the Congress of the United States is appropriating money to map the entire human genome, to map every single gene in the whole human race. It's a \$3 billion, 15-year program. As we map the genes and then sequence them, we will then be able to locate specific genetic markers for specific genetic traits and diseases.

We've already located over 100 gene traits. For example, there's a diagnostic test now that can tell you if you have Huntington's chorea, if you're going to get it.

Well, in the 1990s, increasingly the scientific community will be able to give you a genetic readout of your genetic instructions or mine.

This raises very big eugenics questions. Should your employer know if you have an Alzheimer gene? They might not want to invest 10 years on you in a corporate track if they know you're going to get Alzheimer at 40.

Should a chemical company know if you have a genetic predisposition for cancer in a chemical work environment? You might not get the job, because they don't want a lawsuit if you come down with cancer.

You see, it's going to be more expedient to start changing, it's going to be more expedient to match the individual genetic types of the workers to the environment than it is to change the environment and clean it up so that it's safe for all the workers.

So in this decade, we're going to face the possibility of a whole new form of eugenics and discrimination not based on race or skin color, ethnicity, or even religion, but a new form of discrimination based on a person's genetic readout—where people will be given diagnostic tests to determine their genetic predispositions, and match their genetic makeup to the work place, or to the school track, etc.

The primary civil liberties issue of the genetic engineering age in the 1990s will be the right of genetic privacy, the right of each citizen to control their own genetic information—in other words, have that information made available only to themselves.

So the right of genetic privacy, on one hand, versus the desire of the institutions of society to

have knowledge of one's genetic readout for specific tasks. Companies for jobs. School system will want to know your child's genetic readout, in terms of tracking that student into curriculum. Insurance companies will want genetic readout in order to provide policies for insurance. The police department and government might want a person's individual genetic readout, in order to ascertain predispositions for certain social behaviors.

That's rather dubious that the genetic readout can do that, but what I'm saying here is that the right of genetic privacy versus mandatory genetic screening by the institutions of society will be the primary civil liberties issue of this coming decade. And it raises some very important eugenics questions.

What happens when a civilization begins to discriminate and begins to define a person's status by their genetic readout, by their genetic testing? It's a very dangerous phenomena. And yet, that is the road that we're traveling on if we move into a genetically engineered civilization.

The World Tomorrow: You write in your book *Algeny*, "The new world we're entering is alien to the vision of all the great theologians, philosophers and metaphysicians of the past." Why do you say that?

Jeremy Rifkin: Well, I think that we're moving into a world that is increasingly desacralized, a world in which all of life is reduced to utility, expediency, quantifiability, a world in which the sacredness of life and the creation becomes increasingly irrelevant. We actually substitute life with simulation.

And you know, the great prophetic voices in history, and the great voices in Judeo-Christian theology and the other great religions of the world, have spoken to this hubris over the eons of time.

What's happening here is we're trying to, we are trying to substitute for God. We're trying to become gods. We're trying to use our science and technology and our prowess to literally fashion the world in our own image.

And I think when civilization reaches that point, it's time to stop and begin to reflect about the real meaning of life, and go back and listen to the prophetic voices in Judeo-Christian theology, go back and look at what they have been saying about what our mission here is on this planet.

I believe we are caretakers. We are stewards. You know, in the book of Genesis, God says you shall have dominion. You know, for a while we defined dominion inappropriately as subdue nature, harness it, use it; idle hands are the devil's workshop.

I think now, however, a new generation of theologians in the Christian community and the Jewish community are saying the original idea of dominion is caretaking. We're stewards of the earth. This is our responsibility to be a custodian.

When we manipulate the planet, when we rearrange it to suit our own short-term narcissistic needs, when we pollute it, when we destroy it, we're

not acting as stewards. Then we are acting in rebellion to our covenant vision.

I think what's required here is a reassessment of modern science and technology. You know, modern science and technology has provided tremendous short-term material benefits for all of us. But the same scientific and technological world view we grew up on has also given us the greenhouse crisis which now threatens the survival of the planet.

And the same vision of science and technology has resulted in species extinction on a mass scale. We're now losing a species to extinction every 30 minutes. In the next 11 years, we could lose up to 15 to 20 percent of all the species on this planet, for the first time in history.

The same science and technology that we've used in the modern world has resulted in depletion of our soil base, acid rain, the poisoning of our air and water and the undermining of the planet that we have to live in.

So in a sense, if we are to judge the modern world view of science and technology, in the short run it was seductive; we did benefit—but now in the long run, we're paying the bill for our shortsightedness.

Our science is based on Francis Bacon's dictum of power over nature. Bacon said we could detach ourselves from nature, and as neutral observers we could make nature do what we want it to do. Francis Bacon said knowledge is power. The more power we amass over nature, and the more control we exercise over the environment, the more secure we'll be, and the more progress we'll make.

And now we have a new generation of intellectuals. And the theologians are saying let's redefine the basis of science. Science should be based not on power over nature, but empathy with the environment. We are custodians. We are caretakers. So we should develop a philosophy of science based on working with nature rather than against it.

Our traditional science is based on divide, dissect, reduce, isolate and exploit. Now we need a new science, a post-modern science, based on connect, relate, integrate and join, so that we develop a partnership.

The planet is an organism. It functions as an organism. And we have to realize that we have a responsibility to take care of that organism.

So I think what's called for is a renaissance, a new way of thinking about science.

Can one be in favor of science and still be critical of the modern philosophy of science that we used exclusively? Yes. In fact, the new science of integration, connection, partnership, relationship, is much more sophisticated than the old science of divide, dissect, reduce and isolate. It's easier to splice a gene than it is to understand all the relationships in one pond of water.

So what we need to do is develop a science that's compatible with stewardship, a science that's compatible with resacralizing our relationship to the planet, that is based on principles that are compatible with Judeo-Christian theology, so that we don't

live in two schizophrenic kingdoms: our belief system, our theology, on one hand, and on the other, our science and technology.

Now those belief systems are at odds. To bring them together, we need a science and technology that's compatible with custodianship and stewardship and resacralizing our relationship to life.

The World Tomorrow: You speak of desacralization. Could you explain that for us?

Jeremy Rifkin: I think it's not too hard to understand. Life is sacred. Life is precious. This is the only place we know of in the universe where life is being nourished. Yet, we're so cavalier about it. We treat it with abandon.

Fifteen percent of our species, the human species, goes to bed hungry every night because we don't take care of our brothers and sisters. We are destroying all the other species on the planet we live in, because of our own selfish, short-term needs and whims and caprices. That certainly doesn't pay. That certainly goes against the principle of honoring the sacredness of life.

I believe we have a responsibility as caretakers to our own species and the rest of the planet. We have a responsibility to take care of, and to nurture, and to respect the rest of the creation, all the animals and plants. We live in one planet together.

And I would say the modern world has shown a total disregard for the sacredness of life at every level—and especially our modern world view, our *Weltanschauung*, our paradigm, if you will. Our modern science and technology has narrowly circumscribed to power, utility, control and expediency.

And you know, if you have a world view based on expediency, and a world view based on short-term exploitation, if you have a world view based on dividing and dissecting and exploiting, we'll end up with a world that's divided and dissected and despoiled, and that's expedient, and in which we're alienated.

The World Tomorrow: With respect to science, what view do you feel we need to adopt?

Jeremy Rifkin: We need a new, more sophisticated post-modern approach to progress. We need to define progress and science and technology and economic initiatives in terms of how well a new innovation enhances our well being, stewards our resources, protects future generations, and resacralizes our relationship to the earth. Then we would have a definition of progress that would be compatible with Judeo-Christian theology, and the best of

what we are as a spiritual being.

The old idea of progress is more output in less time is pure materialism; it's purely a secular version. If we define our whole civilization in material terms and secular terms, then we shouldn't wonder why we've lost the spiritual soul of our being.

So we need a definition of progress that brings into consideration the larger spiritual considerations of what it means to be a human being. And I think we need to develop a philosophy of technology based on sustaining our resources in the long run, rather than exploiting our resources in the short run.

So we need a philosophy of science based on empathy rather than subjugation and control; a philosophy of technology based on sustainability rather than short-term expedience. And we need an economic philosophy based on equity for all humans, and for fair treatment for the rest of the creation.

If this doesn't sound particularly unique—and I notice you're smiling—this is the kind of philosophy that is inherent to Judeo-Christian theology, to what the great prophetic visionaries have said throughout history. We need now to integrate this into our personal lives.

The World Tomorrow: So you would say that so far as technology is concerned today, we've abandoned the entire spiritual element that needs to go hand in hand with this.

Jeremy Rifkin: Yes. I mean in the old days, before the modern era, tools were an expression of not only of material needs but of spiritual fulfillment as well.

In the modern era, the spiritual component of our tools was eliminated. Now our technologies are purely secular. They're designed with the idea of material output, expediency, profit and utility in mind.

What happens in a world where that, where that's the only way we use tools? That's a world that's devoid of any kind of larger purpose for us as human beings. We're not just the tool maker. We're not just here to develop more material goodies. We're here, you know, for other purposes as well.

The highest purpose of civilization should be to turn out a generation of caring human beings.

Does that mean we shouldn't be productive? No, we've got to be productive, but it shouldn't be the exclusive value. If we're caring human beings first, then underneath that we can be productive, because we have to enjoy the good life, and we have to fulfill our material creature comforts. But when the material creature comforts become everything, then we lose sight of what it means to be a human being.

Interview with Nicholas Wade

Nicholas Wade is an editorial writer with the *New York Times*. He writes on issues of defense, space, science, medicine, technology, environment and public policy. Mr. Wade joined the *Times* editorial board in February 1982.

Previously, Mr. Wade served as Washington correspondent and deputy editor of *Nature* magazine in London, and a member of the news staff of *Science* magazine in Washington.

A prolific writer, Mr. Wade is the author of several books including *The Ultimate Experiment*, *The Nobel Duel* and *A World Beyond Healing*. He also co-authored a book with William Broad, *Betrayers of the Truth*.

Mr. Wade was born in Aylesbury, England, and educated at Eton. He received a bachelor of arts degree in the natural sciences from King's College, Cambridge, in 1964. He and his wife have two children.

The World Tomorrow: You co-authored a book with William Broad titled *Betrayers of the Truth*. What are the basic tenets of that book?

Nicholas Wade: I think the most important one is that the checking mechanisms of science—the internal quality control procedures—are not nearly as good as everyone had assumed. The cases of scientific fraud that have come to light have in all the cases we looked at sailed right through the quality control system. They've been caught by other means: by personal means, because someone in the same lab was envious or suspicious, or whatever of the guy who was forging the paper.

The World Tomorrow: Are you saying that people in science are deliberately forging material?

Nicholas Wade: Yes, that is the case. I should say it's quite rare that someone forges the whole experiment because there's a lot of work to make up daily from scratch. That kind of thing happens only rather rarely. What is much more common is that people shade the data a little, or fail to report some data that they should, because it doesn't fit with the theory they're trying to prove.

We were just very surprised by them [the instances of scientific forgery]. It is, after all, very surprising that someone who has spent six or seven years in the arduous apprenticeship to be a researcher, and learn the truth about nature, should find himself or herself in a position where he's actually falsifying the truth.

The World Tomorrow: Does all of this suggest that scientific method then is limited in some fundamental and basic way?

Nicholas Wade: Yes, I think it does. Or rather it means in parallel with the scientific method. There's something else that goes on in science. And this something else, in fact, is not so different to what goes on in every other walk of life. And the people accept a scientific claim, not on its own merit, but also by its coloration, by who the author is, what university it comes from. If you come from Harvard, if you've got lots of eminent scientists with their names on your paper, people are going to believe you far more than if you're some nobody from some unknown university.

And I think that's very important, because it un-

derlies a well-known historical fact in science that often very radical new ideas are rejected by the scientific establishment they're aimed at.

The World Tomorrow: Why does this happen?

Nicholas Wade: Scientists are trained to understand the truth about nature, but they also have a career just like everyone else—a very competitive career. And, for the most part, the career pressures and the desire to understand the truth, are two forces that confirm and corroborate each other. But every so often there's a disjunction and certain scientists will shade the truth, forget their purpose in life, become more fixated on grants, and prizes and awards, of which there are many in science. And, to do that, they will depart from the strict canons of accurate reporting and inquiring.

The World Tomorrow: The concept of scientific theory seems to be muddled as well. When does a "theory" become fact? For example, evolution seems to be widely regarded in certain textbooks as fact, even though it is officially a theory. Isn't that a contradiction in terms?

Nicholas Wade: It is true that evolution is a theory, and I think many scientists do not understand the role of theory in science. Theory is a very important, deep word in science—quite different from how we use it in every day language. And a theory is a deep set of ideas that explains scientific laws, and the scientific laws are what explain the facts ascertained by experiment. So, there is so much built on the scientific theory that it is, in a way, corroborated by all the facts that it explains. So we can have a very high degree of faith that the theory is an accurate description of nature. Yet, having said all that, every scientific theory is liable to be overthrown and replaced by a better theory. So, in my view, a scientist should always stop short of saying a theory is absolutely true, however how strongly he may believe that, because he must recognize the possibility for change.

The World Tomorrow: We hear a lot today about the growth of biotechnology. It poses serious moral and ethical problems for us in the area of gene mapping. For example, you can suddenly discover that your offspring-to-be, because of your par-

ticular genetic structure, may have Alzheimer's disease at the age of forty-three. After learning that you may choose not to have such a child. Where do you see biotechnology taking us in a moral-ethical sense?

Nicholas Wade: Well, I think it's certainly going to present a lot of the problems of the kind you mentioned. Extremely difficult problems. I don't think that means we should cut off biotechnology and say these problems are so hard, we can't handle them. I think we probably should be glad of the opportunity it gives us to combat disease at least and maybe to increase people's parental choices. I think you just have to hope that we'll muddle through it, and be wise enough as a society to make these choices correctly.

The World Tomorrow: Earlier you spoke about the apparent lack of morality within the scientific endeavor. With that in mind, why should one be hopeful that there'll be a certain improvement in the biotechnical sphere?

Nicholas Wade: I think that the scientific community does, or if it doesn't, should reflect the morality of a society at large. And also, I think scientists too would say that it's not their responsibility alone to decide these problems—these moral problems. After all, they're no better equipped than the rest of us, and they have no right to make these decisions for the rest of us. It is society who will decide in the end, but with the advice of the scientists.

The World Tomorrow: Within biotech, you have an enormous amount of wealth being put into a new industry. With wealth pursuing these kind of technologies, will this force the kind of moral dilemma that you are saying has already occurred in science?

Nicholas Wade: The problem, in my view, has come at a different point, which is with the universities. We've gone through a period where university scientists tend to eschew any involvement in money making, to one in which they're all involved. Every

biologist who's worth anything, has some kind of consultancy or business relationship. And that seems to be a pity, because for the very reason you mention, society is going to need a lot of advice about these moral problems. And where will we look, but to universities, hoping to receive disinterested advice from biologists? But there are no disinterested biologists now. All of them have a commercial interest in seeing biotechnology proceed in one way or another.

The World Tomorrow: Who do you think is going to be able to construct an adequate code of ethics and morality for science as it advances?

Nicholas Wade: Well, that's a very difficult question. I suppose the quick answer to it is scientists themselves. After all, we like most of our professional groups to be autonomous and independent and self-regulating. So I think we look to scientists to provide their own morality. And by and large I think they serve us quite well in that respect.

The World Tomorrow: A lot of what we've talked about sounds very negative when it comes to scientific endeavor. What are the positive aspects you see about science and scientific advancement in our world?

Nicholas Wade: Science and technology are the engines of progress. And that is how we escape the Malthusian dilemma, because advances in technology enable us to use resources more efficiently, and thus to raise our standard of living. I think that is the major reason why we look to science for progress.

The World Tomorrow: The meaning of life—is that something we can one day shake up in a test tube and we'll have the answer to? Or, are those areas that science has difficulty with?

Nicholas Wade: Yes. It has great difficulty with them. And the origin of life is one of the major unsolved scientific problems. But at the same time, I can't see anything that says it is insoluble.

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