Reformed Church of America

Contents Listing

1977 Energy Prospectus

The bitterly cold weather conditions that have gripped the Midwestern and eastern sections of our nation this winter have served to dramatize once again the energy crisis that we are facing. The pains and fears emitted from this most recent crisis seem to be echoed in louder tones. This, no doubt, is because the shortages of energy fuels are touching the industrial production and heating needs of the nation, which effect our "body-life" responses and not simply our convenience and luxury needs as the fuel crisis of a few years ago, which saw lines of cars at service stations and threats of gasoline rationing.

Again, the question is raised, "Is the fuel shortage real, or is it the result of holdback by the fuel industry with a design to raise the prices of the product?" For some, I suppose, the question will never be satisfactorily answered. But the fact is, that all the agencies (both within the industry and outside of it) that would have the knowledge to answer this question are reporting that the energy fuel shortage is real. Their reporting indicates that the known fuel reserves for the fossil fuels of natural gas and oil will begin to come to an end between thirty and forty years from now.

At least three factors are relevant to this judgment. The first is the projected fuel consumption rate over the next number of years. This is conditioned by several factors including weather variations over the years which may require greater or lesser fuel consumption needs, — increases in industrial production and thus greater demands for fuel supplies,— and, the amount of conscientiousness with which the public in general put conservation methods into practice to reduce wasted fuel levels. All the graphs show that
the projected demands into the next century well be far greater than the supplies available.

The second factor is the rate of available known fuel reserves. How long these will last is, of course, dependent to a large degree upon the above mentioned factor. The graphs indicate here, that at the present rate of consumption the supply and demand line will run generally parallel with a gradually widening difference for about ten to fifteen years. At that point the known reserves take a dramatic plunge for the next fifteen to twenty years.

The third factor is the unknown fossil fuel reserves that might be available. This is dependent upon industrial research and development that is engaged whereby discovery of new fuel sources can be found. But, where these discoveries might be made, and how much will be available, is still a matter of assumption and speculation. How much of this research and development of new reserves may well depend upon such incentives provided to the industry in terms of price regulation, national energy policy and encouragement by society in general.

What, then, will be the answer to the energy crisis? To try and give an answer, I suppose, would be to play the part of a prophet in the midst of a situation so complex, even those professionally involved in the field do not know the answers.

A few things we do know, and some directions we might be able to recommend.

We do know, for instance, that there are vast amounts of coal reserves which are available only for the mining. To be sure, the use of this energy fuel will require some very extensive conversions in some instances, but the fact remains, coal is available. To get it is the present problem.

We also know that the availability of uranium for production as a nuclear fuel is limited.

These two fuel sources seem to offer the greatest potential for the widest possible usage, at least with the application of present technology. But there are also a number of other alternate forms of energy which are being explored. For example, there is synthetic gas (syngas) which is produced from coal and could produce the equivalent of 500,000 barrels of oil a day by 1985. There is shale from which could be produced as much as 500,000 barrels of oil per day by 1985. There is synthetic crude oil, which appears
only to be a very long range and rather scarcely feasible possibility.

Geothermal energy, or the use of natural bent and steam reserves in the crust of the earth, is a very limited source of energy as well as very geographically restricted But it is an alternate where it would be available. The same would be true for the use of solar energy, although this form may not have quite the geographical limitations as the former. It is certainly a more feasible and more applicable source, but total effectiveness is still conditioned by the amount of sunlight available, and is dependent upon a backup system of some kind. Its application, however, is already in use in a variety of ways in many places, and more extensive development is to be encouraged if future solar and renewable sources of energy needs are to be met.

Other suggestions have been hydrogen conversion for an energy fuel because of its unlimited availability and cleanliness. Tar sands as a source of oil salvation is another. And municipal trash and wind are still others.

The basic problems with research and development of any of these alternate forms of energy fuels are cost of production, massive dimensions of the production operation,— limited applications in relationship to cost and other factors, —and not the least vocal problem, the environment.

Perhaps it is time we need to take a good look at the hard facts that our fuel sources are rapidly diminishing, and therefore something must be done if there are to be sufficient, if any, energy supplies fifty years from now. This may obviously involve some re-evaluation of our priorities with regard to the environment and ecology. Although with careful planning and implementation of energy research and production programs to find new means of energy sources, even this environmental consideration need not necessarily be upset.

Perhaps two concerted efforts need to be made. First, an aggressive program needs to be engaged by the whole energy industry to discover more efficient methods of conservative use of our present fuel supplies in addition to research and development of alternate fuel sources.
The second is aggressive energy conservation efforts by the public. There needs to be the exercise of responsibility on the part of people with an eye toward taking whatever measures are necessary to reduce the amount of energy consumed. This should be especially true for Christians who should be aware of the need for responsible living in all areas of life. We are our brothers' keeper and this becomes very pertinent to the exercise of energy conservation.

Christian citizens must be aware that the Gross National Product (GNP), which is the accepted measure of national economic health, is directly related to the availability and use of energy. Therefore, we must discontinue emphasis on the growth of the Gross National Product, because of the depletion of the earth's resources.

THEREFORE, the Christian Action Commission RECOMMENDS that General Synod:
R 15. Urge the constituency of the Reformed Church in America to exercise responsible stewardship with regard to the use of energy in the light of the crisis that exists, by putting conservation methods into practice in whatever ways possible; (ADOPTED)

R 16. Urge churches to make buildings which are vacant during mid-week days available for use by other community organizations and programs as needed, thus reducing the volume of heated space that is available but unused and that the need for new buildings and the type of construction thereof by carefully examined in the light of present and future use and energy costs and availability; (ADOPTED)
R 17. Urge the constituency of the Reformed Church in America to encourage governmental representatives to enact federal and state policies which are structured to encourage industries and the general public to utilize auxiliary sources, such as solar energy, and that governmental representatives be encouraged to provide tax incentives and financial resources to accomplish these purposes; (ADOPTED)
R 18. Encourage its constituency to support the establishment or enforcement of legislative prohibitions against the generation of excessive profits for those who control the sources of energy. (ADOPTED)

1980 Report of the Christian Action Commission (Energy)

Introduction

Each of the topics with which the Christian Action Commission deals in the following statements should be of concern to us as Christians. It is important at the outset to recognize that all of these varied topics are indeed interrelated.

We must begin by acknowledging, in the midst of these critical topics, that the God of history is rendering judgment upon us. The message of that judgment is to call into question the ways in which we organize our relationships with one another. We live in a world of inequity. This results in the domination of some people by others. Whether we talk about our obligation to include the handicapped in full church participation or about the most stewardly use of energy resources or about the rights of the Palestinian refugees, we are remit of the evil which is inherent in our world.

We must acknowledge first that we are experiencing God's judgment on us; second, that God's judgment is fully deserved because of the uncritical way that we have lived in our world of inequity; third, that we must carefully and prayerfully study ways in which our religious, social, economic, and political structures have maintained and increased that inequity; and fourth, that we must take steps through all of our agencies and assemblies to combat that inequity in all of its forms. In this spirit, the Christian Action Commission calls upon the General Synod to consider the following recommendations.

THE ENERGY CRISIS AND RESPONSIBLE CHRISTIAN STEWARDSHIP

Many Americans are not convinced that there is an energy crisis. A recent Gallup Poll indicated that 77 percent believe that the oil companies are responsible for the latest energy shortages and subsequent price increases. Have the oil companies deliberately cut production to create a shortage? There are conflicting reports on the cause of our present energy shortages. There are not easy answers, but there are a number of things that can be said with certainty.

The energy sources that we have depended on are being depleted. As the demand for energy increases, we cannot be assured of an adequate supply. Alternate sources of energy will need to be utilized as we make the transition from petroleum to other energy sources. This raises the question of which alternative sources are appropriate. Solar energy, nuclear fission, and coal are the most obvious alternative forms of energy. But both nuclear fission and coal have severe social and environmental implications, and solar energy, even though it may be a long range solution, does not solve the immediate need for an alternative energy source.

The earth's energy resources are limited. If we do not responsibly manage God's creation, we will deny both present and future generations their rightful heritage. Every person depends on energy to survive. Many of the problems that we are now faced with can be attributed to the way we have misused the limited resources of

energy that God has given us. We may be forced to reduce our consumption not only because of increased cost, but the flow of oil from the Middle East may be interrupted: In the long run OPEC may be doing us a favor. Petroleum is an exhaustible resource. We need to decrease our dependence on oil and develop new technologies…

The cost of energy will continue to increase. In November of 1978 imported oil was $13.50 per barrel. The cost in January 1980 was $29.20. This is an increase of over 100 percent in 13 months. In the past we have been blessed with cheap energy costs. The availability of inexpensive energy has made us careless. As Americans, we are the world's leading energy consumer. We consume 33 percent of the world's energy with less than 6 percent of the world's population. Estimates are also that we waste 50 percent of the energy we use. If we continue to increase our consumption of energy, we will have to be willing to pay the increased cost.

The use of energy can contribute to injustices in our society. Energy and its distribution relate directly to the welfare of society. We must be concerned that energy resources are equitably distributed. Since we are serious about our commitment to social justice, we must be willing to give a faithful response to the challenge of the energy crisis. The church and individual Christians must become involved in shaping a just society.

We must change our individual and corporate lifestyles. The most significant things that we can do is to begin to conserve energy through more efficient use. We must reduce our energy consumption. We must admit to ourselves and to each other that there is a finite supply of energy resources. We must be willing to conserve these resources and insure equitable distribution to meet the needs of all persons. We must be willing to face the challenge of responsible Christian stewardship.

R 1.
a. To urge each congregation of the RCA to engage in reflection and dialogue on the energy problem and all its implications, and further,

b. To urge the GPC to develop and/or avail itself of existing resources to assist congregations in responsible energy stewardship and appropriate Christian lifestyles consistent with the mission of the church, and farther,

c. To urge each congregation of the RCA during the next three years to have an energy audit and assess its schedule of programs to initiate energy saving measures, and further,

d. (To urge the executives for Church Planning and Development to coordinate all energy conservation related programs both denominationally and interdenominationally, and further,)

The advisory committee presented the following substitute for R 1d:

To urge the executive for church planning and development to coordinate energy conservation related programs, especially in regard to construction and remodeling, and request that the Church Building Fund and Extension Foundation loan guidelines be amended to include requiring energy efficiency standards, and further,

e. To urge congregations to establish energy education programs so that Reformed Church members can (more) responsibly impact public policy. (ADOPTED AS AMENDED)

1982 CARE FOR THE EARTH: THEOLOGY AND PRACTICE

Part I: The Land: God's Gift for our Care

A central theme of the Old Testament is God's promised gift of land. Through the experience of the people of Israel with the land, we are taught much about the promise and the peril of humanity's relationship to God's

creation. Land is the domain of the Lord, entrusted to the people not because of their power but because of God's faithfulness to them.

Most of the kings of Israel tried to accumulate land by grasping and controlling it. The human temptation is to cling to land, trying to manage it, rule over it, and own it. The prophets warned against the seductive potential of land and of the human tendency to treat land as one's own domain, rather than as a gift from the Lord to be cherished and held only with the humility of a steward.

These two conflicting attitudes toward the land are revealed in the story of Ahab and Naboth (I Kings 21). King Ahab proposes that he buy Naboth's vineyard. But Naboth
finds it unthinkable to sell the land of his inheritance—that is, the land given to him by the Lord through his ancestors. At Queen Jezebel's promoting, Naboth is killed; Ahab then confiscates the vineyard he has wanted. The prophet Elijah comes to Ahab, asking in the name of the Lord: "Have you killed the man, and taken possession of the land as well?" Then Elijah pronounces the Lord's judgment on Ahab.

The prophet Micah also spoke against the sin of trying to possess part of God's creation
for one's own power and aggrandizement. "Shame on those who lie in bed planning evil and wicked deeds and rise at daybreak to do them, knowing they have the power. They covet land and take it by force." (Micah 2:1 2)

God's gift of land to the people of Israel was conditional. It depended upon their living in a way that acknowledged the land to be the Lord's land and themselves to be the Lord's people. Because they chose instead to grasp and possess the land as if it were their own, they lost it. That is the judgment announced by the prophet Jeremiah.

The story of Israel's relationship to the land tells us about our own relationship to the creation. We, too, are called to treat the land as God's gift rather than as our possession. In our own time, however, we are seeing the story of Naboth's vineyard being repeated across the landscape of modern North American agriculture.

As North American Christians, what can we do to become better stewards of the land for which we share responsibility? How can we best witness to the biblical conviction that "the earth is the Lord's and not our own"'?

One major concern is that we are losing our inheritance, the farmlands of the United States and Canada. According to the federal government's National Agricultural Lands Study completed in early 1981, the United States is losing agricultural land at the rate of three million acres per year. Also, according to the Christian Farmers' Federation of Ontario, that province (which encompasses more than half of Canada's best food land) lost more than three million acres of agricultural land between 1961 and 1976.

Farmlands across North America are being converted into housing developments and shopping centers, and are being used in other non agricultural ways. At the same time, more and more food must be produced from our acreage in order to meet domestic and international needs. As farmland is sold and used for non food purposes, the food needs of affluent North Americans increasingly are being met by our importing food from poorer countries in the world and food raised in those countries as crops for export frequently means less food raised for the hungry within their own borders.

We are not only losing land as a resource for food: we are also losing our relationship to the land as its caretakers and stewards. Increasingly land is becoming a mere commodity to be bought and sold, rather than a treasure to be cared for and used justly to meet the needs of all God's beloved children. In the United States, small farms are disappearing at the rate of over two thousand a month. Many small and moderate sized farms are being bought out and consolidated into larger and larger farms. Farmland is being bought up, not only by large scale farmers, but also by banks, insurance companies, and other investors. Already, over half of United States farmland and fully one quarter of Ontario, Canada, farmland is actually farmed by non owners. As larger, well established farmers and non-farming investors compete for the limited amount of land available, land prices rise and prospective farmers

are priced out of the market.

The consolidation of land ownership into fewer hands, and increasingly into the hands of the wealthy, is alarming as it moves our society even further away from the values of economic democracy. The care of the earth as a gift given by God is far better entrusted to those who live close to the land and depend on it, than to impersonal economic forces which regard land primarily as a financial investment and a source of profit.

In response to this growing complex of land related problems, what can Christians do? First, the Church can affirm and support those people of faith whose first commitment is to use the land according to God's purposes rather than according to the principle of maximum economic profit. In particular, this concern arises when individual members of our congregations are confronted with choices about the land which they themselves farm or which they own. Secondly, all Reformed Church people can learn about and give their civic support to local, state/ provincial, and federal programs which preserve and protect agricultural land and family farms. Thirdly, as part of our Christian stewardship, we can
oppose those tax, credit, and commodity policies of our government which fuel the drives to bigness and to absentee ownership in farming.

R 2a.
To affirm the vocation of farming, commend farming as a career choice and as a way of life for our young men and women, and encourage those within our denomination who are already farming to be steadfast in their calling and aware of its great potential as a way of Christian service in a hungry world. (ADOPTED)

R 2b.
To urge Reformed Church members (who hold or inherit title to farmland) to be mindful of their responsibilities as stewards of God's earth, and to be aware of the importance of enabling and maintaining family farming. (ADOPTED AS AMENDED)*

R 2c.
To call on Reformed Church members to support the adoption and implementation of measures designed to preserve agricultural land. (ADOPTED)

Such programs typically involve financial (usually tax) incentives in exchange for a pledge to keep the land in agricultural use. Present measures include: agricultural districts, zoning for agricultural use, and differential tax assessments.

R 3.
To call on Reformed Church members to support state/provincial and federal legislation which would remove existing government program and tax incentives to non-farm investment in farmland and to the consolidation of farmland into larger units. (ADOPTED)

Fundamental to the task of preserving the land is the need to help those who want to become small scale farmers and ranchers. By assisting those with limited financial means to begin as small, family farmers, we can resist the current trends toward the separation of owning the land from working the land and toward the amassing of more and more land in the hands of the very wealthy. Such assistance is offered in the United States by loan programs for beginning farmers now available in a half dozen states. Federal legislation in the United States has been proposed to offer loan guarantees to states offering such programs. The legislation is known as the Beginning Farmer Assistance Act (H.R. 2977).

R 4.
To encourage adoption of state/provincial and federal legislation which would effectively assist beginning farmers and ranchers. (ADOPTED)

Our inheritance of good growing land is not only threatened by economic forces of buying and selling, but also by changes in the soil itself. Erosion by wind and water is increasing. Topsoil is being lost far more rapidly than it can be renewed by nature. Use of synthetic fertilizers also increases the rate of soil deterioration and erosion.

….

Such changes in the earth itself are a problem, not only for us, but for our children's children. Such heavy and almost irrevocable damage raises fundamental questions about modern agricultural methods. We need to use and to research further farming methods which honor the very soil of creation.

> R 5
> To encourage Reformed Church farmers to use agricultural methods which care for and preserve the earth entrusted to them, and to support both private and government programs of research into soil-conserving agricultural techniques. (ADOPTED)

Under our biblical calling to keep and preserve God's creation, we in the church should initiate and support efforts to improve the ways our society uses the land.

Part II: Redeeming the Creation

The first three chapters of Genesis tell us a great deal about the relationships between God and the creation, between God and humanity, and also between humanity and the rest of creation. In the story of Eve and Adam's eating the forbidden fruit, we learn that the human rejection of God's way affects more than our own personal relationships to the Lord. That original sin disrupted not only humanity's relationship to God, but also humanity's relationship to God's creation. "Cursed is the ground because of you," the
Lord God said to Adam, "...thorns and thistles it shall bring forth to you." (Genesis
3:17b 18a).

In the New Testament we learn that Christ not only restores and reconciles our relationship to God, Christ also restores our right relationship to the creation of which we are a part. In the first chapter of Colossians, for example, we read: "Through Christ, God chose to be reconciled to the whole universe, making peace through the shedding of Christ's blood upon the cross to reconcile all things, whether on earth or in heaven, through Christ alone" (1:20). And in the letter to the Romans, again Paul writes: "For the created universe waits with eager expectation for God's children to be revealed. It was made the victim of frustration. . .yet always there was hope, because the universe itself is to be freed from the shackles of mortality and enter upon the liberty and splendour of the children of God" (8:19 22).

Our new life in Christ consists of a restored relationship to both God and creation. As people in the Body of Christ, we and all of creation move toward the fulfillment and wholeness intended for everything through Christ. We are not delivered from this world; nor are we simply assured of a greater spiritual reality lying beyond this world. Rather, the bodily resurrection of Christ means that the power of sin and death is defeated, and the new creation is breaking forth in this world.

Our new lift in Christ has its roots—and bears its first fruits here—within our own broken and mortal lives. Likewise, newness in Christ for all the rest of creation begins here, within its mortal brokenness. Daily we experience brokenness within the created order. We can seldom drink safely from the streams of this continent; the air around us has been fouled by the fumes from a nearby industrial plant, by invisible wastes of our own automobiles, by the stench of a giant feed lot containment for cattle outside town. As a people who are being made new, we have a particular interest in the renewing of God's creation in efforts, for example, to restore the quality of the air and to protect supplies of water and their purity.

We in the Reformed Church in America should have a special concern for one of the current issues of air quality, since there is already conflict between our two constituent nations over the issue of “acid rain.” This is a form of air pollution which crosses the U.S. Canadian border. Thousands of lakes in the eastern Unwed States and Canada are becoming acidified, especially from the emissions of existing coal fired power plants.
Present law in the U.S. is lax concerning standards of emissions from these plants. Without a change, the devastation of acid rain will increase during the coming years.

Many regions of North America are experiencing dangerously high levels of pollutants called “fine particles,” which are especially hazardous because they can be drawn into people’s lower lungs. Controls on these pollutants in the U.S. have not been set by the federal government.

Hundreds of toxic chemicals arc regularly found in the atmosphere of major urban centers. Although scientists are beginning to agree that a large percentage of cancer cases
are related to such toxic chemicals in the environment, only four such carcenogenic air pollutants are now regulated and controlled in the United States.

Diesel cars, trucks, and buses are becoming ever more common on our highways; exhausts from diesel engines emit thirty to seventy times more particulate matter than conventional gasoline engines. We can also expect much more use of coal as a response to American energy needs in the coming years. This raises serious questions about air quality in the future.

Despite the new forms of very hazardous air pollution that are not covered by existing laws, there has been an improvement in air quality in the United States over the past decade. Because of automobile emission controls, carbon monoxide levels have dropped by a third; suspended particulate emissions are down for the present; and sulfur dioxide
in the air we breathe has lessened by two thirds. These improvements are due primarily to the Clean Air Act of 1970.

This legislation is scheduled for renewal by the Congress in 1982; congressional action to fund enforcement provisions will be required and amendments to the Clean Air Act may be offered in any legislative session. We need to strengthen and expand legislative measures that conserve air quality.

R 6a.
To oppose any weakening of the Clean Air Act, and to urge that provisions of that act be expanded to control the human causes of acid rain and to place limits on fine particulates and toxic chemicals in our atmosphere. (ADOPTED AS AMENDED)*
R 6b.
To encourage Reformed Church members, mindful of their part in renewing Gads creation, to be active in local efforts to improve air quality and to express this commitment through the exercise of both their state/ provincial governments and their citizenships. (ADOPTED).

Pure water— thirst quenching and life-giving— was a metaphor Jesus used to point to
himself as Living Water. We can no longer, however, take for granted either the quality or the quantity of the everyday water available to us. More than 700 industrial chemicals,
heavy metals, pesticides, and other pollutants have been found in our modern surface supplies of water. These pollutants are usually not detected, much less removed, since the task of most water treatment plants is limited to disinfection. Of the several thousand largest cities in the United States, only half can now meet the federal standards for basic sewage treatment.

R 7.

To encourage Reformed Church members to be involved locally in the protection and enhancement of the quality of water used in their communities, working to assure that government standards for safe water be upheld. (ADOPTED)

About half of us rely on surface water (that is, water from reservoirs and water recycled through treatment plants). The other half of us use groundwater (water from wells which tap immense underground acquifers). Such groundwater has normally been considered protected from impurities. Recently, however, groundwater in various areas has been, found contaminated by toxic industrial solvents as the result of improper disposal of chemical wastes. When groundwater is contaminated, wells—private or public—must be closed. It is essential, therefore, to emphasize the protection of groundwater.

R 8.
To urge the Environmental Protection Agency to be active, in cooperation with the states, to prevent further contamination of groundwater resources. (ADOPTED)

Not only the quality of water, but also the quantity of God's created water is endangered. We are using water resources faster than they can be renewed and replenished by nature. While more than half of the water consumed in the United States is used in irrigation, the amount of water taken for personal and household use has risen dramatically. Before water was piped into homes, each city used only two or three gallons of water per dweller. Now in New York City, for example, almost two hundred gallons per person are used per person are used every day. In city and suburb alike, we waste water wantonly. Water conservation can and should start in the individual household.

R 9.
To urge Reformed Church members to begin taking practical steps to conserve their individual and household use of water. (ADOPTED)

Not to be overlooked is the extreme danger posed by nuclear waste. The principal concerns are the mill tailings that are the result of the uranium mining process and the dozen or so deadly radioactive elements that are the waste product of reactors. Mill tailings (a ton of crushed debris for every four pounds of uranium fuel) give off low level radiation. Once thought to be harmless, the radiation is now known to be both toxic and long lived (thousands of years of half life).

More deadly than the tailings, however, are the 30 to 40 tons of spent fuel produced by each reactor every year. Plutonium is one such waste product. It can burst into flame spontaneously. Ingested, a millionth of a gram will cause lung cancer in humans. It retains its toxicity for 250,000 years. Reactor wastes are stored "temporarily" in concrete lined pools at nuclear plant sites. We can expect such pools to begin leaking into our groundwater long before the radioactivity hazard subsides.

In sum, there is simply no acceptable means at present to provide long range, safe containment of these dangerous nuclear waste elements. It is imperative that we take action on this crucial matter.

R 10.
To urge our governmental officials and agencies to treat nuclear waste disposal as an urgent and critical concern, and to curtail the production of nuclear waste until satisfactory disposal methods are developed. (ADOPTED)

Finally, we note that the Interior Department of the United States government is charged with overseeing 550 million acres of public land. This is land which is owned and administered by the federal government on behalf of all the people and for our common welfare. It is held in trust by the government which is to function as the

caretaker and preserver of the nation's renounces.

The present administration and its Interior Department have urged widespread extraction of resources on these lands and elsewhere in situations where serious environmental problems are present. Previous environmental protection policies concerning the regulation of strip mining, exploration for minerals in wilderness areas, and the leasing of off shore oil and natural gas have been overturned. Policies favoring rapid resource exploration with little regard for environmental consequences seem to have free reign.

We confess that "the earth is the Lord's and the fulness thereof" and that we are called to act as wise caretakers of creation arid its resources because we are accountable to God.

R 11a.
To express disapproval of the environmental policies of the Reagan administration, specifically its emphasis on resource exploitation rather than enforcement of environmental protection legislation. (DEFEATED)

R-11b.
To urge the Reagan administration and congress to develop a national policy which will insure the wise conservation of natural resources and the vigilant protection of the earth's resources. (ADOPTED)

Part III: In Conclusion: Shalom

Humanity was created by God to live in "shalom" (the Hebrew word for harmony/peace/wholeness/justice) with each other and all creation. While this relationship was broken by the Fall, it is being restored in Christ, who reigns over and is reconciling all creation.

The Church's care for the earth and its concern over environmental peril needs to be global. The vision of shalom is one in which all the resources of creation are shored harmoniously among all people. So while we certainly ought to be concerned about the deterioration of land, air, and water within our own immediate societies, our task of caring for the earth calls us far beyond these boundaries.

The life sustaining resources of creation are in peril throughout the globe. The massive consumption of our own affluent societies is severely straining the resources of the earth. Because there are finite limits to these resources, over consumption by one group inevitably means the deprivation of other people. A pattern of reckless and unjust resource consumption lies at the heart of our environmental peril.

We can begin caring for the earth, then, only from a posture of repentance. The restoraton of God's shalom for all of creation requires changes in our attitudes, in our values, and in our lives. If Christ's work of redemption extends not only to us, but to all creation, then both we and the Christian fellowships to which we belong should begin to demonstrate redeemed relationships to the earth's resources, and a commitment that they be shared justly with all people.

1988 Report of the Commission on Christian Action (Genetic Engineering)

The Commission on Christian Action met on October 19 and 20, 1987, at Hope College, Holland, Michigan, and on February 20 and 21, 1988, at Princeton Theological Seminary, Princeton, New Jersey.

GENETIC ENGINEERING

The Commission on Christian Action presented a provisional study of moral questions raised by genetic engineering to the General Synod in 1986 (MGS 1986, pp. 58 69). The General Synod directed. that the General Program Council convene gatherings of medical professionals, theologians, teachers, pastors, and others to reflect on the

proposed document. The General Synod also instructed that the study be distributed to congregations for their response. Five symposia were held in the spring of 1987. Results of these consultations were forwarded to the commission. Several pastors, congregations, and individuals contributed responses as well. Mindful of comment, the commission revised the study and herewith presents a final draft for the General Synod's consideration.

Genetic Engineering: Theological and Ethical Perspectives

Advances in the biological sciences have given humans the possibility to intervene in the basic building blocks of life. What is loosely called genetic engineering is a possibility now become a reality. Scientists have opened new windows on the created order, offering the human glimpses of the genetic make-up up of living creatures. The expanding knowledge offered by science has made for technological possibilities that have in turn encouraged industry to explore uses of the new science. In recent years the patenting of life in organisms used to clean oil spills, the exploration of agricultural uses to protect crops from frost, and medical science's investigation into new ways to cure human illness have expanded human control over the environment.

The new world brought on by the sciences offers great opportunity accompanied by potential danger. The church celebrates God's good creation as theoretical science helps humans understand the character and processes of the living world. As followers of the Lord who "heals all our diseases," Christians look with hope to new means of alleviating human suffering. We celebrate God's gift to humanity in the form of human genius: those who lead us to a deeper knowledge of the wonder of the created order and those who can forge new breakthroughs in cures for ailments that have been recalcitrant to all previous therapies.

Yet this great opportunity is also a moment of crisis: it is a time for decision. One needs only to think of the onset of atomic energy, which has given humanity a promise wrapped in a new found ability to cause unimaginable destruction. The very genius with which God has blessed the human community can be perverted to evil ends. Thus the church approaches this new world of genetic engineering not only with celebration, but with caution and question. The church does well to remind us that we, as Christians, are deeply aware of the pervasiveness and the depth of human sinfulness. The cross stands as stark witness to the human willingness to destroy even God's own son through our pride, our sloth, and our ignorance of our life in God's love. Will human sin so pervert the possibilities genetic engineering affords that the dream of healing will become a nightmare of death?

The new world of genetic engineering……

commission to Adam and Eve to "fill the world and subdue it: and to have dominion over
the fish of the sea and over the birds of the air and over every living thing that moves upon the earth" (Gen. 1:28).

Before the church can begin to examine some of the multitude of ethical questions that surround this brave new world, the church needs to explore the reality of genetic engineering.
What is the least we must mow about genetic engineering?

I. The Very Lead We Need to Know about Genetic Engineering

Cells are the basic units of life. All living things are made up of cells, from the bacteria and protozoa which are single-celled, to humans and trees which are composed of trillions of cells. Each cell is itself made up of chemical substances called molecules. Some molecules, like water or simple sugars, are rather small, composed of only a few atoms. But cells are also noteworthy for containing several kinds of very large molecules called *macromolecules,* which include proteins, starches, and DNA.

DNA is called an *informational macromolecule* because the arrangement of the molecule contains specific information used by cells. In the English language, letters are placed in linear arrays to convey information. Take, for instance, the sentence:

THIS IS A MESSAGE.

Both order and position of the letters in this message are important. If single letters are changed or a few letters deleted, the consequences are significant. For instance:

THIS IS A MESSAGE.
can become
THIS IS A MESS.

Likewise, DNA is a linear molecule. There are four different subunits which make up DNA, and like the letters of English, the order and position of these letters contain information. Stretches of these subunits, like a sentence, contain a particular message that tells a cell to make a specific molecule and how to make it. Such a stretch of DNA, specifying a single molecule, is called a *gene.*

Since DNA is linear, the molecule can be represented as a line:_____

For the purposes of this study, this is all that needs be known of the structure of DNA. It is, of course, far more complex. DNA is like a very long, thin line. The DNA in an adult human would fit in a teaspoon, but if stretched out it would reach to the moon.

In human cells, and in the cells of most plants and animals, DNA is wrapped in little packages called *chromosomes*. Since there is so much DNA in a cell, these chromosomes make handling of the molecule by the cell an easier task. The “molecule line” gets wound into chromosomes.

In bacteria, DNA is often only a single molecule, usually with the ends connected to form a circle.

Sometimes, in addition to the main circle, bacteria contain extra, smaller circles of DNA. These circles are actually the DNA in little viruses that live in the bacteria. They are called plasmids.

If bacteria containing plasmids are mixed with bacteria lacking plasmids, soon all the bacteria will be infected with plasmids. Scientists can even mix purified plasmids with bacteria to get infections. Bacteria “catch” plasmids much as humans catch colds.

DNA is not the only molecule we need to know about to understand genetic engineering. The other molecules are called *enzymes.* There are many different enzymes, each with a specific job. Each kind of enzyme speeds up one of the very large number of chemical reactions occurring in cells. The reactions ordinarily go at such slow rates as to be useless to cells, but the presence of the right enzyme will make a reaction proceed at a significant rate. For all practical purposes, the enzymes act as switches to turn the reaction on.

Since enzymes are so specific, biologists can isolate a particular enzyme and use it to run a particular reaction in the laboratory. One group of these enzymes, the *restriction endonuclei,* directs the breaking up of DNA into smaller segments.

There are many of these restriction enzymes. Each one breaks DNA at a different place in the sequence of the subunits of “letters” of DNA information. Thus an accomplished molecular biologist can choose restriction enzymes to break DNA wherever he or she desires.

Restriction enzymes will break DNA of plants and animals, of bacteria, or even plasmids.

Another act of enzymes is also available to molecular biologists. These enzymes hook broken fragments back together.

In the DNA of each human cell are thousands of different genes. Molecular biologists can break open a sample of human cells and separate the DNA from the test of the molecules in the cell. Then, by judicious use of restriction enzymes and a bit of trial and error, these biologists can cut a particular gene out from all the DNA and isolate it. An isolated plasmid can then be broken, and the open plasmid circle can be joined to the isolated gene. This is the act of gene splicing.

The newly formed DNA molecule, containing DNA from two different sources, is called recombinant DNA because it results from recombining pieces of different DNA molecules.

Since the recombinant DNA still has all its old plasmid characters, the bacteria can be infected with these recombinant molecules.

Every time the bacterium divides, the recombinant plasmid will double too. By growing large numbers of such infected bacteria, genetic engineers can also grow many copies of the isolated gene. Under optimum conditions, bacteria will divide every 30 minutes. If one starts with one recombinant plasmid, doubling every 30 minutes will produce 1,024 copies in five hours. In 24 hours there will be 280 trillion copies.

The genes introduced into other cells not only are copies, but may function as well. Most genes direct the production of specific proteins, such as enzymes or hormones. The enzymes in turn direct most of the chemical reactions within cells. Some recombinant DNA genes direct the synthesis of their specific protein even in their bacterial host cell.
Thus bacteria can be designed which will produce a protein otherwise difficult to obtain. For example, the hormone insulin has been manufactured by bacteria containing the human insulin gene.

But what if we could transfer a functioning human insulin gene, not to bacteria, but into a diabetic human? Molecular biologists have succeeded is forming recombinant DNA….

Because recombinant DNA technology bypasses the usual means for transferring genes in humans and allows direct transfer from one cell type to another, the potential for this kind of “genetic therapy” is now being explored actively.

II. Theological Perspectives

Genetic engineering involves the human is the very stuff of life, placing us squarely in the midst of the mysteries of God’s citation. Christians worship the God who, out of overflowing love, caused the universe to be. God delighted in the creation: “And God saw everything that he had made, and behold, it was good” (Gen. 1:31).1n fact, God rested on the completion of creation. Creation was given a life of its own, that its creatures, its climate, its geography, the cells and stoma could enter the processes of birth and death, of growth and decay, of new creatures coming to be and of other creatures becoming part of the past.

One of the founders of the reformed tradition, John Calvin, saw the creation as the theater of God’s work in which, were it not fur the blindness engendered by human sin, we could see the traces of the living God.

... he has so wonderfully adorned heaven and earth with an unlimited abundance, variety, and beauty of all things as could possibly be, quite like a spacious and splendid house, provided and filled with the most exquisite and at the same time most abundant furnishings. (*Institutes*, I, 14, 20)

In the sciences the human does indeed receive glimpses of God’s theater. As a consequence of God’s redemptive work, the Spirit leads the human to the awesome knowledge of the workings of God’s creation. Our Song of Hope puts it: “God’s Spirit leads us into Truth—The Truth of Christ’s salvation, into increasing knowledge of all existence. He rejoices in human awareness of God’s creation and gives freedom to those on the frontiers of research” (paragraph 14). As physics has opened the inner world of the atom and nucleus and has made possible

exploration into the further reaches of the stars, so biological sciences now make new probes into the chromosomes and genes that make up the core of life.

And yet this marvelous home has been damaged by human sin. The human is fallen. The human capability to turn coal into electricity has led to the near extinction of lakes and rivers. New knowledge of the workings of the acorn has led not only to nuclear medicine, but to the brink of nuclear war. The conclusion is clear: the wages of sin is indeed death. Yet, the gospel of the love of God proclaims that God wills the restoration of his creation: the entire of creation groans in travail waiting for its redemption (Rom. 8:18 23; cf. Isaiah 11:1-9).

To that end, God has not been absent from the ongoing history of the created order. Many Christians have constricted God's saving activity to his justification and sanctification of sinners, and the story of God's redemption of sinners is certainly central to Scripture. But it is not the full story of God's activity. The prophets give witness to the vision of all creation sharing in the saving activity of God: "The wilderness sad the dry land shall be glad, and desert shall rejoice and blossom…' (Isaiah 33:1).

God's concern for the created world finds its culmination and focus in Jesus Christ. The New Testament links him with the initial creation: ". . . all things were made through him [the Word], and without him not anything was made" (John 1:3). Or, in even stronger terms:

> He is the image of the invisible God, the first born of all creation: for in him all things or principalities or authorities all things were created through him and for him. He is before all things and in him all things hold together (Col. 1:15 20; cf. Heb. 1:2).

God continues to be concerned about creation to the point of God's only begotten becoming incarnate to save all creation.

The human being is a constituent member of the created order. Creation includes the genes, enzymes, plasmids, etc., that fit together in this creation made "just a little lower than the angels:' The human is part of the physical universe. The human is thus finite.

And yet the biblical witness is that the human is more than a collection of physical molecules and processes. Already in creation, the human was given responsibility for the rest of the universe. God gave Adam the task of naming the creatures. It has already been mentioned that God gave the human the task of subduing the earth, a work that assumes human responsibility to the Creator for stewardship of creation. The human is responsible.

The human was, in fact, created in the image and likeness of God: "So God created man in his own image, in the image of God he created him: male and female he created them" (Gen. 1:27). In the very creation, God created the human in relation. This humanity, which found its final and fullest expression in tire person of Jesus of Nazareth, reminds the church that the human was made to live in relation with God and, in turn, in relation with other humans. The human is related.

This study has claimed, then, that the human is fallen, finite, responsible, and related. These four characteristics have several implications.

Because humans are responsible, because they share in the stewardship of creation, the exploration of the genetic structure of life and the use of new techniques provided by new knowledge are matters for which humanity must answer to God. Since, as was noticed in the Incarnation of God's son, the creator of the world maintains a passionate concern for the creation, and since genetic engineering involves humanity in God's creation, Christians are forced to conclude that genetic engineering is of importance to God. Thus the church can encourage and give thanks for the many scientists who have given of themselves for the advancement of knowledge, enabling humans to respond to God in deeper awe and greater reverence for the utter beauty and gift of life.

Believers also see in Jesus, the same Christ in whom creation coheres, the divine work of healing. Thus, it can also be concluded that God is active through the healing work of medical science. Thus, too, the church gives thanks for the countless dedicated women and men who work in research laboratories searching for new cures for human ailments and for those who dispense medical care to the sick. We give thanks for new breakthroughs which have alleviated such diseases as polio and smallpox. We are humbly appreciative of those who investigate suns for capers and those who struggle to find therapies for genetic diseases.

At the same time, the church remains cautious. For the human is also fallen and finite. It is tempting to see medical technology as a new saviour. But the history of human sin reminds believers of how quickly humans respond to false gods who promise to save, only to demand even children as human offerings. Medical technology can drain all our resources in the distant promise of healing this or that genetic defect. It can further promise to provide a "better" human specimen, one devised by human standards of beauty or usefulness. Fallenness calls forth caution.

Finitude reminds the church that the human cannot transcend death's limit. Cure for illness…us that since the human cannot be reduced to a bundle of protoplasm and processes, we need to be wary of assuming that techniques to rearrange genetic material can somehow improve the fragile human creature.

Fallenness also recalls the danger of idolatry. Technology can become an idol if it offers to rebuild creation after the human image. As an idol, it presumes to override God's purposes for creation by claiming that the human can build a better world, altering now the very make-up of life itself. New technology offers unprecedented power.

Power tempts the human to worship. Christians are wary of the promises of fallen gods. This study has already mentioned technology as one candidate for our idolatry. A further candidate is knowledge itself. The church rejoices in new learning as a way of celebrating the creation. Yet knowledge brings with it new problems. What do we humans do with the knowledge that we have gained? Medical technology allows physicians to inform parents of genetics defects of a fetus, but it offers no therapy save abortion. Human knowledge outstrips the human capacity to heal. Science can provide knowledge and ability that can change the genetic structure fur future generations. Should then anything be done about it? Even as the human community presses forward boldly and joyfully in the search for knowledge, the church is left with questions.

Even with these dangers is mind, the human was given the positive command to "have dominion." How can the human exercise this dominion within the context of sin? Since the restoration of creation is part of the redemptive work of Christ, Christians understand their role as stewards under the lordship of Christ. Human dominion is guided by the Lord (dominus) of creation. Believers recall that this Lord disclosed his lordship through servanthood, a servanthood that issued from God's incomprehensible love. Dominion, then, is exercised as humans are opened to the leading of the Spirit of Christ, giving all for love: for love of the suffering human, yes, but also for the love of all creation. This in turn implies humility before nature, respect for the ways of nature, and careful intervention into an earth that is, after all, "the Lord's."

Thus, while the church joins in celebrating the continued search for knowledge, we also join fully in the debate over genetic research and technology. Because humans live in relation to one another and because humanity is corporately responsible to God, all persons—those to be affected by genetic engineering as well as scientists, medical personnel, etc.—should join in open and public discussion of the promises and dangers of genetic engineering. This will mean that discussions of the future cannot be restricted to those corporations with a vested interest, or those scientists with career aspirations on the line, or even the ethicists who might claim sole authority to determine what is proper to science. Since genetic engineering is of concern to the entire society, issues that cluster about this new world need to be debated at those places where public policy is shaped in government, business councils, think tanks, etc. RCA representatives should engage in responsible debate on these matters, keeping fully in mind human responsibility as vice regents of creation, and keeping always before them the goal of human healing.

The cautions are of such crucial nature and the dangers potentially so great, however, that the burden of proof lies not with those who urge a go slow attitude toward such research, but with researchers, institutions, corporations, etc., who propose to continue.

III. Some Cautions and the Questions They Raise

Basic Research and its Regulation

The first area of interest of the nature of basic research and its proper regulation. Basic…
of the knowledge gained. The knowledge gained is itself the primary concern, although there is an underlying confidence among scientists that significant applications of such
knowledge may well be forthcoming. For example, intensive basic research into the mechanism of heredity resulted in the capabilities enjoyed by present day generic engineering. Recombinant DNA technology has presented a central set of methods in basic research beneficial to the related sciences of biology and biochemistry. In genetic engineering itself, scientists continue their research of the detailed structure of individual genes, how genes are arranged in chromosomes, and how the gem function to produce specific characteristics. This basic research raises the following questions:

1. Is safe containment of recombinant organisms assured?

A case in point is the frequent use of the bacterium *E coli,* one of the best known organisms genetically. It is used as the host for much of recombinant DNA. The plasmids of *E. coli* cell receive many of the isolated gates described earlier in this study. Because the natural habitat of *E. coli* is the intestine of warm blooded vertebrates, humans included, concern developed early about the production of such recombinant bacteria. What might happen if bacteria with non-bacterial genes escaped from test tubes and entered the biologists working on them or into other persons working near the laboratory? This concern would be considerably heightened if the recombinants carried toxic germs from some other species of bacteria, or cancer germs from human beings. Since scientists do not fully understand how to regulate gene action, it is unclear what the effect of any gene in large numbers functioning autonomously in the intestines might be.

This concern was so great early in the development of recombinant DNA methods that scientists in the field called for a self-imposed halt to their work. They needed to know the necessary safeguards for such work. As a result, the Asilomar (California) Conference
was held in 1975. Asilomar succeeded in setting in motion the promulgation of guidelines
for recombinant DNA research in most countries involved in the work. The principal issue then and today is the matter of containment. Can investigators be reasonably certain that recombinant strains will not escape and do great harm? The National Institute of Health established elaborate guidelines in the US. Regulatory committees were set up to help determine the kinds of safeguards needed for particular experiments. But the climate of fear was quickly replaced by one of confidence in the ability of scientists to handle most recombinant research with only modest precautions. In fact, the *E. coli* now used is a weakened strain that cannot survive except in laboratory cultures. Consequently, much of the regulatory apparatus was dismantled in 1980, and research has been proceeding at a high rate in universities and commercial laboratories. Thus, the containment issue has been settled.

However, a related issue remains a concern. Scientists still are not certain of the effects that new organisms will have when released into the environment. This question rose seriously in 1983, when frost damage on crops in California resulted when bacteria living on the leaves acted as seed points for the formation of ice crystals. A bacterium was engineered that solved the frost problem. A large scale test on the affected trees was proposed. This first intentional release of recombinant organisms on the environment was halted at the time, but in 1987 the test was attempted in California. Environmental effects remain an open question.

Given the unresolved nature of the environmental question, the church holds that the burden of proof remains with the scientific community to show that the issue of environmental safety has been solved.

2. Who should control basic research?

The issues of containment and environmental contamination axe; only part of a larger set of concerns. The central question of this larger set has to do with the control of scientific research. With the adoption of guidelines and the establishment of regulatory committees, scientists inevitably lose some control of the research process. That occurs when the public becomes directly involved is the controversy over the use of genetic technology. At stake in this controversy is the control of both science itself and an immensely powerful and potentially profitable technology. When control remains largely in the hands of scientists, a problem arises to which this study has already alluded. Scientists may understandably consider their pursuit as being too important and too technical for nonscientists to make informed decisions concerning the future of their research. On the other band, nonscientists may be able to exercise more objectivity than scientists in distinguishing between the kind of research that carries the possibility of inflicting great harm upon the created order and that which allows a more restrictced, and hence safer, investigation.

The church has among its members scientists, ethicists, medical personnel, and persons who are likely to be affected by genetic technology. The church lives by the Word of its one Lord, and that Word demands that decisions is all areas of life, including that of genetic engineering, be placed under the constraint of his love. The church needs to enter fully into the debate. But this matter concerns all persons, not only church members. Thus, as held above, the church deems that the question of control be resolved publicly, through the instrumentalities of government responsive to all sectors of society, a government that, the church prays, also pursues its calling as caring for those citizens entrusted to it by God.

In fact, an elaborate regulatory apparatus already exists. The Food and Drug Administration, the National Institute of Health, the Office of Science and Technology, and the National Science Foundation are all deeply involved in the research and technology surrounding generic engineering. These bodies are not cavalier in their readiness to approve research and production. For example, research that would provide germ-cell therapy is presently proscribed. And yet, even these bodies, driven by different goals, have no coherent policy on genetic engineering.

But control of research is driven by a very different dynamic as well. Industry will proceed on the hope that what is discovered in the laboratory will provide products that will find a market. Today about 60 publicly traded companies are heavily involved in genetic engineering. This raises questions. Should genetic products be made only if they can become profitable? Of course profitability by itself need not disqualify new products. One need think only of the availability of antibiotics. Their low cost presence has alleviated much suffering. However, if genetic engineering is driven by a potential market of those who are able to pay for extremely high-cost therapies, the world society is faced with the possibility of a health technology that will benefit only a few. It is a question of justice. But a deeper moral question asks whether the public good should be determined by those who hold power. Given the Christian faith’s commitment to justice for the disenfranchised, the church thinks not.

Since the implications of genetic engineering are so far reaching, and since the authority is scattered not only among regulatory agencies but also by market forces, the entire matter of control requires a coherent policy. As has been sin, this is a matter for government. In this cast, coherent policy can come only through the legislative process. Since this study has shown Christians as citizens responsible to God and to other humans, the church urges Christians who are scientists, medical personnel, technicians, and businesspersons to participate fully in the development of policy. The church will also make its concerns known ….

Human Genetic Engineering

The second area of interest is that of human genetic engineering. Isolated genes can be introduced into human cells as well as into bacteria. Certain plasmids can be maintained in human cells for extended periods of time. Although a great deal of work needs to be done, it seems possible that human beings may be genetically engineered.

3. Can genetic diseases be cured or only offered symptomatic relief?

There are two general approaches to the problem of human disease. In some cases the cause of the disease is relatively simple, and a cure can be effected by eliminating the cause. For example, antibiotics can cure bacterial infection by killing certain bacteria. In other cases the cause of the disease is more complex or not fully understood. The doctor can manipulate the patient's environment to secure relief of the symptoms. For example, certain kinds of diabetes result from the improper functioning of the pancreas issuing little or no insulin to control levels of blood sugar. Since the cause cannot easily be eliminated, diabetics are sometimes given injections of insulin to relieve the symptoms. This, however, is not a cure.

The many so called genetic diseases are due to the failure of one or more genes to function properly. The effects of gene flaws are inherited, copies of a defective gene passing to succeeding generations. Genetic flaws produce such diseases as sickle cell anemia, Tay-Sachs disease, Down's syndrome (mongolism), thalassemia major (Cooley's anemia), and cystic fibrosis. What shall be treated: the symptoms or the cause? Until recently treatment has been limited to symptoms; the cause involved an aspect of human physiology with which intervention could not be made. Now recombinant DNA technology and other aspects of genetic engineering offer the possibility of both a more sophisticated treatment of symptoms and a beginning ability to intervene with causes themselves. Thus, efforts are being made to change the genetic make up of afflicted persons.

It needs to be kept in mind that "flaw" is an evaluative term. All may agree that something like Down's syndrome is a flaw that is desirable to correct. But there is imperfection in everyone's genetic material. Who, then, shall receive preferential treatment? Only those who can pay? Or again, such things as skin color result from genetic composition. Is "improper" skin color a flaw? Or is predisposition to a certain weight?

In attempting to get at the cause of genetic disease, genetic engineering uses somatic cell and germ cell therapies. Somatic cells make up the greater portion of the human body, including liver, muscle, and skin. Germ cells are the reproductive eggs and sperm that furnish the bridge between one generation and the next. If the genetic make up of somatic cells can be changed, individuals with certain genetic disorders may be said to be cured.

For example, if a diabetic's pancreas can be supplied with functioning insulin genes, the diabetic should no longer require insulin introduced from without. It might be hoped that by introducing altered genes into bone marrow cells, certain blood diseases and immunological problems could be cured.

While experiments with mammals are already under way to accomplish somatic cell therapy, many obstacles remain. The genes must be introduced into only specific kinds of myriads of different cells found in the body. Once introduced, they must survive and function at adequate levels in order to be effective. Undoubtedly, many problems of interaction between the introduced genes and the other genes in the cells will ensue. While it may be many years before this kind of therapy is available for human use, some experts predict its advent in the imminent future. Thus, it is all the more necessary to give adequate thought to the risks involved. The possible consequences of most genetic therapies ate largely unknown. In some instances where the risks are negligible, pursuit of the therapy may be morally obligatory. But in those cases where the results promise to be possibly pernicious, such therapy must be denied.

Even these dramatic cures of the somatic cells of a person are not cures in the full sense of the word. A full cure requires intervention with the germ cells, so that the treated person will not pass on the disease to his or her children. While main technical problems need to be worked out in the cases of somatic cell therapy, progress in germ cell therapy is further in the future.

Germ cell therapy promises to alleviate major causes of human suffering. Recombinant DNA offers the hope of treating previously intractable cancers, not simply by getting at the symptoms, but by getting at the causes. Would

not untold numbers be rescued from pain if those diseases that are passed through genetic codes to future generations could be eliminated? Germ therapy seems not only to be a brave new world, but a happier, healthier world.

Still, germ cell therapy raises grave questions. Why does the church hold greater reservations about germ cell therapy than somatic cell therapy? It needs to be kept in mind that germ cell therapy raises unique questions. Germ cell therapy is not equivalent to the removal of an offending organ, or event getting the body do produce its own insulin. Medical technology would invade the basic building blocks of life not only for the life of a single generation, but for the lives of generations to come. To engage in germ cell therapy is to alter the gene pool for the future. The danger in making such an alteration is not that certain commonly agreed upon unfavorable diseases are eliminated: rather the danger lies in the possibility of irrevocably altering the human creature to the ill. Germ cell therapy offers the possibility of human control of the gene pool. Who should make the judgment as to acceptable risks? Or who could judge which defects demand priority? Someone would have to decide. But who could that be? There is simply no group competent to make such a judgment. The Christian understanding of sin alerts the Church to the fact that a terrible and irrevocable mistake will be made somewhere along the line.

Nor should there need to be anyone to make the decision. This study has already referred to the creation as a gift of God and of humans as constituent members of that gifted order. It would be the height of human presumption to dare to start creation over. It would also efface the very image of God in which the human was created. To be created in the image of God is to be created in otherness—other than God and other than one another. The human is, then, created to relate to the Other and others. To reduce the human to products of its own idea of perfection, and thus to reduce the human to mirror images of itself, is to drain the world not only of the variety that makes up the human community, but to eliminate the very humanness of the community itself.

Thus, the church holds that the matter of germ cell therapy is not simply a matter of risk; it is a transgression which dare not be attempted. The human race must not be willing to allow even its best inventions to become an idol. Christians follow the Lord who, when tempted to turn stones into bread, refused this temptation for the very human reason that “man shall not live by bread alone, but by every word that proceeds from the mouth of God” (Matthew 4:4).

Military Uses of DNA Technology

Biological engineering is exceedingly complex and has implications for application beyond….
of a purposeful use of genetic engineering for destructive purposes (*Christianity and Crisis.* September 19, 1983). The human race has been here before. We are painfully aware of our earlier experiences with both chemical and nuclear engineering in which potentially beneficial technologies produced harmful effects. Some of them were inadvertent, others definitely purposeful. Against that background, the possible military uses of DNA technology become a matter of deep concern. With military technology here and abroad already operational at frightful levels, massive contributions to it from the laboratories of genetic engineering can only strike terror into the hearts of the earth’s peoples. The Christian conscience must ask here, as with similar uses of God given creative energies, whether this is not one more Promethean abuse of human privilege.

The US Department of Defense funding of research in biology, including that of genetic engineering, has increased in recent years, while funding by the National Institutes of Health has decreased. Since the professional fortunes of so many talented biological researchers depend directly on the obtaining of research funds, this shift naturally forces many of those highly gifted in biological science to obtain funds from the Department of Defense. It is likely that similar pressures for military related research are experienced by biologists in other countries as well. Why the intense interest in recombinant DNA technology? Several factors are quite obvious. A legitimate one is the development of vaccines against pathogens that already exist either as potential weapons or as disease causing organisms that military forces might encounter in various trouble spots around the world. There is also interest in the production of large amounts of certain substances that are toxins and chemicals related to the functioning of

the nervous system. A third area of interest relates to the deterioration of equipment under field conditions, a process that might be slowed with the use of appropriately engineered organisms.

There is an ongoing controversy over the efficacy of biological organisms as weapons and the use of genetic engineering by the military. While some warn that the potential for the military use of biologically engineered organisms is very great, others point out that there is international support for the banning of research in biological weapons, as manifested in the widely supported treaty called the Biological Weapons Convention of 1972. However, since the US did not sign that treaty, its efficacy must be questioned. Again, some argue that the actual use of organisms as weapons of warfare is not to be regarded as a very dependable weapon system since the effects of such organisms on a population cannot easily be predicted, which is hardly a compelling argument. The point is not whether such weapons would be effective, but that almost all developments in technology are seen as potential candidates for military use. It is crucial that the church join forces with those around the world who am more than ready, after centuries of cruel and heartless strife, to “beat swords into plowshares and spears into pruning hooks” (Isaiah 2:4). Christians too often have stood idly by waiting for Jesus Christ to return to make all that happen. Passivity ignores both the human responsibility to the created order and the contemporary presence of the cosmic redeeming Christ who breaks down the walls that divide and makes even enemies one in him.

A Matter of Priorities

A final issue to be addressed is that of priorities. Genetic engineering is terribly expensive. The cost of building new laboratories, especially on an industrial scale, is very great particularly if serious attention is given to vigilance with regard to safety matters. A society simply does not have the resources to commit to all desirable projects. The problem can be illustrated by consideration of genetic diseases. Many people suffer from rare maladies that are due to improper function of genes. Is the expenditure of huge funds to correct such maladies through genetic therapy justified when multitudes are suffering grievously from the common maladies of malnutrition and starvation? Alternate forms of symptom relief already exist for genetic disabilities and that is sufficient. These sorts of questions are handled primarily in the political arena as various concerns compete for available resources. For that reason the church must become more deeply engaged in the political process, keeping uppermost in mind that the powerless need representation. In such issues of human welfare, the ability to pay should not be the primary determinant in the allocation of resources.

A different sort of priority issue relates to the possible benefits of genetically engineered agricultural plants and animals to alleviate world hunger. While such benefits do exist on a small scale, the easy assumption that refinements in technology will provide a full solution to the problem must be avoided. That genetic engineering can increase crop productivity is undeniable, but lack of productivity is not currently the cause of world hunger. In many parts of the world people are too poor to buy seeds, whether they are genetically engineered or not. Also, people are being encouraged to grow luxury crops for export, rather than food crops for their own use. This structural problem in the way the world allocates and distributes its resources should not be concealed behind hopes of securing a technological solution to world hunger. Technology is a false saviour. Some even argue that new technologies frequently only aggravate the problem. Those who can afford the technology gain control of the land as well, producing more poor and landless farmers instead of fewer. Technological remedies may well aggravate the structural problem of land distribution that make a few people richer than they were before and do very little for the plight of the starving. Technological remedies are not required at the moment; rather the nations require a strong sense of biblical justice that seeks an equitable sharing of the good things of God’s earth with all its peoples.

IV Conclusion

The issues raised in this study are far reaching. They affect the lives of countless people and include possible changes in the genetic structure of the human that will affect future generations. The church celebrates the new knowledge offered by biological sciences, giving us the opportunity to join in God’s delight in the wonder of creation. We rejoice in new possibilities for the alleviation of previously intractable diseases. We encourage further

research and the development of a technology that will ease suffering.

RCA congregations should teach their members about the implications of this new world and to hear the question as to the nature of the human and the challenge of our relation to the created order. In turn, we urge RCA members to reflect together in study groups, in worship, and in technological discussions, remaining open and obedient to the Lordship of Christ. Any true "Christian action" can begin only in prayerful listening for God's will.

As the RCA involves itself in public policy issues in its commitment to corporate responsibility through the companies in which it invests, in legislation that presents itself
to national and state governments, and as Reformed churches and members find opportunity to witness in both public and private venues—continuing caution is urged. The following principles are therefore offered:

1. That the question of environmental effects of artificially produced genetic products be determined in a controlled environment before uses beyond experimentation begin.

2. That research and experimentation with genetic intervention with individuals for the relief of disease (somatic cell therapy) be affirmed; but that intervention into the human gene pool (germ cell therapy) be proscribed until such time as the questions raised in the study be resolved satisfactorily.

3 That the availabilitv of resources not be so constricted by genetic engineering so as…..

4. That a strict constraint be placed on military uses of this technology.

In the process of developing this statement, the Commission on Christian Action has been made aware of still farther questions raised by a host of related issues, most having to do with the onset of human life. It is now possible, for example, for prospective parents to receive a genetic screening for the fetus presently carried by the mother. However, there is no therapy available to the parents outside abortion of the fetus. Is such screening wise or even morally acceptable? In vitro fertilization is a reality, as is surrogate motherhood. These raise questions for church members, unprecedented pastoral issues. The commission suggests further study on the origin of human life and the pastoral issues entailed by the new technologies.

Rl.
To adopt the following principles to guide the RCA in its response to genetic engineering:

1. That the question of environmental effects of artificially produced genetic products be determined in a controlled environment before uses beyond experimentation begin.

2. That research and experimentation with genetic intervention with individuals for the relief of disease (somatic cell therapy) be affirmed; but that intervention into the human gene pool (germ cell therapy) be proscribed until such time as the questions raised in this study be resolved satisfactorily.

3. That the availability of resources not be so constricted by genetic engineering so as to deflect from projects that demand a higher priority.

4. That a strict constraint be placed on military uses of this technology. ((ADOPTED(
(The advisory committee recommended the R 1 be amended by adding the following to No. 4: "and that this technology be prohibited for military offensive purposes." The motion LOST.)

R 2.
To instruct the general secretary to communicate this study to appropriate agencies (for example, the National Institutes of Health, the National Science Foundation, and the Office of Science and Technology) and to ecumenical partners. (ADOPTED)

R3.
To circulate this study to the church in a manner appropriate for study. (ADOPTED)

R4.
To Instruct the Commission on Christian Action to (begin) prepare for the 1989 General Synod a study of the moral and pastoral issues raised by new technologies [e.g., in vitro fertilization, generic screening, surrogate motherhood] and legal arrangements that affect the onset of human life. (such as in vitro fertilization, genetic screening, surrogate motherhood, and the like.) (ADOPTED AS AMENDED)

1993 Global Warming

God's Creation

In the beginning God created the heavens and the earth. In the end God's redemptive plan will bring forth a new heaven and a new earth. Between the creation and the redemptive recreation, humanity has not only tended the garden, but also manipulated, abused, and degraded God's good work. Misguided human efforts to control and to have dominion have produced disharmony, broken relationships, and destruction.

But God so loved the world that God's own Son was sent to redeem not only the inhabitants of the earth but the entire creation. Redemption, the restoration of right relationships, is assured. The task of God's children is to participate in this redemption through our relationships with humanity and with the earth. This is our responsibility not only to the Creator and the creation but also to future generations.

The General Synods of 1970 and 1982 called the Reformed Church in America to be stewards of God's creation by reducing pollution, conserving resources, and caring for the land. In the 1990s, at the dawn of the new millennium, a new environmental challenge confronts the Christian community. Once again it is time to call the church to action, to protect the earth from the crippling effects of human activities and to promote healing for the creation.

Global Warming

Global warming refers to the gradual increase in the average temperature of the earth which has occurred in the last century and which is predicted to continue with greater severity over the next century. Since the late nineteenth century, the average temperature has increased 0.5 degrees Celsius. [1] The decade of the 1980s was the warmest on record Looking to the near future, scientists have predicted an increase of 1.0 to 3.1 degrees Celsius by the middle of the next century, with some estimates ranging as high as 5.5 degrees Celsius by the end of the next century.[2] It is important to recognize that there are those in the scientific community who dispute these findings and who doubt the accuracy of the scientific models on which the findings are based, but a growing majority of experts acknowledges that temperatures have increased and will continue to increase because of the buildup of so-called greenhouse gases.

Global warming occurs because of a blanket of gases that traps some of the sun's radiation by limiting the release of heat/energy from the earth's surface. These gases include carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons (CFCs), all of which have increased significantly during this century. Some trapping of this heat is essential to human life, for without it, the earth would be almost thirty-three degrees Celsius colder than it is now.[3] But the concern now is that too much heat is being trapped, with potentially dangerous consequences.

The chief contributor to global warming is carbon dioxide, which is produced by the burning of fossil fuels and by deforestation, which not only releases the carbon dioxide which had been absorbed by the trees but also reduces the number of plants which continue to absorb these gases. Prior to the industrial revolution, the level o£ carbon dioxide was estimated to be approximately 280 parts per million by volume (ppmv); now the level is 350 ppmv ° From 1983 to 1988 carbon dioxide emissions increased approximately 3 percent annually; if this rate of increase

continues, the levels would exceed 550 ppmv early in the next century.[5]

Other gases also contribute to global warming, although to lesser extents. Methane is produced in coal mining, in the transportation of natural gas, and in some agricultural processes (rice paddies, cattle). The concentration of methane has doubled since the industrial revolution.[6] Nitrous oxide emissions, resulting largely from fertilizer use, have increased by almost 10 percent in the last two hundred years.[7] CFCs have increased from almost nothing in 1960 to approximately 1 part per billion and are increasing at the rate of 5 percent per year.[8] In addition to their role in global warming, CFCs have also contributed to the depletion of the ozone layer.

During most of the last two centuries, the advances in industrialization and transportation occurring in Western Europe and North America were the primary contributors to the increase in these greenhouse gases. For example, is 1950, almost 70 percent of the carbon dioxide emissions came from these two regions. In the last forty years, however, other countries have been following the industrial and transportation patterns of North America and Western Europe, so that in 1980, 45 percent of the emissions came from Eastern Europe, the Soviet Union, Asia, Africa, and Latin America.[9] Deforestation, too, has increased significantly as land developers cut down and bum huge tracts of wooded land; approximately twenty million hectares of forests, an area one third the size of France, are lost annually by land development.

The Consequences of Global Warming

The causes of global warming are truly global in scope; so, too, are the consequences Although scientists disagree about the appropriate models to use in analysis and prediction and although there will be regional variations in warming, there is no doubt that a sizable increase in average temperatures would pose serious threats.

Global warming would affect agricultural practices throughout the world. As temperatures increase and rainfall decreases because of greater evaporation, there would be a northward shift in the most favorable climate for agriculture. A few countries in the northern hemisphere would benefit because the growing season would be longer; others would lose because of reduced precipitation. Unfortunately the regions with the most productive soil (North America and much of Europe) would generally suffer the most, which could decrease total world fond yields.[10]

Global warming would also contribute to rising sea levels as the polar icecaps melt at greater rates. Scientific predictions suggest that by the year 2100 sea levels could rise by 0.3 meters to 3.5 meters, which would have disastrous consequences for several countries.” Entire coastal cities would be flooded, agricultural land near the coasts would be rendered useless, drinking water would be contaminated, and shipping patterns would be changed.[12]

Even though there would be a decrease in average precipitation, global warming could enhance the intensity or violence of storms, resulting in more storm-related injuries and deaths as well as more water runoff and soil erosion as the torrential rains come faster than the earth can absorb them.[13]

Although the consequences of global warming would be worldwide in scope, developing countries are particularly vulnerable to declining agricultural productivity and rising sea levels. Aggravating this problem even further is the fact that these countries have the fewest resources to dens with these consequences.[14]

Our responsibilities

Christians have a clear responsibility to promote healing and restoration for the creation. We confess that the earth is the Lord’s (Ps. 24.1) and that we are but stewards or caretakers of what God has entrusted to us (Gen. 2,15). We recognize that human sin has not only broken the relationship between God and humanity but has also twisted the relationship between humanity and the rest of the creation and has reduced the ability of the creation to sing praise to the Creator (Gen. 3.17). Throughout history, and particularly since the Enlightenment, humans have viewed creation as a resource for human use, to be manipulated and exploited in the quest for material prosperity.

Humankind has perverted God's call for humans to have dominion into actions that seek domination.[15] We have overemphasized God's call for us to subdue the earth (Gen. 1.28) without understanding how that is balanced by God's complementary call for us to till and keep the garden (Gen. 2.15).

We must replace this anthropocentric view of creation with a renewed vision of the creation as a gift of God, valued in and of itself as a reflection of the Creator. We must realize anew that God's redemptive love (John 3.16) embraces the whole creation.

A Call to Action

We call upon the church to promote integrity for the creation, to restore broken relationships, and to equip men and woman of God to act wisely, creatively, and redemptively.

What can we do? What must we do, in the name of the one who created and who redeems, for the sake of future generations and for the sake of the creation itself?

The greatest priority must be to reduce the use of fossil fuels, particularly coal and oil. At an individual level we must reduce our automobile use, purchase products and appliances which take less energy to produce and which consume less energy in operation, and participate with others in community activities designed to conserve resources and to protect the environment.

Churches, too, can play a positive role with wise purchases and an active educational effort to inform members about the causes and consequences of global warming and the steps that are necessary to reduce this danger.

Governments must work individually and collectively to promote energy efficiency and conservation through tax incentives, efficiency standards, and environmentally sensitive purchasing. Governments can also reduce deforestation through more effective land use end zoning regulations that do not provide incentives for land developers to extend suburban development projects into relatively untouched wooded areas. Protecting the environment involves costs for both producers and consumers, and one way the government can help us to recognize these costs is to impose additional taxes on products that contribute to global warming. Far example several European nations have considered or imposed a carbon tax in an effort to reduce carbon dioxide emissions to 1990 levels by the turn of the century.[16] The United States government has lagged behind several of its European allies in terms of setting a specific target for reducing carbon dioxide emissions.

Related to this, there must be an international priority to develop alternative sources of energy. In recent decades public support for such research has waxed and waned as economies flourish or recess, but there must be a continuing commitment to renewable energy sources regardless of the current health of a nation's economy. The Christian community must take the lead in proclaiming that economic growth is not the ultimate goal of humankind, that ecological health needs to have an increased priority for the sake of future generations.

There must be an international effort to reduce deforestation and to promote reforestation. Individuals, groups, churches, governments, and international communities can participate is tree-planting efforts. In addition, governments should reduce tile incentives for the kind of land development practices which result in such significant deforestation.

Because emissions of greenhouse gases from developing nations will increase significantly in the next generation, it is essential that they be involved in efforts to combat global warming. Unfortunately, many of these nations cannot afford to take the necessary steps because of their huge debt burdens. They simply cannot afford to purchase the

latest energy-saving technologies; they cannot afford to support research into renewable energy sources; they cannot afford major reforestation campaigns. It is the particular responsibility of the industrialized world, which has caused so much of the global warming, to provide substantial financing for these projects and to alleviate the debt burdens of other countries. For example, some have suggested a debt-for-trees swap, in which a portion of a nation's international debt would be forgiven in exchange for a reforestation project.

For too long humanity has viewed the creation as a resource available solely for human purposes, particularly for the benefit of the present generation. For too long humanity has ignored the destructive consequences of human actions, which will affect future generations. God's creation groans in agony, awaiting the redemption that God has promised God's people must act now to repent of our sins and to promote healing throughout the creation. The earth is the Lord's and the fullness thereof, may that be our confession of faith and our motivation for changed lives.

Notes:

1 Stephen K Schneider, Global Warming.' Are We Entering *the Greenhouse Century?* (San Francisco: Sierra Club Books, 1989), p. 24.

2 Christopher Flavin, Slowing *Global Warming: A Worldwide Strategy,* Worldwatch Paper 91 (Washington, D.C.: Worldwatch Institute, 1989), pp. 16-17.

3 William R Cline, *The Economics of Global* Warming (Washington, D.C.: Institute for International Economics, 1992), p. 15.

4. Flavin, pp. 12-13.

5. Ibid.

6 Cline, p. 17.

7 Philip D. Jones, and Tom L. Wigley, "Global Warming Trends," *Scientific American,* August 1990, p. 91.

8 Flavin, p. 12.

9 Robert M. White, "The Great Climate Debate," *Scientific American, July 1990, p. 9 i* _

10 Cline, p. 87.

11. Richard L. Wyman, cd, Global *Climate Change and Life on Earth* (New York: Routledge, Chapman and Hall, 1991), chap. 10.

12 Ibid.

13Cline, chap. 3.

14William E. Gibson, "Global Warming as a Theological Ethical Concern," in Dieter T. Hessel, A,JTer *Nature's Revolt: Eco,Justice and Theology* (Philadelphia: Fortress Press, 1992), p. 116.

15Loren Wilkinson, ed., *Earthkeeping in the 90s: Stewardship of Creation* (Grand Rapids: William $. Eerdmans Publishing Company, 1991), chap. 14.

16 Cline, chap. 8.

R9.

To direct the general secretary to write letters to the president and vice-president of the United States, the prime minister of Canada, and key members ofxhe U.S. Congress and Canadian parliament, urging **support for national and** international policies to reduce the emissions ofgreenhouse gases, to curb deforestation, and to promote reforestation. (ADOPTED)

R-10.

To direct the general secretary to write letters to the president and vice-president of the United States, the prime minister of **Canada,** and key members of the U.S. Congress and Canadian Parliament, urging support for legislation which establishes incentives for reducing fossil fuel consumption and encouraging the development and use of alternative energy sources. (ADOPTED)

R 11.

To direct the minister for social witness to continue to prepare and distribute educational materials and worship

resources on environmental issues, including global warming, for study by the churches. (AnON'fED)

R-12.
To call on pastors to prepare special liturgies and sermons so that members may be equipped to understand environmental issues from the biblical perspective of creation and stewardship, and further to encourage pastors to submit these resources to the Office of Social Witness for possible distribution within the Reformed Church in America. (ADOPTED)

The advisory committee recommended to amend R-13:

R 13.
To call on RCA churches to improve the energy efficiency of church buildings and appliances, to plant trees, and to promote recycling and carpooling, etc. (ADOPTED AS AMENDED)

Reason: This amendment makes the list suggestive, rather than comprehensive.

The advisory committee recommended to amend R-14:

R-14. To encourage RCA churches to develop programs that [put church members into natural settings that] enhance appreciation of God's creation. (ADOPTED AS AMENDED)*
Reason: There are many other ways of appreciating God's creation in addition to natural settings.

R-15. To encourage RCA camps and conference centers to stress environmentalissues in their programs and to model environmental stewardship in their operations. (ADOPTED)

1994 Toxic Waste Dumps and Minority Communities

In response to an overture from the Regional Synod of New York, the General Synod of 1993 instructed the Commission on Christian Action and the Office of Social Witness "to make an in-depth study of the injustice of placing a disproportionately large number of toxic waste disposal sites in or near low-income or minority communities, for report to the 1994 General Synod" (MGS 1993, R-25, p. 124).

The Commission on Christian Action noted that a number of such studies have already been made, among them a major study undertaken by the United Church of Christ (UCC), Commission for Racial Justice, Toxic Waste and ***Race in*** *the* ***United*** States.[1] In light of this study and corroborating data provided by the Environmental protection Agency[2] and other sources, the commission determined it was not necessary to conduct an in-depth study of its own. Instead, the commission offers the following summary of these studies and their recommendations.

Toxic waste facilities are a problem for all. Many products which are desired or have come to be needed result in a generation of toxic waste either in their use or manufacture. These wastes have to go somewhere, and it is difficult to find places where toxic wastes do not have the potential of interacting with people and other living things nearby. It is interesting, however, to discover that there is a distinctly nonrandom distribution of these sites in relation to human populations in the United States.

The Report of the UCC Commission for Racial Justice used a careful statistical analysis of the association of various factors with the location of toxic waste facilities. The study began with the establishment of a data base of all the U.S. residential postal ZIP codes. These were then classified according to the location of over four hundred commercial hazardous waste facilities as well as the minority percentage of the population in each region, the mean household income, the mean value of owner-occupied homes, the number of uncontrolled toxic waste sites per one thousand persons, and the pounds of hazardous waste generated per person. The purpose of the study of household income and home value as opposed to race was to allow for the role of socioeconomic level on the

choice of location of waste sites.

Using five different statistical methods for the study of associated events the study then asked which of the variables were the strongest predictors of which ZIP codes contain hazardous waste facilities. Results showed that the group of residential ZIP codes with the highest number of commercial hazardous waste facilities also had the highest average percentage of residents who belonged to a racial and ethnic group. Those ZIP codes with no waste facilities had a lower proportion of racial and ethnic residents.

Race was the most significant factor associated with the location of the sites. This remained true even after adjusting for socioeconomic status, urbanization, and regional differences. The average minority percentage of the population in regions with one operating commercial hazardous waste facility was twice that of communities without facilities, and in communities with two or more hazardous waste facilities, the average minority population was more than three times that of communities without facilities. The statistical tests revealed that the probability that these associations occurred purely by chance is less than one in ten thousand!

The UCC study emphasizes that the method of analysis does not allow one to determine why these associations exist. But they do exist, and such conditions seem so unjust on the face of it that action is required. The UCC study contained several recommendations urging:

- The President of the United States to issue an executive order mandating federal agencies to consider the impact of current policies and regulations on racial and ethnic communities.
- The formation of an Office of Hazardous Wastes and Racial and Ethnic Affairs by the U.S. Environmental Protection Agency. This office should assure that racial and ethnic concerns regarding hazardous wastes, such as the clean-up of uncontrolled sites, are adequately addressed. In addition, we urge the EPA to establish a National Advisory Council on Racial and Ethnic Concerns.
- State governments to evaluate and make appropriate revisions in their criteria for locating new hazardous waste facilities to adequately take into account the racial and socioeconomic characteristics of potential host communities.
- he U.S. Conference of Mayors, the National Conference of Black Mayors, and the National League of Cities to convene a national conference to address these issues from a municipal perspective.
- Civil rights and political organizations to gear up voter registration campaigns as a means to further empower racial and ethnic communities to effectively respond to hazardous waste issues and to place hazardous wastes in racial and ethnic communities at the top of state and national legislative agendas.
- Local communities to initiate education and action programs around racial and ethnic concerns regarding hazardous wastes.[3]

The UCC study (conducted in 1987) noted these issues were not at the forefront of the nation's attention. It would be difficult to argue these are now priority issues. However, an outgrowth of the UCC study has been an increased attention to them. The term "ecojustice" has come to signify the realization that environmental issues are part of the same set of questions as those associated with racial and social justice.

The UCC study said "racial and ethnic communities had been marginally involved with issues of hazardous wastes. One reason for this can be traced to the nature of the environmental movement which has historically been white middle and upper-class in its orientation." Benjamin Chavis, Jr., ones executive director of the National Association for the Advancement of Colored People and executive director of the UCC Commission for Racial Justice at the time of the UCC study, was recently quoted as saying, "One of the reasons we have an environmental justice movement is that the larger environmental movement would not let the brothers and sisters in."[4]

Since 1987 many further studies have strengthened the basic points of the UCC study. The literature on the subject of toxic wastes and race is now extensive. A bibliography, espies of the UCC Commission for Racial Justice report, Toxic Waste acrd ***Race,*** and other related resources are available upon request from the Office of Social Witness.

As a result of these studies, there has been further refinement of the Commission on Christian Action's understanding. Several key questions emerge:

There can be little doubt there is a correlation between the locations of toxic waste dumps and minority communities. This is an injustice, but why does it arise? Is it due to an overt racism that regards the inhabitants of minority communities as less deserving of consideration ***when*** placing toxic waste sires? Does the problem arise because of less political organization or influence in minority communities, making them more vulnerable?

Is there a need for people with greater political influence to act and speak on behalf of those exposed to serious health risks? Altenratively, arc there ways of empowering local **communities** so they can act on their own behalf as effectively as more affluent communities in preventing the placement of hazardous waste facilities?

In what ways can those who have traditionally been concerned with social **justice issues** be joined with those more concerned with environmental issues? What common concerns do **these groups** share? What impediments are there to these groups' joining in common cause

The commission on Christian Action considers these findings to be particularly troublesome. These findings point out not only the continued degradation of tine environment but also the insidious nature of racism in society. Those with tire least political or economic power in society suffer the most from the ill effects of industrial economy.

Following the example of the Lord, the Reformed Church in America has made the commitment in its directional statement for the 1990s "to identify mare and more with the needy, tire suffering, and the oppressed" (see "Building the Church for die 21st Century" in tire Evangelization and Church Growth section). Such a commitment calls the RCA to stand with those who are the victims of environmental racism and to work with them and others in redressing this injustice.

Notes:

1 . Commission for Racial Justice, United Church of Christ, *Toxic Waste arid Race in the UnitedStutes: ANational Reporton the Socio-EcanomleChruacteristics ofCorrununities with Hazardous Waste* Sites, United Church of Christ Commission nn Racial Justice, *1987.*

2. Environmental Equity; Reducing Risk for All Communities, 2 Vol. EPA-230-4-92008A. Washington: U.S. Environmental Protection Agency, June 1992. See also a review putting this report in context: Julie A. Rogue, "Environmental Equity: Reducing Risk for All Communities," Environment, Vol, 35(S), pp. 25-8, June 1993.

3. Toxic Waste and Race in the United States: A National Report on the Socio-Economic Characteristics of Communities with Hazardous Waste Sites.

4. Quoted in David L. Wheeler, "When the Poor Face Environmental Risks," The *Chronicle for Higher Education,* February 23, 1994, pp. A10-Al I.

R-2.
To instruct the general secretary to write letters to the President of the United States, the director of the Environmental Protection Agency, and key legislators expressing opposition to the disproportionate placement of fords waste damps In minority communities; and further,

to request there be appropriate revisions in the criteria for locations of new hazardous waste facilities. (ADOPTED)

R-3. To call upon RCA congregations who are currently dealing with this issue of toxic waste dumps and minority communities to communicate with the Office of Social Witness about their efforts to address the problem; and further,

to request the Office of Social Witness to share this information with the Reformed Church in America in order to facilitate cooperative efforts among congregations. (ADOPTED)

1997 CARING FOR CREATION: THE CHURCH AND PAPER USE

In 1970,1982 and 1983, the General Synod of the Reformed Church in America expressed the concern and responsibility of the church for the well-being of God's creation (MGS 1970, pp. 206-208, MGS 1982 pp. 63-70, and MGS 1993, pp. 98-103). The report of the Commission of Christian Action to the General Synod of 1982 concluded:

The church's care for the earth and its concern over environmental peril needs to be global... The life-sustaining resources of creation are in peril throughout the globe. The massive consumption of our own affluent societies is severely straining the resources of the earth . . . We can begin caring for the earth, then, only from a posture of repentance. The restoration of God's shalom for all of creation requires changes in our attitudes, in our values, and in our lives. If Christ's work of redemption extends not only to us, but to all creation then both we and the Christian fellowships to which we belong should begin to demonstrate redeemed relationships to the earth's resources and a commitment that they be shared justly with all people (MGS 1982, pp. 69-70).

One area where the church can begin to demonstrate a redeemed relationship to creation is in its use of paper. Both the volume of paper consumed, with the resultant depletion of the earth's forests, and some paper manufacturing processes that produce toxic by-products, are concerns the church can address.

Paper Consumption

Paper production has grown rapidly throughout the twentieth century, increasing its output twentyfold since 1913. Ironically, office automation has also driven growth of paper consumption, As of 1992, for example, the world had more than nineteen million photocopiers, devices only introduced in 1948. Since 1955 world consumption of printing and writing paper, including photocopying paper, has increased sevenfold. In the United States alone, the spread of office printers, photocopiers, and fax machines spurred a near doubling of office paper consumption during the 1980s.'

The U.S. consumes twice as much wood as other industrial countries, the equivalent of one. mature tree per person per year.[2] A large portion (28 percent to 40 percent) of timber supplies are used for paper production.[3,4] The average American consumes 681 pounds of paper each year; 10,000 sheen of paper are consumed annually by the typical U.S. office worker; and 12,430 square miles of forest are harvested for IJ.N. pulp mills each year.[5] Every year 350 million trees are cut down to make office paper.[6]

Although less than 10 percent of the U.S. old-growth forests remain, they supply 15 percent of the nation's lumber and 5 percent of its paper.[7] Some companies are involved in the harvesting of old-growth forests, while others arc using clearcutting. Clearcutting is cheaper than selective harvesting, but it tends to reduce a once diverse living environment to a monoculture where few species can survive, and it causes soil erosion and sediment water pollution.

Paper Production

The pulp and paper industry is also a heavy user of energy and water, as well as being a major source of toxic water pollutants such as dioxin. Dioxin is the most toxic man-made substance known to science. The Environmental Protection Agency has called dioxin "the most potent carcinogen ever tested on lab animals."[8] It has been the culprit in many of the worst environmental disasters, including those at Times Beach, Missouri; Love Canal, New York; and Seveso, Italy. During the Vietnam War it was known as "Agent Orange."

Dioxin is one of a larger class of compounds known as organochlorines. Organochlorines arc formed when chlorine binds with carbon in organic (carbon-containing) matter in reactive environments such as industrial production processes or incinerators. Organochlorines tend to be very long-lived in the environment, and are also

toxic, even in very small quantities. They tend to bioaccumulate in the fatty tissue of living organisms.

Unlike some eleven thousand other organochlorines that are intentionally manufactured for commercial sale by the world's chemical industry, dioxin is produced only as a by-product of many chemical, manufacturing, and combustion processes. Any use of chlorine in industrial processes, including incineration, chemical and plastic manufacturing, paper and pulp bleaching, or burning hazardous waste in cement kilns, results in dioxin formation.

It is only because the chlorine chemistry and its products have become so widespread that dioxin formation has become ubiquitous over the last fifty years. Virtually all chlorinerelated products and processes ate associated with dioxin formation at some point in their life cycle.

The three major sources of dioxin are incineration, pulp and paper manufacturing, and PVC plastic. Pulp and paper mills form and release dioxin when they use chlorine gas and other chlorinated chemicals to bleach wood pulp white. This makes the paper industry the largest source of dioxin discharges directly into waterways and one of the largest dioxin-producing sectors overall.

Human exposure to dioxin occurs through diet, with foods from animals being the predominant pathway. Over 90 percent of the persistent organochlorines people ingest come from the food they eat. Because these chemicals are stored in body fat and build up through the food chain, the highest levels in food arc found in meats, fish, and dairy products. One expert estimates that the average daily intake of dioxin is "at least fifty times greater than what EPA estimates is a virtually safe dose of dioxin"[9] People with the highest exposures eat more fish, live near a dioxin source, or eat food produced near a dioxin source. Children ace at greatest risk because their bodies are smaller in proportion to the level of dioxin exposure.

In 1994 the Environmental Protection Agency released a six-volume, twenty-four-hundred page report, *Dioxin Reassessment.* This report states that levels of dioxin currently existing in humans have reached a body burden (level of dioxin in the human body) that may cause such adverse health effects as cancer, reproductive and hormonal disruptions, birth defects, unpaired child development, diabetes, altered male sexual behavior, and immune system suppression.[10]

The forest products industry is sufficiently concerned that it has reduced dioxin contamination by as much as 70 per cent since a link between dioxin and paper bleaching was identified in the late 1980s. However, serious incidents of dioxin release continue to cast a shadow on such claims. In late 1990 for example, the EPA claimed that consumption of fish taken downstream from one of four Weyerhauser mills (the third largest company in the industry in sales revenues) posed a lifetime cancer risk greater than one in ten thousand. The EPA felt this risk serious enough to recommend that an advisory be put in place to avoid consumption of the fish. Weyerhauser plants located in Canada made local health authorities issue similar warnings about eating fish caught downriver from the plants. These dioxin problems are typical of the industry.[11]

Maureen Smith, a researcher at the University of California/Los Angeles, recently compared the virgin and recycled paper industries by studying data from the U.S. government's Toxins Release Inventory. She found that switching from virgin to recycled newsprint tends to result in a 99 per cent decrease in the amount of ammonia and chlorine released into the environment. The sludges that result from de-inking processes at recycled newsprint facilities have so far been fairly toxic -but only because so many printers are still using toxic inks. These inks could be replaced with other inks that are ecologically safe, widely available, and competitively priced.[12]

New Technologies, New Behaviors

Part of the answer to reducing the environmental costs of paper production and consumption lies in alternative technologies. Many grades of recycled paper are now available, as are bleaching processes which reduce or eliminate dioxin emissions, printing processes which use say-based and other less toxic inks, and "tree-free" paper made from kenaf, hemp, or agri-pulp.

But alternative technologies are only part of the solution. Caring for creation also requires people to change their behavior, particularly their patterns and levels of consumption. People can begin by becoming knowledgeable about which companies are engaged in harmful logging and paper manufacturing practices, by reducing use of paper, by using postconsumer recycled, nonbleached paper, and by recycling paper whenever possible. Eliminating dioxin emissions and reducing the environmentally harmful logging of forests requires use of unbleached paper and recycled paper. Ultimately, the answer is for
everyone-industry, the government, businesses, the church, and private individuals--to change their taste for clean white paper.

If, as the report to the 1982 General Synod stated, "The restoration of God's shalom for all of creation requires changes in our attitudes, in our values, and in our lives" (MGS 1982, p. 70), then it is essential that these changes become part of the life and ministry of the church. In congregations, offices, homes, and workplaces people must begin to model a redeemed relationship to creation. In terms of paper use, this may mean such mundane and everyday practices as seeking to reduce the volume of junk mail, refusing to purchase products with excess packaging, making greater use of electronic communications photocopying both sides of paper, making use of postconsumer waste, recycled, noubleached or treefree paper whenever possible, using nontoxic inks, recycling paper and paper packaging as much as possible, or instituting an annual "paper free" day in offices and homes. The commission realizes many of these practices seem small, inconsequential, or irritating. However, as author/ farmer Wendell Berry notes, it is the accumulation of such small tasks that will make the difference. He further states:

> The real work of planet-saving will be small, humble, and humbling, and (insofar as it involves love) pleasing and rewarding. Its jobs will be too marry to count, too many to report, too many to be publicly noticed or rewarded, too small to make anyone rich or famous.[13]

ENDNOTES:

1. Darning, Alan T. Saving the *Forests: What Will It Take?* Worldwatch Paper #117, December, 1993. Washington, D.C.: Worldwatchlnstitute.

2. Bielski, Vince. "Shopper, Spare that Tree!" Sierra. July/Aug 1996, p. 39-66.

3. Ibid.

4. Barry, John B. "Men Pulpa." *Sierra,* Jan/Peb 1994, p. 59-63.

5. Earth Island Institute. "ReThink Paper." Available at www.carthisland.org/ei/paper/ ecosources.huul ac:cesssed on February 26, 1997.

6 National Wildlife Federation Corporate Conservation Council. "Cutting Down on Paper Use." Available at www.nwf.org/nwf/Cce/paper.htna accessed on February 26, 1997.

7 Bielski. V., op. cit.

8 Barry, J.B., op. cit.

9 Bhagat, Shantilal, ed. *Between the Flood and the Rainbow, Vol. 4, No.* 1/2, September H 1996. Elgin, IL: Office of Eco-Justice Concerns, Church of the Brethren General Office.

10 Bhagat, S., op. cit.

11 Crawford, Colin. Forest Products. Council on Economic Priorities Research Report, June 1992. New York: Council on Economic Priorities.

12. Young, John E. and Sachs, Aaron. The *Next Efficiency Revolution: Cheating a Sustainable Materials Economy.* Worldwatch Paper #121, September, 1994. Washington, DC: Worldwatch Institute.

13. Berry, Wendell. "Out of Your Car, Off Your Horse," The Atlantic *Monthly,* February 1991, p. 63.

>The advisory committee recommended to amend R-5:
R-5. To direct the RCA Distribution Center, denominational offices, and staff to decrease the use of paper, by including:

1. Using recycled, reclaimed, or tree-free paper that is dioxin. free with non-chlorine bleach whenever practicable and possible-including printing, duplicating, correspondence, and other uses of paper.

2. Using both sides of the page for duplicating whenever feasible.
3. Seeking suppliers of soy ink or similar inks of low environmental impact for use whenever practicable and possible.

4. Using electronic technology whenever practicable and possible.
(ADOPTED AS AMENDED)

The advisory committee recommended to amend R-6:

R-6.
To encourage RCA Institutions, congregations, classes, and regional synods to reduce paper consumption and reduce the environmental consequences of paper use, by including:

1. Using recycled, reclaimed, or tree-free paper that is dioxin-free with non-chlorine bleach whenever practicable and possible--including printing, duplicating, correspondence, and other uses of paper.

2. Using both sides of the page for duplicating whenever feasible.

3. Seeking supplies of soy ink or similar inks of low environmental impact for use whenever practicable and possible.

4. Using electronic technology whenever practicable and possible.
(ADOPTED AS AMENDED)*<

R-7.
To Instruct the Office of Social Witness to continue to provide study material on lifestyles and the environment; and further,

to Instruct the Office of Social Witness to assist the Reformed Church in America to explore ways of making these environmental concerns part of its life of witness and worship. (ADOPTED)

General Synod 1998 RCA

Caring for Creation (Climate Change)

In response to a Commission on Christian Action report, “Caring for Creation: The Church and Paper Use” (MGS 1997, pp. 89-93), the 1997 General Synod instructed the Office of Social Witness to continue to provide study material on lifestyles and the environment and to assist the church in exploring ways of making these environmental concerns a part of its life of witness and worship (MGS 1997, R-7, p. 93.)

Through its Office of Social Witness the RCA participates in the National Religious Partnership for the Environment (NRPE), a coalition of four groups (Jewish, Roman Catholic, mainline Protestant, and Evangelical) which work together in developing resources and programs for a faith-based response to environmental issues. The minister for social witness serves as the co-chair of the National Council of Churches Eco-Justice Working Group, one of the four NRPE partners. Such ecumenical cooperation makes it possible to develop more resources and programs than would otherwise be possible.

This year, for example, the F.co-Justice W orking Group published a resource packet of study, worship, and action resources on human health and the environment which was sent to seventy thousand Protestant congregations, including each congregation in the RCA. Other activities of the Working Group which are helping to equip RCA members and congregations include an ecumenical training event, an annual public policy briefing, and a quarterly newsletter, In addition, a variety of study resources are available through the RCA Distribution Center and from the Office of Social Witness. The minister for social witness also led several workshops on the Christian response to environmental issues.

“Caring for Creation Coordinators” wire enlisted in several regions of the denomination. These people serve as resource and support persons to aid congregations in their ministries of defending and restoring creation. Through the Office of Social Witness, coordinators receive resources and training to assist congregations in three areas of ministry: learning (suggesting resources that wilt help churches learn about environmental issues and the biblical theology of creation); lifestyle (helping churches and families with ideas for reducing consumption, conserving energy, recycling, reducing use of toxins and pesticides, etc.); and legislation (serving as a conduit of information about important environmental issues and public policy issues so that Christians can write their legislators and make their feelings known).

Several RCA caring for creation coordinators were able to attend an ecumenical training event in Estes Park, Colorado, in May 1997. Another training event in Montreal, Noah Carolina, is scheduled for August 1998. Caring far creation coordinators were instrumental in helping congregations organize special worship services, ecumenical events, workshops, letter-writing campaigns, educational opportunities, and service projects.

The advisory committee recommended:
R-25. To encourage each classis to identify one person to serve as a “caring for creation coordinator” and to communicate that person’s name and address to the Office of Social Witness. (ADOPTED)-<

Climate Change

In 1993, in response to a report of the Commission on Christian Action on global warming (MGS 1993, pp. 98-103), 1993 General Synod voted;

To direct the minister for social witness to continue to prepare and distribute educational materials and worship resources on environmental issues, including global warming, for study by the churches (MGS 1993, p. 102).

In the past few years a number of resources have been made available to RCA congregations, including, *It’s God’s World: Christians, the Environment, and Climate Change*. More recently, RCA caring for creation coordinators, working with colleagues in sister denominations, helpedto place a public service announcement about climate change on local television stations and assisted in gathering more than twenty-five hundred postcards calling for stronger U.S. action on climate change.

The threat of climate change is of particular concern to Christians not only because of their God-given responsibility to tend the garden and to keep it (Gen. 2:15), but because climate change is an issue of justice. Industrialized nations such as the United States and Canada produce the major share of greenhouse gases, but those who live in poor and developing nations will suffer the most severe effects of climate change. Coastal flooding, more frequent and severe storms, the spread of insect-borne infectious diseases, and changes in agricultural practices would most seriously affect those least able to cope with such changes.

Climate change is also an issue of generational justice. The effects of global warming may be minimal in our lifetimes. It will nest he so for succeeding generations. Current energy-rich arid overly consumptive lifestyles may well be depleting the environmental capital on which the lives of future generations depend.

Climate Change Update
by the Commission on Christian Action, 1998

In its 1993 report to the General Synod the Commission on Christian Action called the church’s attention to the issue of global warming and changes in climactic patterns likely to be caused by the increased atmospheric levels of heat-trapping gases in the atmosphere (*MGS 1993*, pp. 98-103). The report argued that the issue of climate change is one that calls for the church’s response. We have a biblical mandate to tend and keep creation. Moreover, since the effects of climate change will fall disproportionately on the poor and on future generations, the issue is a matter of justice. We cannot love God and love our neighbors as ourselves, and ignore the potentially

disastrous consequences that human-induced climate change may have on future generations, on the poor, and on all of creation.

The 1993 report called on the church to advocate for policies that promote energy efficiency and conservation through such measures as higher energy efficiency standards and economic incentives, including imposing additional taxes (such as a carbon tax) on products that contribute to global warming. The synod also called on congregations to address the issue, to improve the energy efficiency of church buildings, and to consider other actions aimed at reducing greenhouse gas emissions.

SCIENTIFIC EVIDENCE FOR CLIMATE CHANGE

Since the 1993 report there has been growing scientific evidence that climate change caused by human activity is already occurring. The decade of the 1980s was the warmest decade of record and the 1990s are well on the way to surpassing the record warmth of the ’80s. The four warmest years on record were 1990, 1995, 1997, 1998. Global temperatures in 1998 were the warmest in the past 119 years, since reliable instrument records began. The previous record was set in 1997.

The year 1998 was also the twentieth consecutive year with an annual global mean surface temperature that exceeded the long-term average.1 The Intergovernmental Panel on Climate Change (IPCC), a body of nearly 2,500 international scientists that has been researching climate change since 1988, reported in 1995 that “the observed warming trend is unlikely to be entirely natural in origin...the balance of evidence suggests that there is discernible human influence on global climate.”2 If greenhouse gas emissions are not reduced, the IPCC projects future temperature increases of about 3.5 degrees Celsius (six degrees Fahrenheit) by the end of the next century, a faster rate of climate change than any experienced during the last 10,000 years. The difference in temperature from the depths of the last ice age to now is five to nine degrees Fahrenheit.

For the past thirty years climatologists have predicted that global warming would occur most rapidly at the poles. Recent evience suggests that such warming may have already begun. While global temperatures have, on average, warmed by one degree Fahrenheit over the last century, the Antarctic Peninsula has seen a jump of more than five degrees in the last fifty years. Huge sections of the ice shelf, including some pieces as large as the state of Delaware, have begun calving off its eastern shore. The southern half of the Greenland ice sheet, the second largest expanse of land-bound ice on earth, after Antarctica, has shrunk substantially in the last five years. If big ice sheets melt even partly, sea levels will rise around the world. Melting might also disrupt the ocean currents that modulate the earth’s climate by distributing heat around the globe.

Although there is now substantial scientific consensus in support of IPCC conclusions, there are those who are working to undermine its case, seizing on remaining uncertainties in data or computer modeling to argue against the need to respond to the threat of climate change. The Global Climate Coalition, a leading oil industry public relations outlet and other organizations such as the National Coal Association, the American Petroleum Institute, and the Western Fuels Association have spent millions of dollars trying to downplay the threat of climate change and cast doubt on the scientific evidence.3 While there is a continuing need for further research and better computer modeling of the effects of increased greenhouse gas emissions, these uncertainties should not be used as an argument for delaying action. We do not know everything there is to know about potential climate change. We do know enough to act now. Prudence requires reducing greenhouse gas emissions without waiting for every last scientific uncertainty to be resolved. The vast scale of the environmental and social damage that would be caused by climate change, and the long time scale it will take to reverse the effects call for taking preventive action. It will be easier to achieve reductions now, and at less cost to society, than to wait until the problem has grown worse.

Meanwhile atmospheric levels of carbon dioxide and other greenhouse gasses continue to rise. Atmospheric levels of carbon dioxide in 1860 were 280 parts per million (ppm); in 1993, 350 ppm; and in 1998, 363 ppm, the highest point in 160,000 years.4 Not only are atmospheric levels increasing, but the rate of emissions also continues to increase at about 1 percent per year. Even maintaining current levels of carbon dioxide emissions will raise concentrations to over 700 ppm by the year 2100. In 1992 the U.S. committed itself to reducing greenhouse gas

emissions to 1990 levels by the year 2000, and relied on volunteer efforts to do so. So far, such volunteer efforts have proven ineffective. A healthy economy, low fuel prices, the increasing popularity of larger, fuel-inefficient cars and sport utility vehicles, and our energy consumptive lifestyles have contributed to a 10.7 percent *increase* in emissions since 1990. The forecast is that emission levels will be at 13 percent above the 1990 level by the year 2000. The United States emits more carbon dioxide than any other nation, both in total and per capita. More than 98 percent of U.S. carbon dioxide emissions can be traced to the consumption of fossil fuels.

The Intergovernmental Panel on Climate Change has conservatively estimated that the atmosphere can sustain carbon emissions of no more than two billion tons per year without serious disruption of the climate. Spreading that quota evenly among the ten billion people projected to share the planet by 2100 yields a per-person quota of a pound a day. The U.S., Japan, and other industrialized nations are emitting carbon at a pace twelve to twenty-seven times this figure and the rates continue to climb.

EFFECTS OF CLIMATE CHANGE

The climactic consequences of increased levels of heat-trapping gases in the atmosphere are likely to include the following:

1. Weather patterns, particularly rainfall, are likely to change significantly and have a severe impact on water resources and water availability in many regions.
2. Droughts, storms, and floods are likely to be more frequent and more severe than in the past, especially in subtropical regions where many developing countries will be particularly severely affected.
3. The geographic distribution of vegetation types would be altered, leading to changes in habitat and further exacerbating the rate of species extinction (already occurring at the alarming rate of 75 to 100 species per day!).
4. Atmospheric warming would increase the temperature of the oceans, leading to an expansion in the volume of water and a rise in sea levels. Sea level rise would be exacerbated by melting polar ice. Already the sea level has risen ten to twenty-five centimeters in the last century. The IPCC estimates that it will rise another fifty centimeters by the end of the twenty-first century. Such a rise would have severe consequences for people and ecosystems in such areas as the Pacific and Caribbean islands, countries with populations and agriculture on river deltas (Bangladesh; Egypt; Louisiana, U.S.), and many coastal regions.
5. Insect- and rodent-borne diseases such as malaria, dengue, yellow fever, and encephalitis are likely to increase and spread into new areas.

WHAT CAN GOVERNMENTS DO?

In 1997 in Kyoto, Japan, the industrialized nations adopted the Kyoto Protocol, a treaty in which they agreed to make specific emissions reductions within eleven to fifteen years (2008 to 2012). The treaty calls for industrialized countries to reduce their emissions of carbon dioxide and other greenhouse gas emissions by an average of about 5 percent below 1990 levels. The United States' reduction would be about 7 percent. The U.S. administration has signed the protocol, but it awaits ratification by the Senate. Prior to the Kyoto conference the U. S. Senate passed a resolution stating it would not ratify any agreement that might harm the U.S. economy or did not include participation by developing nations. Although the treaty does not call for binding limits on emissions by developing nations, these nations are not exempt from the stipulations of the agreement. All signatory nations must inventory emissions and create pilot programs to limit them. Moreover simple justice requires that the industrialized nations, and the U.S. in particular, take the first steps in reducing emissions. In seeking an appropriate balance between consumption and the equitable use of global resources, we need to make a distinction between the "luxury emissions" of the rich and the "survival emissions" of the poor. "From everyone to whom much has been given, much will be required" (Luke 12:48).

The treaty agreed to at Kyoto must be adopted by over half the industrialized nations before it takes effect. U.S. ratification is crucial. Late last summer leaders of several mainline denominations (including the Evangelical Lutheran Church in America, the Presbyterian Church (U.S.A.), the Reformed Church in America, the United Church of Christ, and the Church of the Brethren) signed letters to President Clintonand U.S. senators urging ratification of the Kyoto Protocol to the Climate Convention.

CLIMATE CHANGE AND CHRISTIAN WITNESS

The threats to creation represented by global warming are a cause for concern for everyone on the planet, but for Christians the issue is more than a matter of self preservation; it is a matter of faithfulness.

Global climate change is an issue of justice. The industrialized nations, representing less than 20 percent of the world's population, are responsible for 75 to 80 percent of the annual greenhouse gas emissions. Yet those who live in poor and developing nations are the ones who will be most seriously effected by global warming. The North American suburbanite can afford to turn up the air conditioner and pay a little more for groceries. The peasant living in coastal Bangladesh would become an environmental refugee. Climate change is also an issue of intergenerational justice. The effects of global warming in our lifetimes may be minimal. It will not be so for our children and our children's children. Current North American energy-rich and overly consumptive lifestyles are being subsidized by the poor and by future generations.

Christians understand the threat of global climate change in the context of covenant. God has established a covenant "with every living creature" (Genesis 9:10ff.) and with the earth itself (Genesis 9:13). Humankind has been given a special place in this covenant relation. We are not merely one species among many but a species to whom God has given a unique and important responsibility. We are placed in the garden of creation "to till it and to keep it." God has given us dominion over creation, not to do with it as we please but, in the words of Old Testament scholar Walter Brueggemann, "for its profit, well-being, and enhancement...to see to it that the creation becomes fully the creation willed by God."6

This means, among other things, that our relationship with God, with our fellow human beings and with the rest of creation are all of a piece. A break in any one part of the covenant relationship affects the others. We cannot love God and hate our neighbor. Neither can we love God and our neighbors while we degrade creation.

Our response to the threat of global climate change is a matter of Christian witness. We confess that in Jesus Christ God entered creation in order to heal and restore the relationships broken by human sinfulness. The early Christians sang of Jesus Christ as the one in whom, through whom, and for whom all things were created and the one through whom God was pleased to reconcile to himself all things, whether on earth or in heaven (Colossians 1: 15-20). This confession of a "cosmic Christ" has important implications for the church's ministry. The church is called to bear witness to the Christ who reconciles and restores *all creation.* "The church is not an elite body, separated from a doomed world," writes New Testament scholar, J. Christiaan Beker, "but a community placed in the midst of the cosmic community of creation. Its task is not merely to win souls but to bear the burdens of a creation, to which it not only belongs but to which it must also bear witness."7

Dealing with the threat of climate change will require changes in technology, in public policy, and in our ways of thinking and living. We should not expect that it will be easy, and we should try to find ways in which the burdens of change are shared. But the longer we wait to deal with global warming, the more harm will occur and the greater will be the human, environmental, and economic costs for our children and grandchildren.

1. National Oceanic and Atmospheric Administration. "Climate of 1998: Annual Review," available at URL www.ncdc.noaa.gov/ol/climate/research/1998/ann/ann98.html, accessed February 12, 1999.
2. IPCC. *Second Assessment Report of the Inter-governmental Panel on Climate Change.* Geneva: IPCC, 1995, p. 22.
3. Ross Gelbspan, "The Heat Is On," *Harper's Magazine,* December 1995, pp. 31-37.
4. Lester R. Brown and Christopher Flavin, "A New Economy for a new Century." *State of the World 1999,* Washington, DC: Worldwatch Institute, 1999.
5. David Malin Roodman, "Building a Sustainable Society," *State of the World 1999,* op. cit., p. 171.
6. Walter Brueggemann, *Genesis.* Atlanta: John Knox Press, 1982, pp. 32-33.
7. J. Christiaan Beker, *Paul the Apostle: The Triumph of God in Life and Thought.* Philadelphia: Fortress Press,

1980.
Simple Steps to Reduce Global Warming 1. Buy energy-efficient compact fluorescent bulbs for your most-used lights.
Carbon dioxide reduction: (by replacing one frequently used bulb) about 500 pounds a year. 2. Wrap your water heater in an insulating jacket.
Carbon dioxide reduction: up to 1,000 pounds a year. 3. Ask your utility company for a home energy audit to find out where your home is poorly insulated or energy-inefficient.
Carbon dioxide reduction: potentially, thousands of pounds a year. 4. Whenever possible, walk, bike, carpool, or use mass transit.
Carbon dioxide reduction: 20 pounds for every gallon of gasoline saved. 5. When you buy a car, choose one that gets good gas mileage.
Carbon dioxide reduction: about 2,500 pounds a year if your new car gets 10 mpg more than your old one. 6. If your car has an air conditioner, make sure its coolant is recycled whenever you have it serviced.
Equivalent carbon dioxide reduction: thousands of pounds. 7. If you need to replace your windows, install the best energy-saving models.
Carbon dioxide reduction: up to 10,000 pounds a year. 8. Plant trees next to your home and paint your home a light color if you live in a warm climate, or a dark color in a cold climate.
Carbon dioxide reduction: about 5,000 pounds a year. 9. As you replace home appliances, select the most energy-efficient models.
Carbon dioxide reduction: 3,000 pounds a year if you replace your old refrigerator with an efficient model. 10. Be informed about environmental issues. Keep track of candidates' voting records and write or call to express concerns.
Carbon dioxide reduction: billions of pounds if we vote to raise U.S. auto fuel efficiency.

2001 (?) Report of the Commission on Christian Action
The Commission on Christian Action met November 16-17, 2000, on the campuses of Hope College and Western Theological Seminary in Holland, Michigan; and February 9-10, 2001, at the Xavier Retreat and Conference Center in Convent Station, New Jersey.

GENETIC TESTING AND SCREENING
The Commission on Christian Action presented reports on genetic engineering to the General Synod in 1988 and in 1999. The 1999 General Synod voted to circulate the 1999 report, "Genetic Engineering: An Update" (*MGS 1999,* pp. 87-98) and directed the Office of Social Witness and the RCA Distribution Center to make study resources available to RCA members and congregations (*MGS 1999,* R-28, p. 98). In November 2000 the commission and the Office of Social Witness presented a forum, "New Genetics: Issues in Science, Faith, and Ethics," on the campuses of Hope College and Western Theological Seminary. The1999 General Synod also directed the Commission on Christian Action to follow the 1999 paper with an analysis of the moral and ethical questions that genetic engineering raises, for report to the General Synod 2001 (*MGS 1999,* R-22, p. 98).

The explosion of new genetic technologies, increasingly available for widespread medical and legal use, has brought with it new and difficult ethical questions. These new questions are difficult because the technologies are breaking new ethical ground. There are few standards by which to make an ethical evaluation of the new technologies. Yet many will be faced with these questions for themselves, for family members, or by people seeking pastoral advice. It is important for the church to be involved in the questions raised by genetic technologies not only to serve church members who are faced with the questions brought about by genetic technologies but also to be a part of a dialogue about the ethical issues. To be an effective partner in this dialogue the church must be informed by *both* science and faith.
Genetic technology is a broad term that includes genetically engineered food, animal and human cloning, use of stem cells, gene therapy, gene replacement, genetic enhancement, genetic testing, and genetic screening. This paper focuses on genetic testing and screening, two of the most commonly used genetic technologies. The commission hopes to address issues raised by some of the other areas of genetic technologies in future papers.

Genetic testing employs a wide variety of laboratory tests to determine the genetic status of *individuals* already suspected to be at high risk for a particular genetic condition based on family history or a positive screening test. Genetic screening is the testing of apparently healthy individuals in a *population* to identify those at increased risk of genetic disease themselves or whose children (including future children) may be at increased risk of disease.

Techniques used for genetic testing and screening

Both genetic testing and genetic screening use similar or identical techniques. The techniques seek to identify some DNA change or genetic variant known to be associated with a genetic disease or to match a sample of DNA to the individual from whom it came. A genetic variant known to be associated with a genetic disease can be called a mutation or a mutant gene. Mutations can be inherited or acquired spontaneously. The mutant gene contributes to the disease by failing to produce the protein product it should or by producing a protein product that fails to perform its proper function. Mutant genes associated with many genetic diseases have been discovered and more are likely to be found as the Human Genome Project has now been completed and its information becomes readily available for research use.

The actual techniques used for genetic testing and screening vary. The results of genetic tests depend on reliable laboratory procedures and accurate interpretation of the test results. The tests vary in their sensitivity or their ability to detect mutant genes in all patients that have or will have the disease associated with that mutant gene. The tests can be performed on embryos, fetuses, children, or adults. The precise technique used depends on the amount of tissue available for testing and the type of mutation expected. Techniques that are commonly used for genetic testing and screening include:

1. Ultrasound or sonograms use high frequency sound waves to image a fetus. This is a genetic test/screen that can identify genetic disorders that are already present as an observable phenotype (trait). For example, achondroplasia (a form of dwarfism) can be detected by ultrasound.
2. Karyotypes are an examination of banding patterns, size and number of an individual's chromosomes. This technique can detect large changes in chromosome number or structure. Down's syndrome can be detected by a karyotype.
3. Polymerase chain reaction (PCR) is a technique that amplifies minute amounts of DNA for further analysis, provided some sequence information about the trait is known. PCR is important if the sample for testing is very small. PCR is used to identify specific sequence changes or changes in the number of a small repeating sequence of DNA. PCR is used in pre-implantation genetic testing.
4. Restriction fragment length polymorphism (RFLP) is a technique that takes advantage of the fact that some mutations change the size of some DNA fragments. RFLP analysis can be used to identify single changes or other small changes in DNA sequence.
5. Variable number of tandem repeats (VNTR) is a technique that takes advantage of natural variation found in individuals and is useful in matching a sample of DNA to the individual from whom it came.
6. Allele-specific oligonucleotide hybridization (ASO) is used to detect a common and very specific mutation, known to cause a disease phenotype. ASO can be used to detect a carrier of the gene for cystic fibrosis.
7. DNA sequencing is used to determine the exact sequences of bases (nucleotides, often represented by the letters C, A, T, and G) in the gene of the individual being tested. DNA sequencing is used to detect mutant forms of the breast cancer genes, BRCA1 and BRCA2.
8. Chemical/protein detection identifies abnormal or absent protein products of mutant genes; or excessive or insufficient chemical levels associated with failure of a gene product to function properly. Testing for phenylketonuria (PKU) detects unmetabolized phenylalanine, a natural product that is not metabolized in PKU patients.

Types of genetic testing and screening

Genetic testing and screening can be grouped into three major categories or types according to the reason for testing, the type of DNA variant expected, and the age or stage of development of the individual. The first category is testing or screening for **identification**. Genetic testing or screening for the purpose of identification can be used at any age after birth and a variety of DNA tests can be used. Common uses of genetic testing or screening for identification include legal cases to determine paternity, forensics to eliminate or include suspects in criminal investigations, or to identify victims of crimes. Testing or screening for identification can also be used to identify victims of war, accidents, or large-scale disasters such as earthquakes.

Genetic testing and screening can also be performed on **offspring**. Offspring may be tested at various times during development. Newborn genetic tests are performed on infants within days of birth. The tests can detect specific genetic diseases by examining a DNA or a blood sample from the infant. Some newborn tests are routine. For example, infants born in all U.S. states are routinely tested for phenylketonuria (PKU) and congenital hypothyroidism. If there is a family history of a specific genetic disease, other tests may be performed. These tests are done for reasons that extend beyond reassurance. For certain genetic diseases, early intervention, such as dietary restrictions or hormone therapy, can reduce or prevent the devastating consequences of the genetic disorder. Children with some genetic disorders clearly benefit from an early genetic test. But, for which genetic disorders should newborn tests be performed and who should make that decision? Three groups, the American Society of Human Genetics, the American College of Medical Genetics, and the Task Force on Genetic Testing created by the National Institutes of Health, suggest that genetic testing of children is justified when there is direct medical benefit for the child, a benefit that would be lost by waiting until the child reaches the age at which the disease manifests itself.

Prenatal testing is performed during pregnancy at various times between implantation of an embryo and birth. There are many forms of prenatal testing that are commonly used. Elevated alpha-fetoprotein levels in the mother's blood may indicate fetal neural defects. Ultrasound can image the development of fetal organs and can detect genetic abnormalities that disrupt normal organ development. Chorionic villi sampling and amniocentesis are genetic tests in which a sample of fetal cells is examined by karyotype or another genetic test. Karyotype analysis of fetal cells can detect large changes in chromosome number or structure. Typically these tests are done for reassurance that all is well with the pregnancy. However the test results give probabilities, not complete assurance. Karyotype analysis may not reveal some genetic abnormalities and ultrasound exams reveal only genetic diseases that are manifested as a visible abnormality.

Doing a genetic test is never a neutral act. The new knowledge requires a response, in some cases that may mean facing a difficult decision. When people seek genetic testing they must be ready to face the new responsibilities and sometimes difficult decisions presented by the knowledge the test will provide. It is not clear that individuals undergoing some of these common tests, such as ultrasound, recognize them as genetic tests or are ready for the situation they face if the test results are different than they hoped or expected.

Pre-implantation testing is the newest form of genetic testing of offspring. It is used in conjunction with in vitro fertilization technology when couples know that there is a high probability that their offspring will have a genetic disease. Eggs are harvested from the mother and fertilized in vitro using sperm from the father and techniques that are now quite standard. The fertilized egg begins to grow, divide, and then a few cells from the embryo are removed and tested for a specific mutant gene. Only the embryos that lack the mutant form of the gene are used for implantation. The motivation for use of pre-implantation genetic testing is to have healthy babies and to avoid the suffering that accompanies so many genetic diseases. Increasing the likelihood of a healthy child and avoidance of suffering seem like good reasons to pursue pre-implantation genetic testing. Ethical questions come in to play, however, when people decide which diseases are serious enough to avoid. Ethicists caution against viewing children as commodities and ask if healthy children are a right or a gift. They suggest that our society is moving from an attitude of accepting the children we are given as gifts, to deciding which children, which gifts, we will accept.

Prenatal and pre-implantation genetic testing intensifies the abortion issue. The status of and what is to be done with embryos not used for implantation remains unclear and controversial. Parents who, through prenatal testing, learn that the child they are expecting will suffer from a terrible genetic disease are faced with enduring the pain and suffering of abortion or the pain and suffering their child will experience.

The final category of genetic testing and screening is adult genetic testing/screening. A variety of techniques are used for genetic testing and screening of adults, depending on the nature of the genetic mutation that is expected. The techniques used, though, all try to identify a particular genetic mutation that can cause genetic disease but has not yet exhibited any symptoms. Adult genetic testing and screening is also done for several different reasons.

Carrier testing identifies individuals who are carriers of recessive genetic disorders. The individuals being tested are unaffected but have a possibility of giving birth to an affected child. Carrier testing is usually performed when individuals have reason to suspect they carry a mutant gene based on family history. The most common reason individuals seek carrier testing is to make informed childbearing decisions.

Alternatively, adults may seek genetic testing to define their risks for dominant late-onset disorders-genetic diseases in which disease symptoms do not appear until adulthood. Genetic testing for dominant late-onset genetic diseases, presymptomatic genetic testing, can detect an individual who will definitely succumb to a genetic disease later in life. Huntington's chorea is an example of such a disease. All individuals with a mutant form of the Huntington's disease gene will get Huntington's disease. Information from these tests does not (yet) provide escape from the disease, only knowledge about whether the person tested will or will not get the disease in the future. Presymptomatic testing is indicated if an individual has reason to suspect they carry a dominant late-onset gene based on family history.

Predispositional genetic testing is used to determine the risk for late-onset genetic diseases that have less than 100 percent penetrance. Individuals who carry these mutant gene forms are at increased risk for some genetic diseases but getting the disease is not inevitable. Many of the genetics tests available currently for late-onset genetic diseases with partial penetrance detect genes for cancer, heart disease, or Alzheimer's disease. An example of one such test is a test for the genes that predispose individuals to breast cancer. BRCA1 is one of these genes and a genetic test for the mutant form of this gene is now available. Women face an 11 percent risk of getting breast cancer by age seventy. If, however, they carry a mutant form of BRCA1 that risk increases to 50 percent by age forty-seven and 80 percent by age seventy. A positive predispositional genetic test does not mean that an individual will get the disease for which he or she was tested and a negative test does not eliminate risk for the disease. The test refines the risk, providing a more accurate picture of the risk faced by the individual that was tested.

Consequences of genetic testing and screening

Genetic testing and screening offers many attractive benefits to individuals and to society. Identification testing can exonerate someone who was unjustly convicted or accused of a crime; it can identify victims of crimes, accidents, war, or disasters, giving information that may provide comfort and closure to family members; and it can clarify paternity, which may be important for financial, medical, or other reasons.

Offspring testing and screening may provide reassurance to prospective parents, but it really only provides information about probabilities, not assurances. It can prevent the devastating effects of some genetic diseases or define care and management options for other diseases. Offspring testing can lead to avoidance of the suffering that would be an inevitable part of the life of a child born with a genetic disease, or provide parents with the information necessary to make an informed choice. Pre-implantation testing can greatly increase the probability of having a healthy baby.

Adult testing aids in making informed childbearing decisions. It also clarifies an individual's risk for a particular disease, determining whether that individual is at the same risk as the general population or at a higher risk level. Clarifying risk can help define care and management options, such as revealing whether or not a significant lifestyle change is required, if aggressive drug therapy is necessary, or even if a prophylactic mastectomy or oophorectomy is warranted. Finally, test results can provide psychological relief regardless of the outcome. Patients usually indicate that the knowledge provided by genetic testing brings a sense of power-at least the enemy has been identified and they know what they are combating.

The information received from genetic testing can also lead to potential problems. Genetic testing patients may blame family members for passing on a mutant gene. Others may experience survivor's guilt, along with questions as to why they were spared and others were not. Some parents or grandparents may feel guilty for passing a defective gene to affected children. Other patients may develop a fatalistic view of life, coming to believe that we are nothing more than the products of our genes and all has been decided in advance.

Of great concern to genetic testing patients is the potential misuse or misappropriation of test findings that may result in loss of insurance (life, health, or disability) or in the denial of benefit payments. Other patients may be subjected to discriminatory actions, including the potential loss of employment due to the revelation of genetic test findings. Finally, some patients may experience recrimination from a society that may disagree with a particular life decision made in light of test information. Such may be the case of a parent who chooses to give birth to a critically ill child, nearly certain to succumb to death in early life, whose brief survival results in great financial cost to the health care system.

Issues for public policy

Public policy must address issues of safety and accuracy of the tests and the laboratories in which they are

performed. Tests must be reliable and safe. Furthermore, tests must be interpreted accurately. A fully certified genetic counselor should be involved whenever possible to communicate the information accurately and to provide counseling support.

Issues of confidentiality should also be addressed and must clearly regulate who has access to the information from genetic testing. If insurance companies pay for the test they may want access to the test results. But it is not yet clear whether they should have access to that information or if it belongs solely to the patient.

The requirements of informed consent must also be clearly regulated. Genetic testing is not done in isolation. The results affect the genetic status of other family members, offspring, and future offspring. Identification of the patient is not easy. For example, in prenatal testing, are the patients the parents or is the patient the child? If a person tests positive for a mutant gene, does that person owe that information to other family members who now have an increased probability of also carrying the mutant gene? Individuals seeking genetic testing must understand beforehand that the information acquired from genetic testing is not information they receive in a vacuum. The information will likely affect a large number of other people and those who will be affected should be informed before the test is performed.

Finally, genetic testing can be very expensive and society must deal with the issue of extreme disparity of available health care. While our society is debating the merits of genetic testing for rare diseases, children worldwide are dying of simple problems such as hunger and diarrhea. Jesus teaches us in the parable of the sheep and the goats (Matt. 25) that we are to be a voice for those who have no voice. “Truly I tell you, just as you did it to one of the least of these who are members of my family, you did it to me” (Matt. 25:40) and alternatively, “Truly I tell you, just as you did not do it to one of the least of these, you did not do it to me” (Matt 25:45).

The current state of disparity in health care between the wealthy and the poor should not be tolerable to Christians. Increased technology has the potential for making the current disparity greater. Genetic testing and screening should be available to all whom it could benefit, regardless of their income level. To that end, public policy must assure that health care programs for the poor provide necessary funds to pay for equal access to genetic testing and its benefits.

The outlook for the benefits of genetic testing and screening is optimistic. Genetic testing and screening has an enormous potential to contribute in a positive way to human society and individual lives. It can lead to increased quantity and/or quality of life, has the potential to reduce health care costs, and it is the first step in gene therapy or gene replacement technology. Gene therapy/replacement contains additional ethical concerns and in that light genetic testing and screening may actually lead to pharmacogenetic treatments and decreased need for gene therapy. Pharmacogenetics is a new area of research that uses specific genetic information for a patient to design drugs that will act best for that particular individual with their unique genetic structure. Genetic testing is one of the first steps in pharmacogenetics.

The role of the church

The church must be solidly informed by both faith and science if it is to play a role in shaping the ethical context surrounding genetic testing and screening. The church needs to possess an accurate, complete, and sophisticated understanding of the scientific issues. The scientific community appears to be open to ethical input, as evidenced by the money set aside by the Human Genome Project for studying the ethical issues that it evokes.

Genetic testing and screening provide us with increased information. The writer of Ecclesiastes reminds us that “with much wisdom comes much sorrow; the more knowledge the more grief” (Eccles. 1:18, NIV). Increased knowledge inevitably brings increased moral responsibility. Genetic testing is never a neutral act. Once information from genetic testing is acquired, there is no avoiding some response. Inaction is no less a response than action. The church needs to stand with, support, and share the love of Christ with our brothers and sisters responding to information received from genetic testing.

The church has an important role to play in providing a biblical perspective on disease, suffering, and wholeness. A deeper, more holistic perspective will offer a word of caution to society, which seems so eager to seize on the hope of perfection through technology. We must remind our fellow humanity that technological advances, no matter how marvelous, will not save us. Salvation and wholeness finally come only through Jesus Christ.

The church is always predisposed toward efforts both to alleviate suffering and value life, although neither is finally our ultimate loyalty. As we encounter issues surrounding genetic testing and screening, we proceed with caution, with accurate scientific information, and as prayerful, humble creatures.

Glossary

Alpha-fetoprotein (AFP) A protein normally synthesized by the liver, yolk sac, and GI tract of a human fetus, but which may be found elevated in the sera of adults having certain malignancies or carrying a fetus with neural defects.

Clone Organism, cells, or molecules that are descended from a single progenitor.

Congenital hypothyroidism Inherited condition in which the thyroid gland is overactive. The gland is usually enlarged, secreting greater than normal amounts of thyroid hormones, and the metabolic processes of the body are accelerated.

Deoxyribonucleic acid (DNA) A large nucleic acid molecule found primarily in the nuclei of cells where it functions as the carrier of genetic information.

Dominant late-onset disorders Disorders that are manifested when an individual carries only one copy of the mutant gene but the symptoms of the disease do not appear until after the age of reproduction.

Embryo The stage of human prenatal development between the time of implantation (about two weeks after conception) until the seventh or eighth week of development. The stage is characterized by rapid growth, differentiation of the major organ systems, and development of the main external features.

Fetus The stage of human prenatal development after the embryonic period, usually from the eighth week after conception to birth.

Gene replacement Form of gene therapy in which a normal or functional gene is introduced in such a way that it replaces the resident faulty gene, restoring normal function to the cell in which the replacement occurs.

Gene therapy The correction of a genetic deficiency in a cell by the addition of new DNA and its random insertion into the genome.

Genetic enhancement A form of gene therapy in which the resultant change does not correct a clear genetic deficiency, but rather improves or augments a normal function already present in the cell or organism.

Genetic screening The testing of apparently healthy individuals in a population to identify those at increased risk of genetic disease themselves or whose children (including future children) may be at increased risk of disease.

Genetic testing Tests that determine the genetic status of individuals already suspected to be at high risk for a particular genetic condition based on family history or a positive screening test.

Huntington's chorea A lethal human disease of nerve degeneration with late-age onset. It is inherited as an autosomal dominant phenotype.

In vitro fertilization Fusion of sperm and ovum (egg) outside of the female reproductive tract.

Karyotype The entire chromosome compliment of an individual or cell, as seen during mitotic metaphase.

Mastectomy The surgical removal of one or both breasts.

Mutant gene A gene carrying a mutation.

Mutation The process that produces a gene or chromosome set that differs from wild-type (normal/typical) or the gene or chromosome set that results from such a process.

Oophorectomy The surgical removal of one or both ovaries.

Pharmacogenetics New form of drug therapy that uses specific genetic information for a patient to design drugs that will act best for that particular individual with his or her unique genetic structure.

Phenotype The detectable outward manifestation of a specific gene or set of genes carried by an organism.

Phenylketonuria A human metabolic disease caused by a mutation in a gene encoding a phenylalanine-processing enzyme, which leads to mental retardation if not treated; inherited as an autosomal recessive phenotype.

Recessive genetic disorders Genetic disorder that is only expressed as a phenotype in individuals homozygous for the recessive gene; the individual must possess two copies of the mutant gene to express the phenotype.

Stem cells Cells that divide, generally asymmetrically, to give rise to two different progeny cells. One is a stem cell like the parental cell and the other is a cell that enters a differentiation or specialization pathway.

Resources

Willer, R.A., Editor, *Genetic Testing and Screening: Critical Engagement at the Intersection of Faith and Science*, Kirk House Publishers, 1998, ISBN 1886513112

Alliance of Genetic Support Groups, http://medhlp.netusa.net/222/agsg.html

Human Inheritable Genetic Modifications: Assessing Scientific, Ethical, Religious and Policy Issues, http://www.aaas.org/spp/dspp/sfrl/germline/main.htm

March of Dimes Birth Defects Foundation, http://www.noah.cuny.edu/providers/mod.html
National Reference Center for Bioethics Literature, http://www.georgetown.edu/ research/nrcbl/scopenotes/ sn22.htm
National Society of Genetic Counselors, http://members.aol.com/nsgcweb/nsgchome.htm
The Council of Regional Networks, http://www.cc.emory.edu/pediatrics/corn/member/ coorlist.htm
The National Human Genome Research Institute, http://www4.od.nih.gov/oba/sacgt.htm
Understanding Genetic Testing, http://www.gene.com/ae/ae/aepc/nih/index.html
What is Genetic Testing? http://www.lbl.gov/education/elsi/frames/genetic-testing-f.html

R-105

To direct the RCA Distribution Center to make the paper, "Genetic Testing and Screening," and the 1999 paper, "Genetic Engineering: An Update," available to congregations for study and discussion. (ADOPTED)

R-106

To encourage RCA congregations to identify genetic counselors and other resource people in their communities who can help church members with education, guidance, and support con-cerning the issues of genetic testing and screening. (ADOPTED)

R-107

To encourage RCA seminaries to include in their curricula opportunities for study and discussion of the ethical issues raised by new genetic technologies. (ADOPTED)

R-108

To request that congregations send to the Office of Social Witness the names of genetic counselors, scientists, health professionals, and others who could serve as resource people and/or represent the denomination in ecumenical forums and dialogues concerning the issues raised by new genetic technologies.

The advisory committee recommended:

R-108 (amendment)

To request that congregations send to the Office of Social Witness the names of genetic counselors, scientists, health professionals, <u>Christian ethicists,</u> and others who could serve as resource people and/or represent the denomination in ecumenical forums and dialogues concerning the issues raised by new genetic technologies. (ADOPTED AS AMENDED)

Reason: To ensure that Christian ethical perspectives are represented in the dialogues.

The advisory committee presented a new recommendation:

R-109

To direct the Commission on Theology to produce a position paper on the ethical and theological implications of the paper, "Genetic Testing and Screening," for report to General Synod 2003. (NOT ADOPTED)

Reason: To provide guidance and assistance to members of the RCA in dealing with these ethical issues.

The advisory committee presented a new recommendation:

R-110

To request that the Office of Social Witness compile a summary of previous General Synod statements on genetics and related issues and make this available to the church. (ADOPTED)

Reason: To provide guidance and assistance to members of the RCA in dealing with these ethical issues.

The advisory committee presented a new recommendation:

R-111

To direct the Office of Social Witness to explore with the larger Christian community the ethical and theological issues raised by new genetic technologies. (ADOPTED)

Reason: To cooperate with other Christian communities in offering ethical counsel to the wider society.

BREAD FOR THE WORLD COVENANT CHURCH PROGRAM

The 2000 General Synod voted "to encourage RCA congregations to become Bread for the World covenant churches" (*MGS 2000*, R-126, p. 447). Bread for the World is a Christian citizens' movement that seeks justice for the world's hungry people by communicating with U.S. legislators and advocating for policies that help people

in need. Through the covenant church program a church commits itself to integrate hunger concerns into the life of the congregation. Bread for the World provides education, worship, and action resources for the congregation's hunger ministry and witness.

Many RCA congregations are responding to the needs of those who are poor and hungry by providing direct assistance and by offering support, training, and encouragement to help people move toward the goal of gainful employment. RCA members and congregations also advocate with governmental leaders concerning public policies that directly affect the lives of the poor. The solutions to poverty and hunger call for acts of both generosity and justice-sharing our substance with those in need and working for a society and a world where none are forgotten or left behind. God calls us "to share your bread with the hungry" (Is. 58:7) and also to "loose the bonds of injustice...to let the oppressed go free" (Is. 58:6). The Bread for the World Covenant Church program provides important resources, guidance, and encouragement for this part of the church's ministry and public witness.

R-112

To commend the following RCA congregations for their participation in the Bread for the World Covenant Church program and for their ministry and witness on behalf of poor and hungry people.

First Reformed Church, Schenectady, New York
Pitcher Hill Community Church, North Syracuse, New York
Sunnyside Reformed Church, Long Island City, New York
Reformed Church of Locust Valley, Locust Valley, New York
Colts Neck Reformed Church, Colts Neck, New Jersey
Second Reformed Church, Kalamazoo, Michigan
Christ Memorial Reformed Church, Holland, Michigan
Church of the Master, Warren, Michigan
Covenant Community Church, Muskegon Heights, Michigan
Hope Church, Holland, Michigan
Maplewood Reformed Church, Holland, Michigan
Third Reformed Church, Holland, Michigan
American Reformed Church, Orange City, Iowa
Meredith Drive Reformed Church, Des Moines, Iowa
Christ's Community Church, Glendale, Arizona

(ADOPTED)

AFRICA: HUNGER TO HARVEST

The 1999 General Synod endorsed the Jubilee 2000 Campaign calling for debt relief for the world's heavily indebted poor countries (*MGS 1999*, R-26, p. 110). The synod also voted to encourage local churches to join the 1999 Bread for the World offering of letters campaign, in support of legislation that would effect debt relief for some of the world's heavily indebted poor countries (*MGS 1999*, R-28, p. 111). Thanks to an intensive lobbying campaign and numerous letters from individuals (Bread for the World members generated more than a quarter million letters to members of Congress), the U.S. Congress approved $545 million over the last two years toward the U.S. share of the international debt relief plan. The World Bank and other international financial institutions also announced a major shift in policy that would tie debt relief efforts to poverty reduction.

In return for debt relief, countries must make a commitment to spend the savings on desperately needed human services, including nutrition, health care, education, and clean water. Poor people in more than a dozen sub-Saharan African countries are already benefiting. Uganda, for example, has used debt relief to help raise primary school enrollment from 54 percent to 90 percent and has also managed to bring down the HIV infection rate, mainly through community education programs.

Bread for the World's 2001 Offering of Letters, "Africa: Hunger to Harvest," urges the U.S. Congress to help reduce hunger in Africa through continued funding for debt relief and an increase of $1 billion in poverty-focused assistance to Africa. Sub-Saharan Africa is the only region of the world where hunger is widespread and increasing.

With this additional aid African countries could better carry out development programs that give communities the capacity to improve education, health, agriculture, and economic opportunity. The cost to U.S. taxpayers would amount to one penny a day per U.S. citizen. By making this commitment to Africa, the United States could

leverage as much as another $4 billion in development aid from other countries.
Despite positive economic and political changes in Africa, severe problems remain. In sub-Saharan Africa, one of every three persons is chronically undernourished. One child out of every seven dies before his or her fifth birthday, and half of these deaths are due to malnutrition. This hunger has multiple causes, including severe poverty, the HIV/AIDS pandemic, civil wars, continued foreign debt, degraded land, and inadequate education. African nations need additional U.S. aid to develop their human and natural resources-and thereby strengthen their capacity to deal with hunger, poverty, and related problems. Among other things, sub-Saharan Africa needs 1) resources to improve farming and support farmer-owned businesses, 2) to prevent and treat HIV/AIDS, malaria, tuberculosis, and other infectious diseases, 3) to enroll more children in school (especially girls, who are often kept out), and 4) to create microenterprises and business opportunities. Such poverty-focused development aid has proven effective, especially when no longer influenced by the geo-politics of the cold war and when development programs include the involvement of local community organizations and citizens groups.
In spite of this, U.S. foreign aid has declined steadily over the last fifteen years and is now one-fifth of what it was in 1962. Aid to Africa from the U.S. has dropped by 20 percent since 1990. Currently the U.S allocates less than 1 percent to foreign aid overall. Development assistance to sub-Saharan Africa is about one-twentieth of 1 percent. The United States ranks last among twenty-two industrialized nations in the percentage of gross national product (GNP) given as development assistance.
Poverty-focused development assistance and debt relief work best together. Debt relief allows a country to redirect money from debt payments toward meeting basic human needs: clean water, basic education, health care, and food. In addition to increased development assistance, “Africa: Hunger to Harvest” will advocate for the remaining appropriation necessary to fulfill the U.S. commitment to the international debt relief plan-$240 million for fiscal year 2002.
With well-targeted development assistance and continued debt reduction, the U.S. and other wealthy nations can increase the ability of African nations to manage their own development and eventually decrease the need for further aid. Ultimately such programs can bring an end to hunger. Through the simple act of writing letters, Christian citizens can work together to advocate for national and international policies that can dramatically affect the lives of millions of our brothers and sisters in Africa.

R-113

To encourage RCA congregations to participate in the Bread for the World 2001 offering of letters campaign, “Africa: Hunger to Harvest.” (ADOPTED)

The advisory committee presented a new recommendation:

R-114

To give participants of General Synod 2002 the option of fasting one meal, with the money saved designated for Bread for the World. (ADOPTED)

Reason: To give delegates an opportunity to put their faith into action.l

Future Work

The commission continues to research issues raised by new genetic technologies, such as the use of stem cells, gene therapy, and cloning. Other concerns the commission has discussed and may explore further include: agricultural/economic issues, health care reform, ethical investing, peace and justice in Israel/Palestine, and partnerships between government and “faith-based” organizations in meeting social needs. Members of the commission also welcome suggestions and communications from the church. They can be sent to the commission c/o John Paarlberg, Minister for Social Witness and Worship at jpaarlberg@rca.org.
On behalf of the church, the commission thanks those who are completing their terms of service: Don De Young and Fred Mueller, who served as moderator. They brought important gifts and passions to the work of the commission. Their presence has enriched both the life of the commission and the witness of the church.

Report of the Commission on Christian Action

The Commission on Christian Action met October 19-20, 2001, at Loyola of the Cenacle in Chicago, Illinois, and January 31-February 2, 2002, at the Duncan Retreat Center in Delray Beach, Florida.

THE CREATION AND USE OF EMBRYONIC STEM CELLS, 2002

In December 1999 the journal *Science* declared stem cells the "breakthrough of the year." Promising what appear to be miraculous cures but surrounded with ethical controversy, the creation and use of embryonic stem cells presents an area where Christians find themselves divided. However, even in the absence of complete consensus, the members of the church must engage each other and society, exploring the complex new issues presented by science within the framework of our Christian faith.

Background

The Commission on Christian Action presented reports on genetic engineering to the General Synod in 1988 and in 1999. The 1999 General Synod voted to circulate the 1999 report, "Genetic Engineering: An Update" and directed the Office of Social Witness and the RCA Distribution Center to make study resources available to RCA members and congregations (*MGS 1999*, p. 87-98). The 1999 General Synod also directed the Commission on Christian Action to follow the 1999 paper with an analysis of the moral and ethical questions that genetic engineering raises. Recognizing the enormity of issues encompassed by the term "genetic engineering," the commission determined to address individual, specific issues in separate papers. Toward that goal, the commission and the Office of Social Witness presented a forum, "New Genetics: Issues in Science, Faith, and Ethics," on the campuses of Hope College and Western Theological Seminary in 2000 and presented the paper "Genetic Testing and Screening" to the General Synod 2001. The 2001 General Synod directed the Office of Social Witness and the RCA Distribution Center to make this paper available to congregations for study and discussion (*MGS 2001*, R-105, p. 383).

Continuing to address issues raised by new genetic technologies, the commission presents this paper on the creation and use of human embryonic stem cells. Such a paper is timely in light of the recent public debate over the use of stem cells and the recent decision by U.S. President George W. Bush to allow government funding for limited research using human embryonic stem cells. The purpose of the paper is largely educational, since it is vital that Christians be well-informed in order to contribute meaningfully to the debate on any issue of genetic engineering. The paper will first explain what stem cells and stem cell lines are and how they are created. Then it will describe the potential uses for stem cells, including descriptions of experiments that support the belief that stem cells will be useful to human medicine. Penultimately, the ethical questions surrounding the creation and use of stem cells will be outlined, and some biblical principles that may guide decisions about the creation and use of stem cells will be presented. Finally, recommendations about the creation and use of stem cells will be suggested.

The Creation of Human Embryonic Stem Cells

Human embryonic stem cells are continuous cell lines that are derived directly from the inner cell mass of a human pre-implantation embryo. Embryonic stem cells can be derived from several sources.

1) One source of embryonic stem (ES) cells is from embryos created in fertility clinics for couples seeking to use *in vitro* fertilization techniques to overcome infertility problems. Because harvesting eggs is an unpleasant, difficult procedure and the percentage of successful fertilization and implantation events is unpredictable, often more embryos are created than will be used for implantation. Embryos not used for implantation are frozen away in fertility clinics and used if implantation is unsuccessful or if another pregnancy is desired. These "extra" embryos are frozen at the 32- through 64-cell stage (day 5-6, before normal implantation would occur) and can remain frozen almost indefinitely. Currently, depending on the fertility clinic and on arrangements made with the couple, these embryos are frozen indefinitely, discarded, donated to other couples, or donated to research.

2) Embryonic stem cells can also be obtained by using a technique called somatic cell nuclear transfer (SCNT). In this method the nucleus (the cell structure that contains the chromosomes) from normal unfertilized eggs is removed and the enucleated egg is fused with a nucleus-containing cell derived from an adult. This procedure is more commonly known as the first step in cloning. It has not yet been carried out successfully with human cells. However, given the right conditions, the resulting cell is essentially the same as a fertilized egg in terms of its potential to develop into an organism.

3) ES cells can also be obtained from embryos created in the laboratory for the express purpose of creating stem cell lines. The procedures and techniques for creating the embryos and isolating stem cells, in this case, are identical to the process used by fertility clinics (#1 above) but the intent is different. These embryos are not created for reproduction.

In each of these cases, embryonic stem cell lines are created by removing from the embryos a small group of internal cells, the inner cell mass that would eventually give rise to a developing embryo. With these cells removed the embryo is no longer viable. The extracted cells are then put in culture, given the right mixture of nutrients, vitamins, and hormones and a support for attachment. Under these conditions the cells will continue to grow and divide—thus an embryonic stem cell line is established. The cells can be maintained indefinitely in culture or can be frozen cryogenically for future use.

The cells of the inner cell mass of an embryo are unique compared to cells of an adult organism in that they are totipotent and they retain their totipotency as long they are propagated in culture, if they are given the right mixture of chemicals. Totipotent cells are special and quite rare. They have only been found in these early embryos and in fetuses as the cells that form sperm or egg cells. Totipotent cells are unique in that they have the ability to develop into or specialize to become any one of the 220 cell types that exist in an adult organism; their potential is total (all fates). Adult organisms contain billions of cells that have become specialized to perform unique sets of functions necessary for the body to function. For example, osteocytes of bone tissue maintain the hard, strong matrix of bones. Skeletal muscle cells are specialized for contraction, while most other cells of the body cannot contract. Neurons of nervous tissue are specialized for conducting nerve impulses so there is communication between the different parts of our body. Once specialized, these cells lose their totipotency. They cannot reverse their specialized nature. For example, bone cells cannot become nerve cells. Cells do exist in adult organisms that are multipotent (many fates) or pluripotent (most fates). For example, bone marrow contains pluripotent blood progenitor cells. These cells can develop or specialize to become all types of blood cells—red blood cells, white blood cells, and platelets—but they are limited to becoming blood cells. Only totipotent cells can specialize to become any of the cell types found in an adult organism.

Furthermore, if given the right molecules or mixture of molecules, similar to those they would be exposed to as they develop in the embryo, totipotent cells can respond to these molecules by specializing and becoming a particular type of cell. This ability is exemplified by mouse embryonic stem cells exposed to the molecule retinoic acid. Upon retinoic acid treatment, mouse embryonic stem cells specialize to become neural progenitor cells. Neural progenitor cells are multipotent cells that can produce neurons, the mature, signaling cells of the nervous system. Scientists and medical personnel believe, with good reason, that this unique property renders embryonic stem cells unique in their ability to treat or even cure diseases and disease states for which we now have no treatment.

Embryos are not the only source of totipotent stem cells. There are three other sources/potential sources of totipotent stem cells.
1) Stem cells can be isolated from fetuses that are miscarried. In a developing fetus, some cells differentiate to form sperm and egg cells. These cells are only present in developing fetuses. At birth these cells have specialized. The cells that give rise to sperm or egg cells are totipotent and are therefore a possible source for stem cells. The cells are surgically removed from a fetus in a process that is technically much more difficult than isolation of embryonic stem cells. After isolation the cells are placed in culture and seem to be very similar to embryonic stem cells. Another problem with isolation of stem cells from miscarried fetuses is that the fetal tissue is usually not suitable for stem cell isolation. Miscarried fetuses often have chromosomal abnormalities or die too long before expulsion so that the cells cannot be isolated or used. Sometimes the fetal tissue is even partially reabsorbed by the maternal mucous membranes. So, although in some cases miscarried fetuses may be used for stem cell isolation, in the vast majority of cases this is not a viable source for stem cells.
2) Stem cells can also be isolated from fetuses derived from elective abortions. The problems of tissue death and chromosomal abnormalities associated with miscarriages are avoided, but the moral and ethical problems that arise in this case are significantly greater.
3) It may be possible to isolate stem cells from adult tissue. In adults there are groups of committed stem cells (progenitor cells). These cells are different from embryonic stem cells in that they are not totipotent but rather multipotent (many fates) or pluripotent (most fates). It may be possible that scientists will find a way to “trick”

multipotent or pluripotent cells into returning to a totipotent state. These experiments are ongoing but have not yet been successful. Currently, using multipotent or pluripotent cells will not suffice if totipotent cells are required. But if adult cells are chemically "tricked" into returning to a totipotent state, these cells would presumably have the same potential for developing into an embryo as do cells created by SCNT.
Unless human embryonic stem cells offer benefits or uses that other sources of cells do not, the debate over their creation and use seems rather pointless. But, scientists and medical personnel do believe that human embryonic stem cells offer possible uses/benefits that other cells do not.

The Therapeutic Uses of Human Embryonic Stem Cells
At the level of basic research, totipotent embryonic stem cells could help scientists understand the complex events that occur during human development in ways other cells cannot. Specifically, stem cells could provide an understanding of the molecular process of specialization or differentiation that makes cells change from totipotency at fertilization to the specialized forms of an adult. Understanding the process of specialization also has practical implications for human health. Medical conditions such as cancer and birth defects are often defects in cell specialization. If the normal processes are understood more completely, we may understand why and how failure of the normal processes leads to disease, and the possibility of correcting or preventing the disease is greater.

A very important potential use for human embryonic stem cells is in treatment of disorders and diseases of the nervous system. Scientists believe, with good reason, that embryonic stem cells might be used to cure people with spinal cord injuries. When mice that had their spinal cords severed experimentally were given embryonic stem cells that had been treated with retinoic acid to form neural progenitor cells, the neural progenitor cells migrated along the old, severed pathways, and the mice began walking again. This presents great hope that the same results are possible for humans with spinal cord injuries. Other experiments show that embryonic stem cells can specialize into the type of neurons that are lacking in Parkinson's disease. This suggests that embryonic stem cells might be able to replace these deficient cells and cure this devastating disease.

Uses of human embryonic stem cells are not limited to diseases of the nervous system. Scientists are working on techniques to grow the pancreatic cells that fail to function in some types of diabetes. Other groups are trying to use blood progenitor cells derived from embryonic stem cells to produce blood cells that could replace diseased cells in people with leukemia or lymphoma.
Another important benefit to embryonic stem cell therapy involves the cells' potential ability to avoid the problem of tissue rejection. If stem cells were derived from a human embryo and placed into an adult, the immune system of the adult would recognize those cells as foreign and destroy them. This is like tissue rejection, a problem faced in skin grafting and organ donation. If stem cells were created using somatic cell nuclear transfer (SCNT) or cloning, anyone could use his or her own cells as the source of the nucleus. When that nucleus fused with the enucleated egg and divided, the cells of the resulting embryo would be genetically identical to the donor. If these cells were isolated, a stem cell line created from them, and they were placed back into the adult donor, the adult donor's immune system would recognize them as "self" and would not destroy or reject them.

Clearly embryonic stem cells raise "hopes of dazzling medical applications" (News and editorial staff, *Science*, 286:2238, 1999) but scientists and non-scientists alike also recognize the highly charged, theologically and ethically complex issues that surround embryonic stem cells. It is vital that Christians carefully, faithfully, and compassionately listen to, learn from, and engage themselves in the debates and discussions that will surely continue to surround this important issue.

Ethical Issues
The issues surrounding stem cell research specifically, and genetics more generally, are so new, complex, and ever-changing that Christians should not expect nor offer any simple, definitive conclusions at this time. Christians hold differing—and often opposing—perspectives on such issues. Conversation, education, debate, and continued engagement with the scientific and political questions are all concerns. At the same time, it is also important to begin to frame the issue within some of the pertinent Christian themes and to advance tentative proposals and

responses.

It is true that Christians need to be engaged with the scientific community and conversant about the cutting edge of genetic research. Yet it is at least equally important that we as Christians be grounded in our faith, steeped in the Scriptures, imaginative yet embedded, constantly conversing among ourselves and involved in a robust theological give-and-take. Christians correctly desire to be part of the public dialogue about genetics, but we also need to take care not to be intimidated or to abandon our unique perspectives and resources in these broader conversations.

The issue of embryonic stem cell research is frequently portrayed as pitting interests of human life, in the form of embryos, against the interests of those who suffer from various diseases and injuries. On this view, one perspective holds that embryonic life trumps the alleviation of suffering; the other perspective suggests the contrary. Neither one of these perspectives is sufficiently holistic, complex, or rooted in the full wisdom of Scripture and the Christian faith to address adequately the challenges and possibilities of stem cell technology. Protecting human life and alleviating suffering are both of great importance to Christians, yet each is also too narrow, too private, and too individualistic to address adequately the vast social and theological implications of stem cell technology.

Christians should strive to look at stem cell technology in particular, and genetics in general, against a much broader horizon. They hold the possibility of greatly changing the way we look at children, marriage, sexuality, health, suffering, wholeness, and perfection, along with other implications as yet not even contemplated. No one can foresee the full ramifications for our world or our faith. As Christians we must enrich our theological imaginations with images from Eden, Babel, and the New Jerusalem. We must ponder questions such as: How do we understand suffering? How do we view our bodies? What is salvation? How do we understand our human role as humble creatures, wise stewards, and gifted co-creators?

This introduction cannot begin to imagine all the theological conversations that may develop around stem cell technology. While discussions about embryonic stem cells that revolve only around the themes of protecting life and alleviating suffering are not comprehensive nor satisfactory, those themes do form the common and dominant framework. That framework of discussion will be utilized in this paper.

Valuing and Protecting Human Life

Life is a gift from God. Valuing and protecting life, especially human life, is of vital concern to the Christian faith. Christians have especially sought to protect and value the lives of the weakest and most vulnerable members of society.

Christians opposed to the use of embryonic stem cells frequently point to the destruction of human embryos necessary to culture embryonic stem cells. The most common sources of stem cells are human embryos “left over” from fertility treatments. (Deriving stem cells from aborted fetuses is also possible, although less common. For many Christians this opens the door to providing an incentive or encouragement for abortion. In order to keep this discussion more focused, it will concentrate on stem cells derived from embryos.) From this perspective, our Christian responsibility to safeguard life extends to human embryos. Accordingly, the destruction of human embryos is viewed as equivalent to the taking of human life.

Inevitably, this leads to that enigmatic question, When does life begin? or other questions that are similar: Is an embryo fully equivalent to a person? When do human beings receive a soul? This sort of question is simply not adequate to address the multifaceted issues involved with the beginning of life and the status of human embryos. Neither the Christian nor the scientific communities have been able to reach any consensus about this. Just as “When does life begin?” has been unable to bring any resolution to the issue of abortion, so too it is unlikely to bring clarity or understanding to the issue of stem cells. Of course to call this question inadequate is not in any way to deny the earlier statements that life is always of extreme importance to Christians. However, focusing on the question, “When does life begin?” will ultimately detract from genuine exploration of stem cell issues.

If all Christians shared a clear-cut agreement about the status, value, and protection due to even the earliest of human embryos, and if science was able to pin down all that is elusive about the beginning of life, even this would not end the dilemmas surrounding the use of human embryos for stem cells. While human life holds an extremely high value for the Christian community, life itself has never been viewed as the highest or ultimate value before which all other concerns must yield. In other words, the protection of human life is not a rigid, absolute practice. Martyrdom, self-sacrificial love, and the acceptance of just war, capital punishment, and abortion by some Christians are all instances where Christians have put other concerns and values ahead of human life. This is not to say the use of human embryos for the production of stem cells is such a case, it is only to point out that to try to address stem cell technology on the basis that "life has begun" is flawed.

Even if it were agreed that an embryo is fully equivalent to a human being, this would not necessarily preclude the use of embryos to develop stem cells. First, it may be asked whether maintaining frozen embryos indefinitely, with almost no prospect for gestation and birth, displays any more value or protection for these embryos than using them for research. Secondly, drawing an analogy between the development of embryonic stem cells and organ donation can be instructive. Just as parents whose child is dying might consent to their child becoming an organ donor, might parents give consent for their frozen embryos or embryos slated for disposal to be used in the development of stem cells? It is the parents' responsibility to protect and care for their child's best interests. Yet Christians do not believe our children are our "private property." Because children are entrusted to us by God, we raise our children to help others and assist God's purposes in the world. Christian parents want their children to be a blessing and gift to the world. Parents who consent to the use of their embryos for stem cell development might view their consent in this manner. Parents would be graciously offering a gift to those whose suffering might be relieved. To allow an embryo to be used for stem cell development could be seen as honoring and valuing that embryo in a manner greater than keeping it permanently frozen or disposing of it.

By the same token, because "When does life begin?" is so murky and ambiguous, the attempts to "draw some line" before which human embryos are less valued is equally imprecise and suspect. The developmental process of the human embryo makes it extremely difficult to find any obvious point at which to say that the embryo's status has plainly or significantly changed. The argument that embryos less than fourteen days old (the time when the possibility of twinning is past and implantation in the uterine wall has occurred) are "pre-embryos" seems strangely artificial and arbitrary. Deciding on a time when embryos merit more protection or respect is just as problematic as deciding when life begins.

Relieving Human Suffering

"Cure the sick, raise the dead, cleanse lepers, cast out demons." So Jesus commands his disciples in Matthew 10:8. Christians have always been at the forefront of the medical arts, seeking to cure diseases and to alleviate suffering. Similarly, the Christian faith has been an impetus to increase human knowledge and to explore God's creation. In a discussion of genetics, the church does not want to do as it did during the time of Galileo, providing a theological defense for a false, outdated point of view.

This desire to cure the sick, lessen suffering, increase knowledge, and encourage exploration holds an important place in many Christians' rationale for supporting stem cell technology. These Christians believe that the ministry of healing and wholeness is continued through stem cell research. They point to the incredible potential, the amazing benefits that could come from it. Accordingly, these Christians believe that although human embryos merit deep respect, the possible medical breakthroughs from stem cells warrant the use and destruction of these embryos. The possibility of using stem cell technology to cure diabetes, Parkinson's or Alzheimer's disease, or reverse paralysis due to spinal injuries makes this technology an extremely meaningful and attractive pursuit. The opportunity is greater than simply relieving suffering. It could so profoundly change the quality of life of some individuals that it brings to mind Jesus' proclamation that he has come so that "that they might have life, and have it abundantly" (John 10:10).

God has entrusted humanity with incredible resources, creativity, and knowledge. Christians seek to pursue good

with these gifts. Expressing creativity and participating in God's creating work is one of the great gifts God has entrusted to humankind. Developing stem cell technology can be understood as part of the human task to be creative. Of course, this role as God's creative agents in the world is to be done carefully and humbly. Yet warnings against "playing God" are often wrongly used to stifle human creativity and exploration. Vaccines and organ transplants, now accepted and received with thankfulness, were once criticized as "playing God."

Other Christians appreciate the potential benefits from stem cell technology yet wonder where the Christian mandate to heal ends, and where a dangerous sort of outcome-based utilitarianism begins. To know ahead of time the desirable result, and then do almost anything to achieve that outcome, produces a precarious "end justifies the means" mindset. Christians must be wary of making ethical decisions on the basis of "cost-benefit analysis." None of us can be indifferent to suffering caused by various diseases and injuries; still a good result—even an amazing result—cannot be justification for wrongful actions. Christians do not endorse the view that simply because science can do something, it should be done. There is an important difference between doing all the good one morally can do, and doing all the good one possibly can do. Genetic engineering pushes humankind into areas where over-reaching our creativity and knowledge becomes a genuine concern. The Christian claim that salvation is in Jesus Christ may humbly remind our world of the risk of seeking too much from medicine and technology, and can work against the illusion that human beings bear ultimate responsibility for overcoming suffering and conquering disease.

The exact moral status of human embryos may remain undecided, but Christians should be hesitant to view them as raw materials necessary to manufacture a product, or a supplier of parts for medical technology. The issue here is much more than a concern for embryos. Instead, there is a concern for a far-reaching, yet subtle form of dehumanization. There is a concern to maintain an understanding of people as more than parts and flesh, and the human body as more than a "thing." It may sound very insensitive to those who suffer, but overcoming disease may be a too limited and narrow perspective, if overcoming that disease distinctly alters the way we view and value the body, human life, and what it means to be human. There is no need for sensationalistic science-fiction scenarios of what the future could hold. Yet the possibility of broad, still unforeseeable, long-term detriment to our social fabric causes some Christians to believe that reluctance and caution toward embryonic stems is the prudent path.

Moreover, while the curing of disease and lessening of human suffering are laudable pursuits, there should be no naiveté about the fact that mingled with these noble pursuits are desires for huge monetary profits and great corporate fortunes. Similarly, those who will potentially benefit from stem cells are certainly the wealthy and privileged. That most of the current stem cell lines were developed from embryos from more affluent societies reveals this connection between wealth and potential stem cell benefits. Such criticism of stem cell technology becomes even more piercing against a backdrop where millions in the U.S. have no have health insurance, millions in Africa with AIDS go untreated, and common diarrhea remains a deadly killer in much of the world.

Those Christians who are reluctant or oppose the development of embryonic stem cells must be attentive not to exhibit a blithe or cavalier attitude toward suffering. Those persons whose suffering might potentially be alleviated through the stem cell technology can rightly ask hard questions about this reticence toward stem cell technology. We must be prepared to discuss their questions and hear their cries. At the same time, Christians can express and embody a sort of compassion that may not be willing to relieve another's suffering at an ethically dubious cost, but is willing to suffer with and support those who suffer. The questions surrounding stem cells powerfully and pointedly remind us that suffering is often alleviated only through sacrifice. Too often we look to others, especially the weak and poor, to make those sacrifices, or we grasp for distant, faceless, apparently cost-free technologies that promise to relieve suffering. As followers of Christ, let us first look to ourselves to make the sacrifices that might relieve the suffering of others.

Provisional Proposals

The questions surrounding stem cell technology are complex and clouded. There are a variety of views within the

Christian community. This variety and disagreement is evident among the members of the Commission on Christian Action, which is unable to find consensus on some topics. The various sources of embryonic stem cells warrant different moral evaluations.

From Miscarriages: There is some possibility of developing stem cells from miscarried fetuses. With parental consent, this source for stem cells seems the least ethically ambiguous. However, miscarriages often occur because of genetic abnormalities in the fetus, making it unsuitable for stem cell development.

Existing Lines of Stem Cells: In August 2001, President Bush restricted United States federal funding to research done on the roughly sixty stem cell lines said to exist. His intention was to discourage the destruction of additional embryos necessary for establishment of more cell lines, while still allowing research on the existing lines. (The aim of this paper is primarily to inform and instigate greater discussion within the church. Public policy recommendations are a very limited, secondary aim.) Continuing to use the existing stem cell lines for research is generally supported by the commission. Wishing something had not been done will not undo it. Now that these stem cell lines exist, research should continue on those lines. There are Christians, however, who assert that experimentation with the existing lines still shares complicity with the wrongful use of the embryos that established those lines. Additionally, continuing funding and research may erode attempts to place some limits or restrictions on genetic research. Conversely, others argue that public involvement and funding is one way to restrain the control of stem cell technology by private corporations. Government funding may help ensure that whatever benefits come from stem cell technology are more justly distributed.

Disposal and Freezing of Surplus Embryos: The commission is divided on the development of stem cells from surplus frozen embryos or embryos facing disposal. Parental consent potentially helps to address concerns about embryos becoming a commodity, managed by scientists and owned for monetary profit. Would parents who give consent for the use of their surplus embryos be sharing and giving a gift to the world, especially those who suffer from various diseases? Or would they be using the sort of “end justifies the means” utilitarian thinking criticized earlier? Is parental consent a self-sacrificial act of generosity, or is refraining from parental consent a sign of patient trust in God’s providence?

If parental consent is given, and especially if embryos are scheduled for disposal, then the use of these embryos could bring great benefit to humankind and can be understood as an honorable end for the embryos. Others believe that letting the embryos die naturally would be the more honorable end. (The creation of these surplus embryos in routine infertility treatments may itself be an ethical dilemma for Christians—one that the commission hopes to address in the near future.) Declining to view embryos, even those that are to be discarded, as a source for stem cells may inhibit the development of an outlook that views human beings as things and spare parts. By turning down this most reachable path toward an undeniable good, one could hope to force our society to greater scientific creativity and Christians to a renewed devotion to care for the suffering. Although it is not yet possible, research is ongoing to develop totipotent stem cells from less ethically dubious sources such as the pluripotent cells in adult bone marrow. Resisting the use of embryonic stem cells could greatly encourage research to focus on developing stem cells from alternate sources.

Production of Embryos for Stem Cells: The commission is most averse and opposed to the production of embryos for the explicit purpose of obtaining more stem cells. Creating embryos solely for scientific purposes, such as cloning and developing stem cells, seems an especially hasty and ill-advised step toward a perspective that views embryos and potentially all life as a commodity or resource.

Finally, the commission is aware that we live in a “post-Christian” context, where it can be difficult to convey Christian ethical convictions. When partisan politics and government funding enter the equation, determining and articulating a Christian perspective becomes extremely perplexing. Both science and government appear willing to hear from the various religious communities; still Christian perspectives may or may not gain wide acceptance. Success or lack of success in influencing public policy is not the measure of the church’s witness. We should

continue to try to articulate a Christian perspective and engage the scientific community, government, and others in dialogue. That there is still much debate and disagreement within the church further reveals the need for continued discussion, study, creativity, and prayer. Meanwhile, scientific research continues. Likely this will mean that on some issues of genetics, at some point the question for Christians may no longer be whether some research is ethical, or whether to move ahead, but rather how to respond to new breakthroughs and developments—even if some Christians had been uncertain about the development.

R-12

To direct the RCA Distribution Center to make this paper, "The Creation and Use of Embryonic Stem Cells," available to congregations for study and discussion.

The advisory committee recommended:

R-12 (amended):

To direct RCA Communication and Production Services to make the paper, "The Creation and Use of Embryonic Stem Cells," available to congregations for study and discussion; and further,

to encourage the use of the website to make available visual aids, additional scientific information, and a process for discussing these issues. (ADOPTED AS AMENDED)

Reasons:

1. Continuing updates are needed as scientific technology advances.
2. The website allows wider and more economical distribution.

R-13

To encourage congregations to discuss among their membership the scientific background and the ethical questions pertaining to embryonic stem cells, using "The Creation and Use of Embryonic Stem Cells" as a resource. (ADOPTED)

R-14

To direct the RCA Office of Social Witness, in conjunction with other appropriate denominational offices and staff, to plan and convene several gatherings across the denomination during the next two years, for the purpose of discussing "The Creation and Use of Embryonic Stem Cells," and further;

to invite scientists, physicians, theologians, and those whose lives may be directly affected by stem cell technology, to be part of these discussions, but also to make a strong effort for these discussions to include and be accessible to typical church members. (ADOPTED)

R-15

To direct the RCA Commission on Christian Action to listen to and reflect upon these gatherings, and to report back to the General Synod of 2004. (ADOPTED)