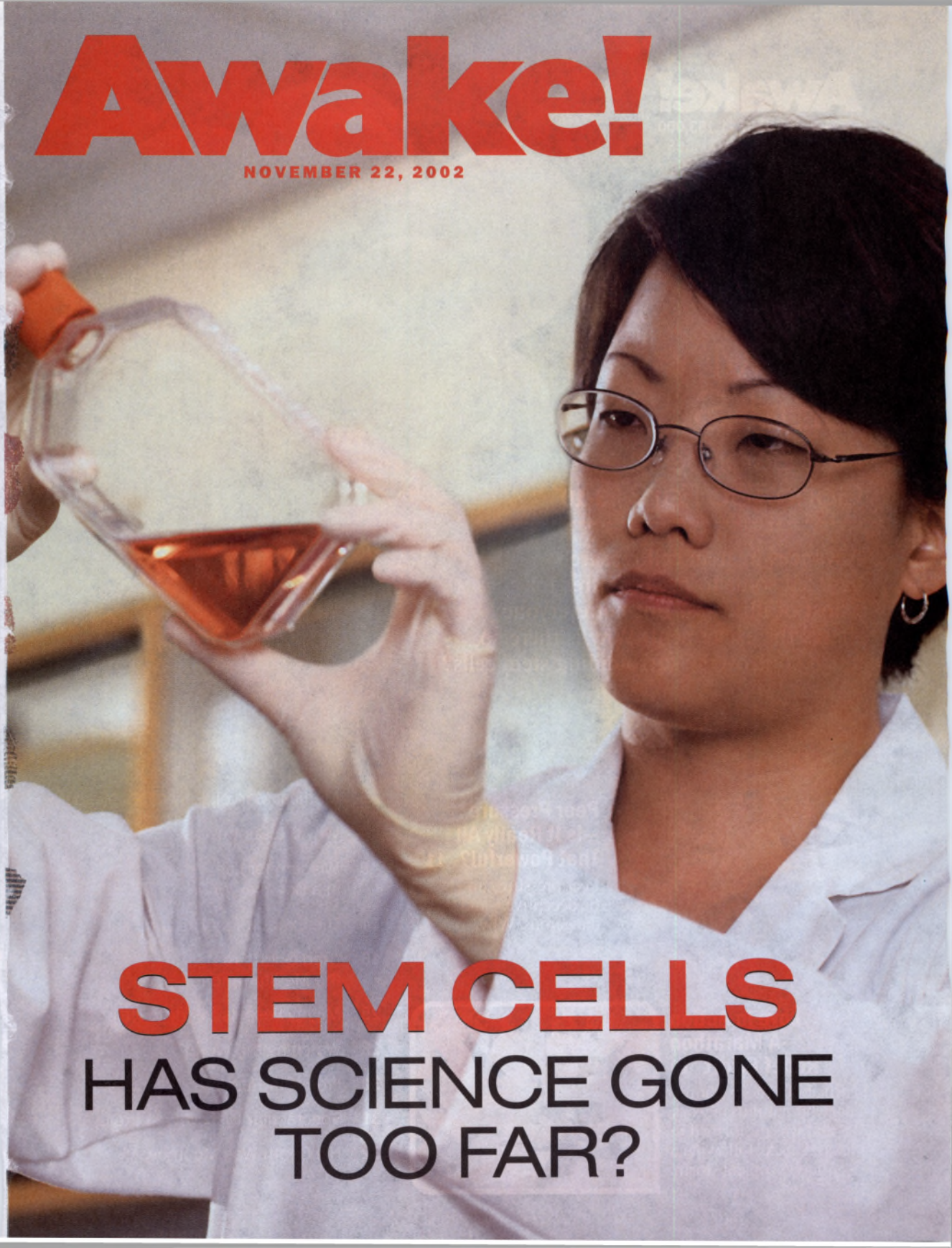
Awake!
NOVEMBER 22, 2002



STEM CELLS
HAS SCIENCE GONE TOO FAR?

Awake!
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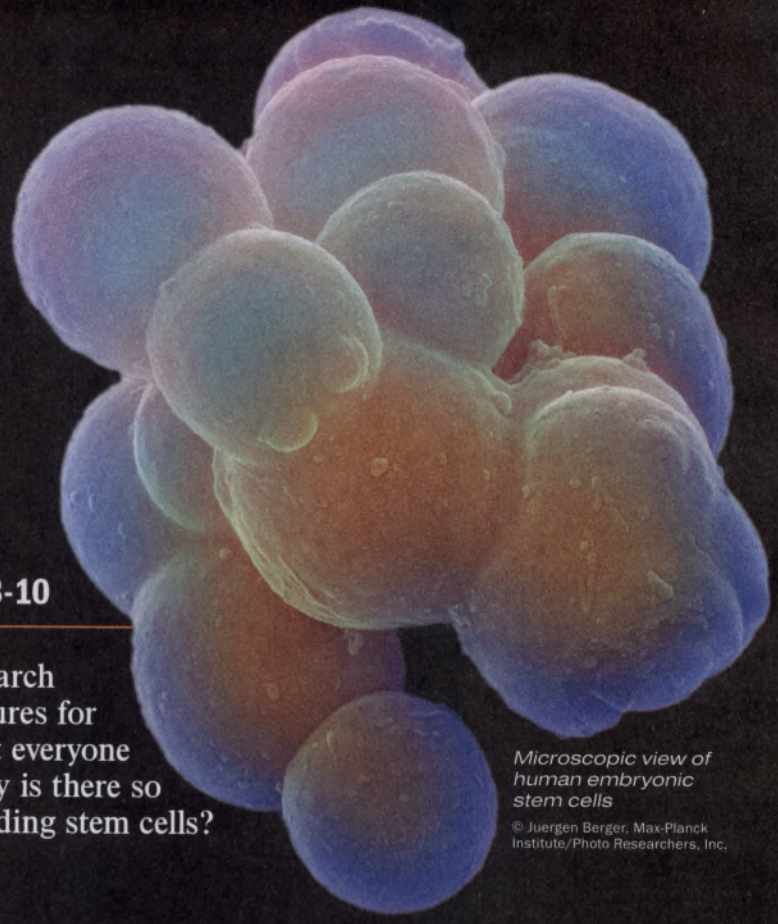
STEM CELLS

Has Science Gone Too Far? 3-10

Advances in stem cell research have led some to predict cures for a host of illnesses. But not everyone shares the excitement. Why is there so much controversy surrounding stem cells?



Microscopic view of human embryonic stem cells

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Medical Marvel, Ethical Minefield

"The stem cell debate has led scientists and nonscientists alike to contemplate profound issues, such as who we are and what makes us human beings."—NATIONAL ACADEMY OF SCIENCES, U.S.A.

KAREN has Type 1 diabetes. Her diseased pancreas no longer produces insulin. Now imagine if Karen could go to a doctor and have new cells, specially cultured in a laboratory, transplanted into her body to replace damaged pancreatic cells. As these new cells became functional, Karen could gradually discontinue insulin therapy and return to normal health.

Until recent times such potential cures would have sounded like science fiction, but now some researchers believe that they are a possibility. Why so? Because in 1998, scientists found a way to culture large numbers of cells called *human stem cells.* These stem cells can grow to become almost any of the over two hundred different types of cells found in the human body, including pancreatic cells.*

According to a report prepared by the National Institutes of Health in the United States, "stem cells may hold the key to replacing cells lost in many devastating diseases." These include "Parkinson's disease, diabetes, chronic heart disease, end-stage kidney disease, liver failure, and cancer," to name just a few. Stem cells can also give rise to blood, and they may even make blood banks obsolete, it is claimed. In fact, doctors have been using stem cells for many years to treat certain blood disorders. These treatments have usually involved transplantation of bone marrow, which is rich in blood-forming stem cells, but now doctors prefer to harvest stem cells taken from circulating blood. Because stem-cell therapies hold promise of regenerating healthy new tissues, they come under the general designation "regenerative medicine."

Certain aspects of this fledgling science, however, are highly controversial. Many people, including a number of scientists, feel that the exploitation of human stem cells—particularly those derived from either embryos or fetuses—shows a disregard for the sanctity of human life. The issue has become so hot, in fact, that it has been likened to an 'ethical and political minefield.'

Because stem cell advocates predict miracle cures for a host of conditions, the following articles take a closer look at the different kinds of stem cells, how they are derived, and why the subject is so controversial.

* Separate laboratories in the United States cultured two kinds of stem cells—*human embryonic stem cells* and *human embryonic germ cells.*

Why the Controversy?

IN THE hands of a skilled craftsman, a lump of soft clay can be fashioned into practically any shape. Embryonic stem cells are the living equivalent of that piece of moist clay; they have the potential to give rise to virtually all of the over 200 cell types making up the human body. How do they do this? Consider what happens to a newly fertilized egg cell.

Soon after fertilization an egg cell begins to divide. In humans about five days of cell division results in a minute ball of cells called a blastocyst. It is essentially a hollow sphere that is composed of a shell-like *outer cell layer* and a small cluster of about 30 cells called the *inner cell mass,* which is attached to the inside wall of the sphere. The outer cell layer becomes the placenta; the inner cell mass, the human embryo.

At the blastocyst stage, though, the cells of the inner cell mass have not yet begun to specialize into specific cell types, such as nerve, kidney, or muscle cells. Hence, they are designated *stem* cells. And because they give rise to virtually all the different cell types in the body, they are said to be *pluripotent.* To make sense of the excitement and controversy surrounding stem cells, let us see what researchers have done thus far and what their goals are, beginning with embryonic stem cells.

Embryonic Stem Cells

The report *Stem Cells and the Future of Regenerative Medicine* states: "In the last 3 years, it has become possible to remove these [human embryonic] stem cells from the blastocyst and maintain them in an undifferentiated

Awake!®

THIS JOURNAL IS PUBLISHED for the enlightenment of the entire family. It shows how to cope with today's problems. It reports the news, tells about people in many lands, examines religion and science. But it does more. It probes beneath the surface and points to the real meaning behind current events, yet it always stays politically neutral and does not exalt one race above another. Most important, this magazine builds confidence in the Creator's promise of a peaceful and secure new world that is about to replace the present wicked, lawless system of things.

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state in cell culture lines in the laboratory."* Simply put, embryonic stem cells can be cultured so as to produce an unlimited number of identical copies of themselves. Embryonic stem cells extracted from mice, first cultured in 1981, have produced billions of duplicate cells in the laboratory!

Because all these cells remain undifferentiated, scientists hope that with the right biochemical triggers, stem cells could be directed to develop into virtually all the cell kinds that may be needed for tissue replacement therapy. Simply put, stem cells are seen as a potential source of unlimited 'spare parts.'

In two animal studies, researchers coaxed embryonic stem cells into becoming insulin-producing cells, which were then transplanted into diabetic mice. In one study the symptoms of diabetes were reversed, but in the other the new cells failed to produce enough insulin. In similar studies, scientists have had partial success in restoring neural function in spinal-cord injuries and in correcting Parkinson's disease symptoms. "Those studies provide promise," says the National Academy of Sciences, "but not definitive evidence, that similar treatments could be effective in humans." But why is research on human embryonic stem cells so controversial?

Why the Concern?

The main focus of concern is that the process of extracting embryonic stem cells essentially destroys the embryo. This, explains the National Academy of Sciences, "deprives a human embryo of any further potential to develop into a complete human being. For those who believe that the life of a human being begins at the moment of conception, ESC [embryonic stem cell] research violates tenets that prohibit the destruction of human life and the treatment of human life as a means to some other end, no matter how noble that end might be."

Where do laboratories get the embryos from which stem cells are extracted? Generally from in vitro fertilization clinics, where women have provided eggs for in vitro fertilization. Leftover embryos are usually either frozen or discarded. One clinic in India discards over 1,000 human embryos each year.

While research on embryonic stem cells continues, some investigators are focusing their efforts on a much less controversial form of stem cell—the *adult stem cell.*

Adult Stem Cells

"The adult stem cell," says the National Institutes of Health (NIH) in the United States, "is an undifferentiated (unspecialized) cell that is found in a differentiated (specialized) tissue," such as bone marrow, blood and blood vessels, the skin, the spinal cord, the liver, the gastrointestinal tract, and the pancreas. Initial research suggested that adult stem cells were much more limited in scope than their embryonic counterparts. However, later findings in animal studies suggest that certain kinds of

* The report was prepared in 2001 by various committees and boards for the National Academy of Sciences in the United States.

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adult stem cells may be able to differentiate into tissues other than those from which they came.

Adult stem cells isolated from blood and bone marrow, called *hematopoietic stem cells* (HSCs), have the ability to "self-renew continuously in the marrow and to differentiate into the full complement of cell types found in blood," says the National Academy of Sciences. This type of stem cell has already been used to treat leukemia and a number of other blood disorders.* Now some scientists also claim that HSCs appear to give rise to nonblood cells such as liver cells and cells that resemble neurons and other cell types found in the brain.

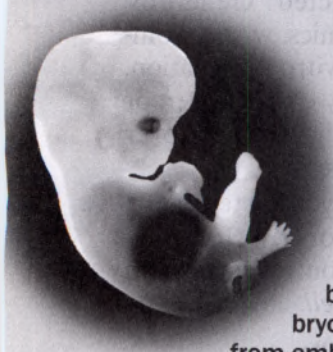
Using another type of stem cell derived from the bone marrow of mice, researchers in the United States appear to have made another significant advance. Their study, published in the journal *Nature*, showed that these cells seem to have "all the versatility of embryonic stem cells," according to *The New York Times*. "In principle," the article adds, these adult stem cells could "do everything expected of embryonic stem cells." Nevertheless, researchers working with adult stem cells still face major hurdles. These cells are rare and difficult to identify. On the other hand, any medical benefits they may yield will not involve the destruction of human embryos.

Health Risks and Regenerative Medicine

Whatever form of stem cell is used, therapies will still have serious drawbacks—even if scientists master the processes that yield tissues for transplantation. One major obstacle is the rejection of foreign tissue by the recipient's immune system. The present solution is to administer potent drugs that suppress the immune system, but such drugs carry serious side effects. Genetic engineering may circumvent this problem if stem cells can be altered so that tissues derived from them do not appear foreign to their new host.

Another possibility might be to use stem cells taken from the patient's own tissues. In early clinical trials, hematopoietic stem cells have already been used in this way to treat lupus. Diabetes may yield to similar therapies, as long as the new tissue is not susceptible to the same autoimmune attack that may have caused the disease in the first place. People with certain heart diseases may also benefit from stem cell therapies. One proposal is that at-risk patients donate their own stem cells in advance so that these could be cultured and later used to replace diseased cardiac tissue.

In wrestling with the problem of immune rejection, some scientists have even proposed



Another Source of Stem Cells

Besides adult and embryonic stem cells, *embryonic germ cells* have also been isolated. Embryonic germ cells are derived from the cells in the gonadal ridge of an embryo or a fetus, which give rise to eggs or sperm. (The gonadal ridge becomes the ovaries or testes.) Although embryonic germ cells are different in many ways from embryonic stem cells, both are pluripotent, or able to give rise to virtually all cell types. This potential makes pluripotent cells very attractive candidates for the development of unprecedented medical treatments. However, the excitement over such potential therapies is tempered by the controversy centering on the source of these cells. They are derived either from aborted fetuses or from embryos. Thus, obtaining these cells involves fetal and embryo destruction.

* For a discussion of Scriptural and other issues related to bone-marrow transplantation, please see *The Watchtower*, May 15, 1984, page 31.

cloning patients but allowing the clones to develop only to the blastocyst stage, when embryonic stem cells can be harvested. (See the box "How a Clone Can Be Made.") Tissues cultured from these stem cells would be genetically identical to the donor-recipient and so would not trigger an immune response. But besides being morally repugnant to many people, such cloning may be futile if the intent is to cure a genetically based disease. Summing up the immune problem, the National Academy of Sciences stated: "An understanding of how to prevent rejection of transplanted cells is fundamental to their becoming useful for regenerative medicine and represents one of the greatest challenges for research in this field."

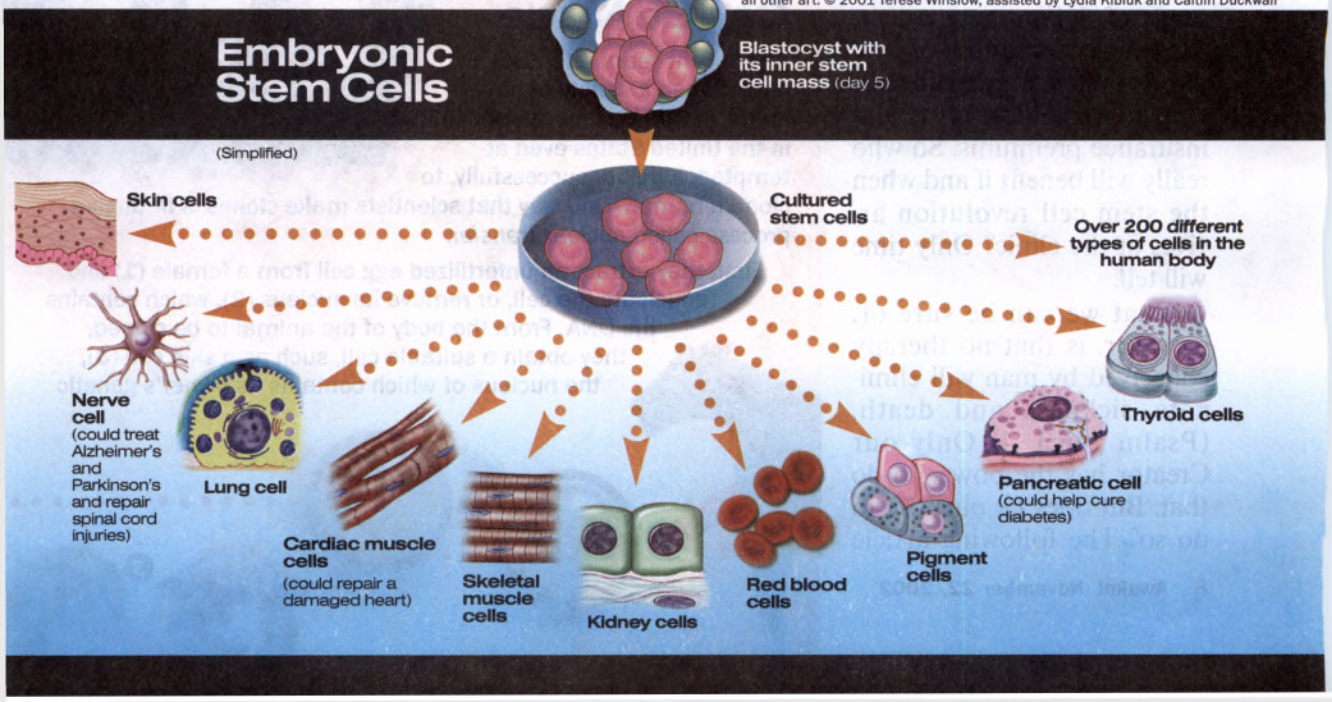
Embryonic stem cell transplantation also carries the risk of tumor formation, in particular a tumor called a teratoma, meaning "monster tumor." This growth may comprise a variety of tissues, such as skin, hair, muscle, cartilage, and bone. During normal growth, cell division and specialization follow a strict genetic program. But these processes can run awry when stem cells are severed from the blastocyst, cultured in vitro, and later injected into a living creature. Learning to master artificially the enormously complex processes of cell division and specialization is yet another major hurdle facing researchers.

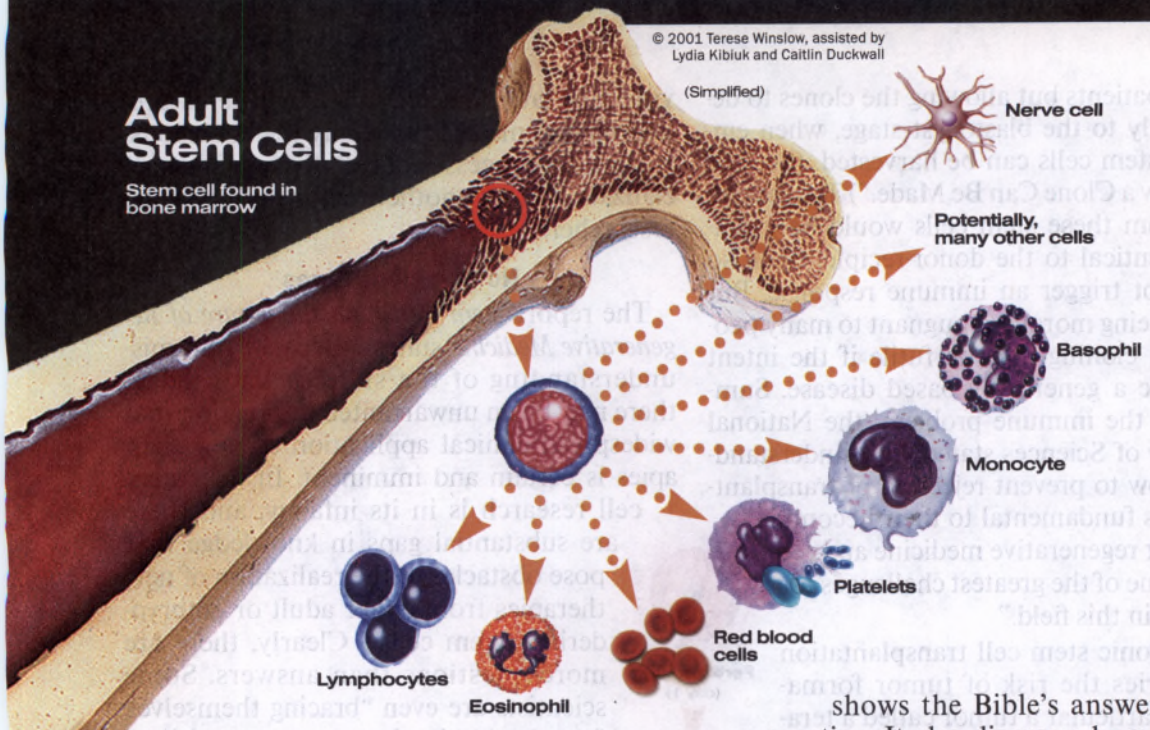
No Imminent Cures

The report *Stem Cells and the Future of Regenerative Medicine* states: "Because of a misunderstanding of the state of knowledge, there may be an unwarranted impression that widespread clinical application of new therapies is certain and imminent. In fact, stem cell research is in its infancy, and there are substantial gaps in knowledge that pose obstacles to the realization of new therapies from either adult or embryo-derived stem cells." Clearly, there are more questions than answers. Some scientists are even "bracing themselves for a backlash when treatments fail to materialize," says a *New York Times* report.

Stem cell science aside, medicine has made great strides in many areas in recent decades. Yet, as we have seen, some of these advances raise complex moral

Blastocyst and cultured stem cells: University of Wisconsin Communications; all other art: © 2001 Terese Winslow, assisted by Lydia Kibiuk and Caitlin Duckwall





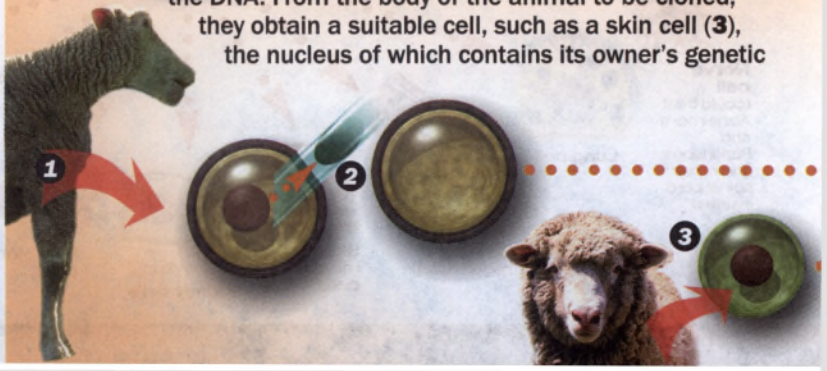
and ethical questions. So where can we turn for sound guidance on such matters? What is more, as research becomes more sophisticated and expensive, therapies and medications often reflect that cost. Some researchers have already estimated that stem cell therapies may cost hundreds of thousands of dollars per patient. Yet, even now millions of people are unable to keep up with escalating medical costs and insurance premiums. So who really will benefit if and when the stem cell revolution arrives at the clinic? Only time will tell.

What we can be sure of, however, is that no therapy conceived by man will eliminate sickness and death. (Psalm 146:3, 4) Only our Creator has the power to do that. But does he purpose to do so? The following article shows the Bible's answer to that question. It also discusses how the Bible can guide us through the increasingly complex maze of moral and ethical questions that arise today, even those of a medical nature.

How a Clone Can Be Made

In recent years scientists have cloned a variety of animals. In 2001 a laboratory in the United States even attempted, albeit unsuccessfully, to clone a human. One way that scientists make clones is through a process called *nuclear transfer.*

First, they extract an unfertilized egg cell from a female (1) and enucleate the cell, or remove its nucleus (2), which contains the DNA. From the body of the animal to be cloned, they obtain a suitable cell, such as a skin cell (3), the nucleus of which contains its owner's genetic



Wisdom for Life in a Complex World

"God gives wisdom and knowledge and joy to the man who pleases him."—ECCLESIASTES 2:26, *THE NEW ENGLISH BIBLE.*

IT IS no small challenge to make wise, ethically sound decisions in a world of increasingly complex medicine and technology. Consider some recent developments that have stirred controversy. Women can now terminate an unwanted pregnancy by just taking a "morning-after pill." Scientists have breached the gene barrier, enabling them to "engineer" plants and animals. Laboratories are scrambling to acquire human embryos for precious stem cells, which many people hope will spawn a medical revolution.

Such attempts to manipulate nature make many people nervous and fearful, not to mention morally or ethically confused. These effects remind us of the Bible's words: "To earthling man his way does not belong. It does not belong to man who is walking even to direct his step." (Jeremiah 10:23) Yes, just as children need guidance from parents, all humans need help from our heavenly Father in order to walk wisely.—Proverbs 1:33.

Wisdom From Listening to God

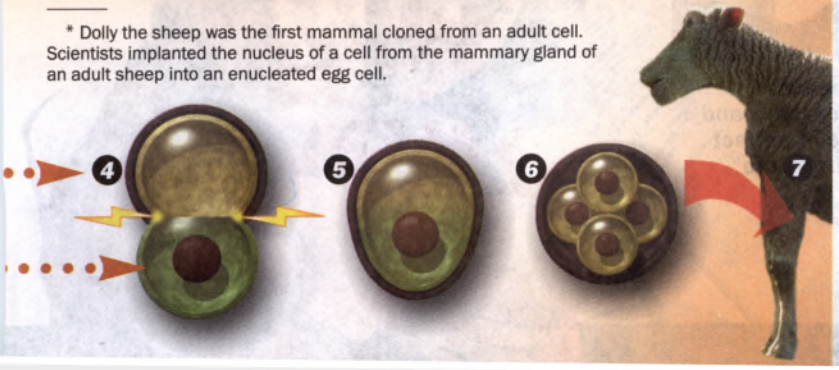
We listen to God by reading and applying his written Word. True, the Bible does not specifically address all the complex medical and scientific issues facing us today. Nevertheless, its principles, which endure forever, can help us to arrive at sound conclusions. —1 Peter 1:25.

For example, consider the debate over human embryonic stem cells. As we have seen, these are obtained at the cost of a live embryo. Regarding the ethical conflict this creates, Francis Collins, director of the National Human Genome Research Institute in the United States, said: "It is a classic example of a collision between two very important principles. One is the sanctity of human life and the other is our strong mandate as human beings to alleviate suffering and to treat terrible diseases . . . Many people feel, I think justifiably, this type of research is taking

blueprint. **They insert this cell (or just its nucleus) into the enucleated egg and pass an electric current through it (4). This fuses the cell with the egg cytoplasm (5). With its new nucleus, the egg now divides and grows as if it were fertilized (6), and a clone of the creature from which the body cell was taken begins to develop.***

The embryo can then be implanted in the womb of a surrogate mother (7), where, in the rare instance that all goes well, it will grow to term. Alternatively, the embryo may be kept only until the inner cell mass can be used to obtain embryonic stem cells that can be kept in culture. Scientists believe that this basic process should work with humans. In fact, the above-mentioned attempt to clone a human was performed with a view to acquiring embryonic stem cells. Cloning for this purpose is called therapeutic cloning.

* Dolly the sheep was the first mammal cloned from an adult cell. Scientists implanted the nucleus of a cell from the mammary gland of an adult sheep into an enucleated egg cell.



liberties with the notion of the sanctity of human life, by manipulating cells derived from a human embryo."

The Bible helps us with this complex issue by revealing God's view of the unborn. In ancient Israel if a pregnant woman was injured by another person and *either* she *or* her unborn child died as a result, God viewed the person responsible as a manslayer. That one had to pay "soul for soul."* (Exodus 21:22, 23) Hence, we can conclude that to the Creator all human life is sacred, including that of the unborn. In fact, God's interest in us begins while we are still in the womb, as the psalmist reveals: "Your eyes saw even the embryo of me, and in your book all its parts were down in writing."—Psalm 139:16.

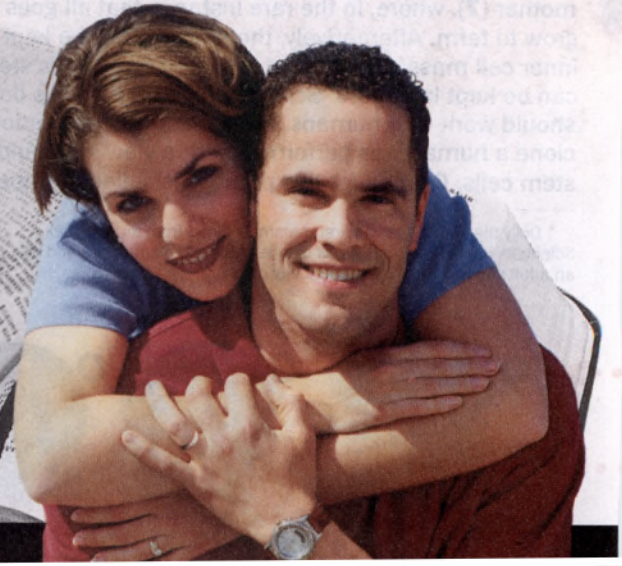
Notwithstanding the great technical strides humans have made, the Bible helps us to have a balanced, realistic attitude toward humans and their achievements. It states: "Put no faith in princes, in any man, who has no power to save. He breathes his last breath, he returns to the dust; and in that same hour all his thinking ends." (Psalm 146:3, 4, *New English Bible*) To some, this statement may smack of pessimism. But does it really? Is it not simply a frank statement of fact? Yes, indeed, for even the most capable human cannot prevent himself from aging, getting sick, and eventually dying—let alone prevent others from doing so.

The Creator, however, has none of our limitations. What is more, he has both the "power to save" and the will to do so. Jesus said: "God loved the world so much that he gave his only-begotten Son, in order that everyone exercising faith in him might not be destroyed but have everlasting life." (John 3:16) To give us a basis to 'exercise faith,' Jesus when on earth cured all the sick and disabled who came to him. Why, yes, he even raised the dead!—Luke 7:21, 22.

Jesus' actions furnished a preview of God's great healing program, which will begin when his Kingdom takes over complete control of the earth. This is what people request when they pray what is commonly called the Lord's Prayer. Indeed, only by means of God's Kingdom—God's heavenly government in the hands of Jesus Christ—will God's will be done here on earth.—Daniel 2:44; Matthew 6:9, 10.

Do these Bible promises imbue you with hope? And do you want to do your best to please God now by having his mind on the many difficult issues that confront us? If so, then we encourage you to listen to and heed God's Word. It really is wisdom for life—yes, for endless life.—John 17:3; 2 Timothy 3:16.

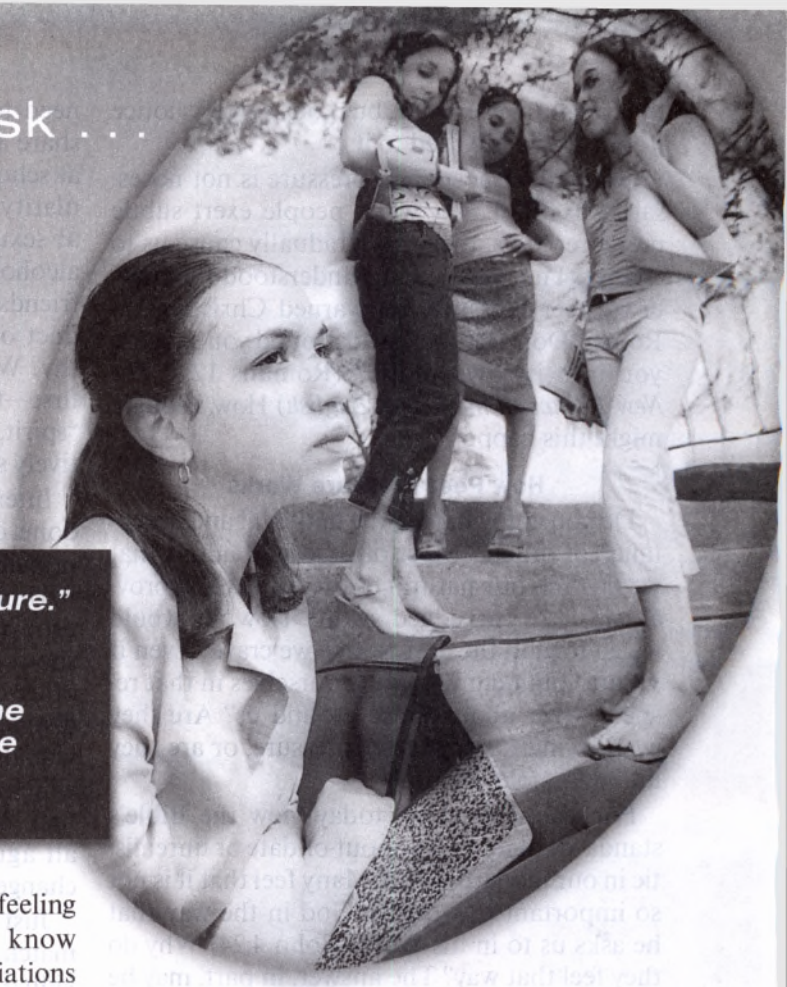
* Some have argued that this law refers only to violence done to the mother. However, the original Hebrew text indicates otherwise. Respected Bible scholars C. F. Keil and F. Delitzsch say that the wording of the Hebrew text "apparently renders it impracticable to refer the words to injury done to the woman alone."—See *The Watchtower*, August 1, 1977, page 478.



The Bible provides guidance for today and a sure hope of perfect health in the future

Young People Ask . . .

Peer Pressure —Is It Really All That Powerful?



"I don't think I feel peer pressure."
—Pamela, a high school student.

"I don't think peer pressure has that strong an effect on me anymore. Most of my pressure comes from myself."
—Robbie, a young adult.

HAVE you ever found yourself feeling this way? Granted, you may know that the Bible says: "Bad associations spoil useful habits." (1 Corinthians 15:33) Still, you may wonder, 'Is peer pressure overrated—maybe not quite as strong as my parents and other older ones say it is?'

If you struggle with such doubts from time to time, you are not the first young person to do so. But we invite you to consider a possibility. Might there be more to peer pressure than you think? Many youths have found themselves surprised at the strength of peer pressure. For example, Angie admits that she might be doing more to fit in with society than she would like to think. She remarks: "Sometimes social pressure is so powerful that you don't even know it is peer pressure. You start believing that it's your own internal pressure."

Similarly, Robbie, quoted above, says that his greatest pressure comes from within. Yet, he admits that it is hard to live near a big city. Why? Because of the peer pressure that comes from a materialistic environment. He says: "Wealth is such a big thing here." Clearly, peer pressure is a force to be reckoned with. Why, then, do so many young people think that peer pressure does not affect them?

Deceptively Strong

Peer pressure can be deceptive—in fact, we may not notice it at all. To illustrate: If we are at sea level, the huge expanse of air above us exerts a constant pressure on us of about 15 pounds per square inch.* You may live under

* A simple experiment illustrates the reality of air pressure. If you take an empty plastic bottle to the top of a mountain, let it fill with air, and seal it shut, what will happen to the bottle as you descend the mountain? It will collapse. The pressure of the air outside is much greater than that of the thinner air inside the bottle.

that pressure every day, but you scarcely notice it. Why? You are used to it.

Granted, atmospheric pressure is not necessarily harmful. But when people exert subtle pressure on us, they may gradually cause us to change. The apostle Paul understood the power of peer pressure. He warned Christians in Rome: "Don't let the world around you squeeze you into its own mold." (Romans 12:2, *The New Testament in Modern English*) How, though, might this happen?

How Peer Pressure Works

Do you enjoy having the approval and acceptance of others? Most of us would admit that we do. Yet, our natural desire for such approval can be a two-edged sword. How far would we go to gain the acceptance we crave? Even if we are confident regarding ourselves in that respect, what about those around us? Are they even trying to resist peer pressure, or are they letting it mold them?

For example, many today view the Bible's standards of morality as out-of-date or unrealistic in our modern world. Many feel that it is not so important to worship God in the way that he asks us to in his Word. (John 4:24) Why do they feel that way? The answer, in part, may be peer pressure. At Ephesians 2:2, Paul speaks of the system of things of the world as having a "spirit," or dominant attitude. That spirit exerts pressure on people to conform to the thinking of a world that does not know Jehovah. How might we be affected?

Our everyday activities of school, study, family obligations, and work usually involve the need to intermingle with people who do not share all of our Christian values. For instance, at school there may be many who pursue popularity at almost any cost, engage in immoral sexual relations, or even abuse drugs and alcohol. What will happen if we choose close friends among those who engage in such conduct or accept it as normal, even praiseworthy? We are likely to begin—perhaps slowly at first—to adopt similar attitudes. The world's "spirit," or "air," will put pressure on us, effectively squeezing us into the world's mold.

Interestingly, modern social scientists have done experiments that support these Bible principles. Consider the noteworthy Asch experiment. An individual is invited to join a group of people sitting together. Dr. Asch shows a large card with a vertical line, then another card is shown with three vertical lines of distinctly different sizes. Next he asks the individuals in the group to give their opinion as to which of the three lines appears to match the first. The answer is easy. The first few times, all agree. But on the third trial, something changes.

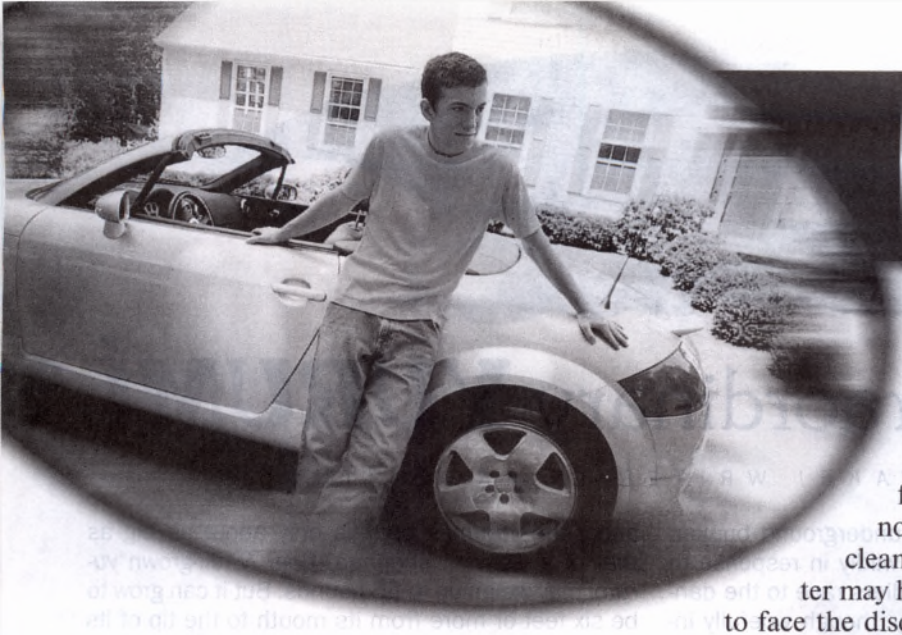
Just as before, it is easy to tell which lines match up in size. But unbeknownst to the individual being tested, the other members of the group are paid to act as part of the experiment. They all agree on the same wrong answer. What happens? Only 25 percent of the individuals tested resolutely stick to what they know to be true. All the others agree with the group at least once—even though this means denying what their eyes tell them!

Clearly, people want to fit in with those around them—so much so that most will even deny what they know to be true. Many young people have observed this pressure in action. Daniel, a 16-year-old, acknowledges: "Peer pressure can make you change. And when more people are around, the pressure builds up. You may even start thinking that what they are doing is right."

Angie, quoted earlier, relates a typical example of such pressure at school: "When you were

In Our Next Issue

- **Is It Still Safe to Fly?**
- **What You Should Know About Christmas**
- **From Deadly Mission to Peaceful Pursuit**



A materialistic environment can create intense peer pressure

in junior high school, it was very important what clothing you wore. You had to have the brand names. You didn't really want to spend $50 for a shirt—why would anybody *want* to do that?" As Angie suggests, it can be hard to detect the pressure while it is affecting you. But can peer pressure affect us in matters that are more serious?

Why Peer Pressure Can Be Dangerous

Imagine that you are swimming in the ocean. While you are busy swimming and riding the waves, other powerful forces may be silently at work. The waves push you toward shore, but there may be an undercurrent as well. Slowly it is moving you sideways. When you finally scan the shore, you can no longer see your family or friends. You never noticed how far sideways the current had pushed you! Likewise, as we go through our daily activities, our thoughts and feelings are under constant influence. Before we realize it, these influences can push us far from the standards to which we always thought we would hold fast.

For example, the apostle Peter was a bold man. He fearlessly wielded a sword in the face of a hostile crowd on the night of Jesus' arrest. (Mark 14:43-47; John 18:10) Yet, years later peer pressure led him to show blatant partiality. He avoided Gentile Christians —even though he had earlier received a vision from Christ directing him not to view Gentiles as unclean. (Acts 10:10-15, 28, 29) Peter may have found it more difficult to face the disdain of other men than to face the point of a sword! (Galatians 2:11, 12) Indeed, peer pressure can be dangerous.

Vital to Acknowledge the Power of Peer Pressure

Peter's example can teach us a vital lesson. Being strong in some ways doesn't mean being strong in all ways. Peter had weak spots, as all of us do. No matter who we are, we need to become conscious of our vulnerable areas. We might ask ourselves honestly: 'Where am I vulnerable? Do I yearn for an affluent life-style? Does personal vanity have a foothold in my heart? How far would I go to gain praise, status, and popularity?'

Now, perhaps we would never deliberately put ourselves in harm's way by choosing to associate with immoral drug users or those who are sexually promiscuous. What, though, about our more subtle weaknesses? If we choose to associate closely with those who will influence us in the area where we have a weakness, then we are setting ourselves up to be manipulated by peer pressure—perhaps to our lasting harm.

The good news, though, is that not all peer pressure is bad. Can we manage peer pressure —even make it work for us? And how can we fight against negative peer pressure? Those questions will be addressed in a future "Young People Ask . . ." article.

The Extraordinary *YURUMÍ*

BY *AWAKE!* WRITER IN ARGENTINA

IN THE darkness of their underground bunker, a community scrambles wildly in response to an attack. Defending soldiers race to the danger zone with weapons ready, though woefully inadequate. Suddenly, a huge section of the protective wall collapses, and debris crushes many inhabitants. Through the breach in their defenses, in blinding light, the invader enters.

Is this a description of an assault on a city in Roman times? Or a scene from an action film? Not at all! Rather, it is the attack of the *yurumí* —from an insect's point of view. For the *yurumí,* or giant anteater, however, this is just one more termite mound on its daily rounds.

An Encounter With a *Yurumí*

Although there are various kinds of anteaters, we will consider specifically the giant anteater, also known as the ant bear. Actually, it is not a bear at all but was perhaps given this name because of its ponderous gait and because it often assumes a vertical position when called upon to defend itself. Also, it "hugs" an assailant with its powerful forearms, as a bear does.

In northeastern Argentina and in bordering countries, the giant anteater is called *yurumí* because of its Guarani name, which means "of small mouth." The name is apt, since its mouth is a very small orifice, even though its jaw extends the length of its head. The *yurumí*'s extended tubular mouth is the first of its features to grab an observer's attention. The *yurumí* also boasts a long, bushy tail, which it sometimes carries in an almost vertical position. Its thick fur becomes long and feathery in its tail, giving it the appearance of being much bulkier than it is. Despite its striking appearance, the *yurumí*'s body is only about as big as that of a German shepherd dog. A full-grown *yurumí* may weigh up to 55 pounds. But it can grow to be six feet or more from its mouth to the tip of its tail.

The *yurumí* leads a lonely, wandering life, mostly in the swampy savannas of South America. When you think of this continent, you might often picture thick rain forests and luxuriant vegetation. But it also has vast expanses of flat, arid grassland dotted with palm groves and mounds of thorny vegetation. The soil in such countryside is rich in decomposed plant material and is ideal for termites. Here the insects erect their skyscrapers of earth and saliva—a combination that makes for very strong construction. These monolithic structures can reach a height of more than six feet.

In the midst of this abundance of insects, we find the *yurumí*—which specializes in eating them. Thus, its scientific name *Myrmecophaga tridactyla* first calls attention to its dietary habits (anteater) and second to the fact that three of the four toes of each of its forepaws are armed with formidable hooklike claws. The *Enciclopedia Salvat de la fauna* points out: "The claws are for hunting food as well as for defense: When under attack the anteater uses them like sharpened stilettos, raising himself up on his hind legs with such skill and ability that they can cause serious injury and even put jaguars to flight."

How Does the *Yurumí* Eat?

The *yurumí* has no teeth. This does not hamper it, however, because it possesses extraordinary means for obtaining its nutrition. First, it has a keen sense of smell—40 times sharper than a

Looking for one of its favorite meals—termites

human's—with which to locate food. The *yurumí* then uses its front paws, with claws measuring up to four inches in length, to dig into the earthen bunkers in search of insects, larvae, or eggs. After doing so, it extends its slender 18-inch tongue into the insects' hidden galleries.

The *yurumí*'s outsize salivary glands secrete gummy saliva to keep its tongue moist and sticky. Ants or termites stick to its tongue and are drawn back into its mouth. But just swallowing these creatures is not enough. It has to digest them too. Interestingly, it possesses strong stomach muscles that grind up the insects.

What Future for the *Yurumí*?

Though distributed in a wide area across Central and South America, *yurumís* have never been abundant. Perhaps they were never prolific breeders. Female *yurumís* bear only a single baby after a gestation period of about 190 days. The mother transports her offspring on her back during its first year. An Argentine naturalist describes an interesting aspect of this: "I encountered a mother with her little one, only a few days old. The tiny creature was easy to miss on the back of the adult, and I noted with interest that the camouflage was made complete by the special location of the cub, which superimposed the black band on his back over that of his mother. Thus, he was less noticeable to birds of prey."

The *yurumí* has a significant effect on the ecological community in which it dwells. A single *yurumí* devours tens of thousands of ants or termites a day. Without the *yurumí*'s constant pressure on the insect population, might these insects increase to plague proportions? In any case, this natural balance is shifting. Why?

Sadly, the *yurumí* is disappearing, little by little, because of man. Some hunt them for sport; others kill them because they regard the *yurumí* as a bad omen. Still others capture them for sale to collectors of zoological rarities, and these anteaters end up either in cages or in museums—stuffed. Will the *yurumí* join other rare creatures in extinction? Time will tell. Efforts are being made to protect this jewel of biological diversity.

A baby "yurumí" being carried on its mother's back

The "yurumí's" impressive 18-inch tongue

Kenneth W. Fink/Bruce Coleman Inc.

"RED GOLD"
From the Mediterranean

BY *AWAKE!* WRITER IN ITALY

SCHOLARS at one time could not agree on whether it was a vegetable or a mineral. Its vivid color has long fascinated admirers. Through the centuries, it has been used as an ornament, an art medium, a talisman, a medicine, and even as money. Today it is mainly used in the production of jewelry. What is it? Red coral from the Mediterranean—so precious that it is dubbed red gold.

Exactly what is red coral? How and where does it form? What methods have been used to collect it? How has it been worked in the past? And how is it worked today?

Animal, Vegetable, or Mineral?

Ancient naturalists described Mediterranean red coral (*Corallium rubrum*), how it was gathered, and its uses. That it is the skeletal remains of an organism in the animal kingdom, as indeed is all coral, was generally not understood until the 18th century. What might appear to be flowers on a miniature tree are actually the tentacles of living creatures—colonies of polyps. The branches, reaching a length of some 10 to 12 inches, are solid calcareous deposits secreted by whole colonies of these organisms to protect themselves. Each branch is of uniform coloration, but several different shades of red can be identified. Red coral will grow on any solid surface—a rock, a shipwreck, or even an ancient cannonball—down to a depth of 800 feet, but it needs calm unpolluted seas of relatively high salinity and a water temperature oscillating between 50 and 85 degrees Fahrenheit. It is found in the Mediterranean waters of Albania, Algeria, France, Greece, Italy, Morocco, Spain, Tunisia, and Yugoslavia and in the Atlantic waters off Cape Verde and Morocco. Estimated growth rates for young colonies range from two sixteenths to five sixteenths of an inch per year in length and about one sixteenth of an inch per year in diameter.

19th-century necklace made up of 75,000 coral beads

Per gentile concessione del Museo Liverino, Torre del Greco

Valued Since Ancient Times

Archaeological evidence shows that coral has long been prized, worked, and traded. At first, man likely did no more than gather branches that were washed up on Mediterranean beaches. Red coral fragments, probably used as amulets, have been found in ancient tombs in Switzerland. It was included among the jewels of a Sumerian deity. Egyptians valued it highly. Ancient Jews set coral alongside silver and choice gold for value. (Proverbs 8:10, 11; Lamentations 4:7) And the Celts too attributed great worth to it, decorating their arms and horses' bridles with it.

Roman naturalist Pliny reports that in the first century C.E., red coral was gathered in the Gulf of Lions, along the west coast of the Italian peninsula, and around Sicily. Colonies were pulled away in nets or cut with sharp iron tools. Back then, the coral was considered a remedy for fever, kidney stones, and eye complaints. It was also thought to protect its owners from typhoons and lightning.

By the tenth century C.E., North African Arabs had invented a device for gathering coral—a large diagonal cross, the beams of which measured between 13 and 16 feet in length. It was weighted with a heavy stone and had groups of nets, some 30 feet long, hanging from its center and extremities. The device was lowered from a boat onto coral-bearing bottoms and was dragged across them. Branches of coral were broken, became entangled in the nets, and were retrieved when the device was hauled back to the surface. Variations of this gear and method were used up until just a few years ago, when fears that they

◄Per gentile concessione del Museo Liverino, Torre del Greco▼

Live coral

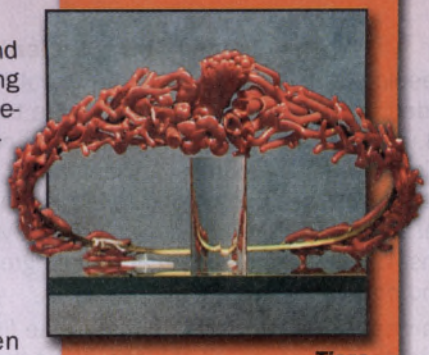
were damaging the seabed and marine fauna led to their being banned in favor of divers. In theory, divers can be more selective and less destructive, but in practice, some have proved capable of completely stripping the seabed of coral.

A Traditional Italian Craft

Ancient Roman craftsmen produced amulets, beads for necklaces, and sculptures representing subjects from mythology and nature. By the 12th century, there was a flourishing export trade in beads, buttons, and other objects between Genoa and Constantinople and various Mediterranean ports. In Marco Polo's time (13th century), Mediterranean coral was in demand in India and Indochina, and Arab merchants took it as far as China.

Trapani, Naples, and Genoa, among other cities, produced huge quantities of smooth-surfaced ornaments. Outstanding during the so-called Mannerism and baroque periods (from the 16th to the 18th century) were the products of Trapani, where small coral shapes, applied to wooden or gilded metallic surfaces, embellished all manner of objects—jewel boxes, trays, picture frames, mirrors, and church ornaments. Elaborate nativity scenes were sculptured in coral, and thousands of tiny coral beads were sown on precious clothes and altar hangings. Especially during the 19th century, a vast array of personal ornaments in all styles and forms were produced —jewelry sets, tiaras, earrings, pendants, necklaces, cameos, brooches, and bracelets carved into flowers, leaves, animals, and designs of classical inspiration.

The town of Torre del Greco, on the Bay of Naples, Italy, specializes in the processing of red coral. In fact, the town processes an estimated 90 percent of all red coral collected worldwide. Here, skilled artisans use circular saws to cut coral branches into segments. Some are machine worked to produce spherical beads. Others are handmilled to specific shapes and sizes, polished, and mounted in settings for rings, earrings, and other items. Half to three quarters of the raw material is lost or discarded during the production process, and this is one of the reasons that finished coral jewelry costs more per gram than gold jewelry.



Tiara

17th-century chalice

Jewelry set

The industry has seen moments of glory and the amassing of great fortunes. Sadly, says the book *Il Corallo Rosso* (Red Coral), it has also attracted individuals "dominated by the desire for quick and easy profits," capable of exploiting banks of coral "to the point of destruction." Concern for the future of this coral and the industry that depends upon it has moved interested parties to recommend rational resource management. Although not considered a species in danger of extinction, branches large enough to be used by jewelers are increasingly difficult to find. Today raw materials for Italian coral jewelry also come from the Pacific. Different species are collected around Japan and Taiwan, at a depth of some 1,000 feet, using even minisubmarines and remote-controlled robots. One thousand three hundred miles off Hawaii, precious corals grow as deep as 5,000 feet.

Stunning coral jewelry and sculptures testify to the skill of artisans who have contributed to this remarkable tradition. And for people who appreciate the handiwork of our Creator, Mediterranean "red gold" is an example of his countless provisions for man's delight.—Psalm 135:3, 6.

All pictures: Per gentile concessione del Museo Liverino, Torre del Greco

NOAA

LOVE IN ACTION

A MARATHON RELIEF EFFORT

RICHARD VARA, a seasoned editor for the *Houston Chronicle,* is not easily impressed, but last year he was. "I have never seen anything like it!" he exclaimed. "I can't believe it." His feelings were shared by Lee P. Brown, the mayor of Houston, Texas, U.S.A. He said: "I wish everyone in Houston could see what you have done. I am extremely impressed." What was the subject of their comments? The editor and the mayor were commenting on a relief effort that was carried out by Jehovah's Witnesses in Houston. What did this effort involve? Why was it needed? And what made it so impressive? To find out, let us start at the beginning.

A Record-Setting Flood

In early June of 2001, a fierce tropical storm named Allison pummeled the flatland area of southeastern Texas. Ultimately, on Friday, June 8, in a 24-hour period, Allison dumped three feet of torrential rain on Houston—the nation's fourth-largest city.* In no time, rising water rushed into shops, offices, and tens of thousands of homes. Freeways around the city turned into raging rivers, washing over stranded automobiles and tall trucks. High water made it impossible even for fire trucks and other rescue vehicles to navigate some of the flooded roads. Helicopters and heavy-duty military vehicles were called in to rescue people.

Finally, when clear skies returned on Monday, June 11, it became evident that Allison had taken a deadly and costly toll. Twenty-two people had lost their lives, including two of Jehovah's Witnesses: Jeffrey Green, a Christian elder, and his sister-in-law Frieda Willis.* In addition, some 70,000 homes had been damaged, making this flood one of the worst natural disasters ever to hit a large metropolitan area. In fact, by causing close to $5 billion in property damage, Allison became the costliest tropical storm in U.S. history.

A Flood of Volunteers

People were in shock. Said one relief worker: "Their beds were wet. Their carpet was wet. Their baby pictures were gone." Many of the more than 16,000 Witnesses of Jehovah in the Houston area suffered loss. Eight Kingdom Halls and hundreds of homes of Witnesses were damaged. Some of these homes were flooded with several inches of water; others had water up to the roof. In all, more than 80 congregations of Jehovah's Witnesses were affected. Yet, these victims were not left on their own. Within days a flood—but this one of volunteers—came to their rescue. How did that come about?

Even before the floodwaters began to recede, Christian elders of the congregations of Jehovah's Witnesses in Houston sprang into action. "We called and visited our brothers and sisters," related one elder. "Then we assessed the damage, and by Monday, June 11, we had compiled a full report listing the victims, the number of damaged homes, and the extent of the damage. This was sent to the headquarters of Jehovah's Witnesses in Brooklyn, New York." A few days later, the

* The cities of New York, Los Angeles, and Chicago have more people. Houston's metropolitan area has about 3,500,000 inhabitants and is larger than the Middle Eastern country of Lebanon.

* A memorial service was attended by 1,300 friends of Jeffrey and Frieda. That support gave much comfort to Abigail—Jeffrey's wife and Frieda's sister.

Floodwaters invade Houston, June 9, 2001
© Houston Chronicle

U.S. branch office of Jehovah's Witnesses put in place a relief committee of eight Christian elders from Houston and provided relief funds. The committee's assignment? To help the victims recover emotionally and also to repair the damaged homes of the Witnesses —more than 700 homes!

'How can we tackle this mammoth task?' wondered the members of the newly formed Jehovah's Witnesses Houston Relief Committee 2001. They spent long evening hours working out an initial plan and called on the more than 160 congregations of Witnesses in the Houston area to assist. "The response was overwhelming," related the chairman of the committee. "Over 11,000 Witnesses signed up, offering their time, labor, and skills free of charge."

Mold Versus Volunteers

A few days after the flood, volunteers went to work at the victims' homes, tearing out saturated carpets, damaged floors, ruined walls, soaked cabinets, warped doors, and everything else that was soiled by the sewage-contaminated floodwater. "We were concerned not only about fixing our brothers' homes," related one volunteer, "but also about safeguarding their health." Since toxic mold would quickly begin to grow behind walls and inside cabinets, the homes first needed to be thoroughly disinfected.

Freeways turned into rivers

Water rushed into homes

HUB OF ACTIVITY

It is Saturday, 7:00 a.m., at Hub No. 4 in northeastern Houston. Talking, laughing, coffee-sipping, and doughnut-munching volunteers mingle in the Kingdom Hall. Some have driven hundreds of miles from their hometown to be here. But at 7:30 a.m., the lively conversations die down, and the hub's overseer conducts a discussion of a Bible text. He also announces that a *Watchtower* Study will be held on Sunday at 7:30 a.m., before the volunteers disperse to their work locations, and he encourages all to share in the study by commenting either in English or Spanish. He conveys a message from the world headquarters of Jehovah's Witnesses, which is received with a round of applause.

The hub's overseer then gives an update on the relief efforts and warmly thanks the volunteers for their willing spirit. He asks: "Does anyone here not know what to do or where to go today?" No hands go up. "How many meals do we need?" All hands shoot up, and laughter erupts. Finally, a prayer is said, and the 250 volunteers—men, women, young and old—are on their way, ready for another long day of hard work.

The same scene takes place at the other six hubs and at the warehouse. Meanwhile, other volunteers working in a central kitchen are already busy stirring the cooking pots—after all, by noon today over 2,000 hungry volunteers throughout Houston will be ready for a hot meal!

To learn how to do the job safely, several Witnesses requested training from the Federal Emergency Management Agency (FEMA), a government agency specializing in dealing with disasters. After that, each FEMA-trained Witness invited ten volunteers to go with him to a damaged home, where they were taught how to disinfect that home properly. The following day each of the ten newly trained volunteers in turn took ten other volunteers with him. "In a few days," recounted one volunteer, "the number who knew how to do this work grew to several hundred." The spreading mold simply could not keep up with the growing number of volunteers! Retirees and teenagers on school vacation worked during the day. At night, other volunteers took over and pressed on. Within six weeks all contaminated homes of the Witnesses were clean and safe.

One Center and Seven Hubs

Meanwhile, the relief committee purchased huge amounts of gypsum board and tons of other construction materials. But where could it be stored? "When the manager of a company learned about our needs,"

Craftsmen conducting classes

TRAINING PROGRAMS

During the relief effort, volunteer craftsmen conducted classes to train unskilled volunteers for specific tasks. Some were trained to disinfect homes. Others learned how to install walls and cabinets. Still others learned how to plaster and paint. These Skilled-Workers Seminars were videotaped, and the videos were then used at the hubs to train additional volunteers. "Through these seminars," noted a relief-committee member, "we ensured the high quality of the repair work."

recounted the spokesman for the relief committee, "he offered the use of a warehouse—with a floor space of 60,000 square feet—free of charge!" Besides holding building materials, the warehouse provided room for office space. Before long, it became the administrative center of the relief effort, where some 200 to 300 volunteers worked days, nights, and weekends.

Since the damaged homes were located throughout a vast area, hubs, or regional relief centers, were established in seven Kingdom Halls. On weekends each hub buzzed with volunteers. (See the box "Hub of Activity.") Many of them had worked together before in building Kingdom Halls in the region. In fact, volunteers with construction skills from 11 different Regional Building Committees in Arkansas, Louisiana, Oklahoma, and Texas helped out.* In each hub, carpenters, painters, plumbers, and other skilled workers took the lead and trained others.—See the box "Training Programs."

A Plan and a Data Base

The volunteers followed a seven-phase construction plan. Construction materials were delivered to the homes in four batches, and repair work on each home was scheduled to be done in three weekends. This way, the entire relief effort would be completed in about six months.

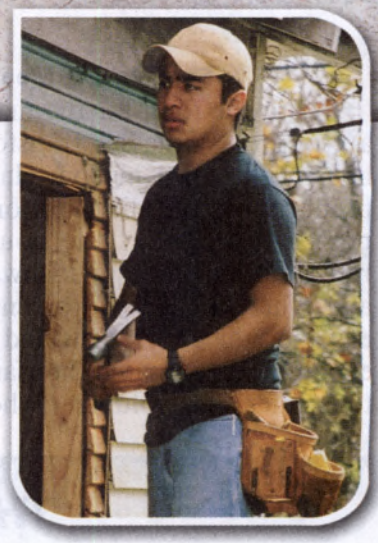
To make the plan work, the committee set up 22 departments, including logistics, purchasing, rooming, and trucking. All departments were assisted by the information contained in an extensive data base that was developed by the volunteers. Before the repair work began, volunteers spent ten days entering information. "It was a data-entry marathon," noted a news report. However, at the end of that "marathon," a trove of useful facts was available. With a click of the mouse, the data base showed when the 11,000 volunteers would be available, what skills they had, and how to contact them. With another click, it showed the status of repairs, the building permits needed, and other details of the damaged homes. The data base became known as "the heart of the relief effort."

Overwhelmed and Grateful

Homes that were mold-free and dry were visited by volunteers skilled in home construction to determine what it would take to repair the damage. "These volunteers would figure the materials down to the number of nails needed," the spokesman commented. "We did not want to waste any funds or donated materials." At the same time, other volunteers obtained the necessary construction permits from city officials.

* Regional Building Committees normally handle the construction of meeting facilities of Jehovah's Witnesses.

Some of the thousands of Witnesses who served as volunteers



Next, affected families were invited to come to the warehouse to choose from a limited selection of carpets, cabinets, vinyl flooring, and other items to replace what they had lost. Flood victims were overwhelmed and often wept when they saw all that was provided for them. Victims also received advice from volunteers with expertise in insurance matters and government policies. Then, homes were scheduled for repair, and on the exact day that the repair crews needed building materials, volunteer truckers delivered them. A non-Witness whose damaged house was being repaired told his Witness wife: "Your brothers are a wonder. One crew leaves, and another rushes in. They work like ants!"

Basic repairs took about three weekends for each home. "At times, though, it took five or even eight weeks," said the committee chairman. When walls were removed in older homes, the volunteers often noticed previous damage, and they did not want to put in new walls without first repairing these old problems. Said one volunteer craftsman: "At times we saw that studs were infested with termites, so we made sure that the termites were destroyed. We did a lot of structural reframing to fix things. We left the homes in good shape." A flood victim reflected the feelings of many such homeowners when he gratefully told a visitor: "My house is better now than when I bought it!"

The kitchen crew prepared over a quarter of a million meals!

Fast-Moving Meals

To provide food for the many volunteers, a group of Witnesses transformed a warehouse behind a Kingdom Hall into a food-preparation and distribution center. Witnesses throughout the country donated refrigerators, freezers, dishwashers, stoves, and other kitchen equipment. Each Saturday and Sunday, 11 chefs and some 200 other volunteers prepared thousands of meals in the center. The volunteer who oversaw this kitchen said: "We have been preparing meals for Kingdom Hall construction projects for 19 years, but this project was bigger than we ever imagined."

The meals were packed into 120 large containers. These were loaded into 60 waiting vehicles, which delivered the meals to all hubs and the administrative center. Meanwhile, each crew working in a home sent one volunteer to their assigned hub to pick up the meals for the entire crew. The volunteers ate their meals in the homes and went right back to work.

Mission Accomplished!

Finally, in April 2002, the 11,700 volunteers reached the finish line of one of the longest relief campaigns ever undertaken by Jehovah's Witnesses. The volunteers spent 1,000,000 hours in repairing or rebuilding a total of 8 Kingdom Halls and 723 homes. One flood victim spoke for many others when he said with tears of gratitude in his eyes: "I thank Jehovah and the volunteers for all the help they have given. To belong to a loving brotherhood is a great comfort!"

"THE REAL ACT OF GOD"

"Insurance companies call natural disasters acts of God," noted one relief-committee member. "However," he added, "the volunteers who worked here for all those months are the real act of God. Our brotherhood is a miracle!" During this relief effort, 2,500 or more volunteers showed up on weekends to work. Said the committee chairman: "Those unpaid volunteers canceled planned vacations, rearranged their family schedules, and put other personal affairs on hold to assist in one of the largest relief efforts Jehovah's Witnesses have ever tackled."

The lengthy relief campaign required sacrifices. One volunteer who supported the work from start to finish held a 50-hour-a-week secular job. Yet, he spent 40 hours each week on relief work. "Jehovah gave me the strength," he said. "Acquaintances ask me, 'Do you get paid for it?' I tell them, 'You could not pay me enough to do this.'" On weekends, after a full week of secular work, a family from the state of Louisiana drove 500 miles round trip to help with the relief work. Many worked from sunrise to sundown, and then they drove back home. One group of 30 skilled volunteers, who drove seven to ten hours one way, said: "It's well worth it." Another volunteer got off her day job at 3:30 p.m. and then volunteered in the administrative center till 10:00 p.m. She also helped on weekends. "It's rewarding," she said.

Indeed, these and all other volunteers were willing to help because of having brotherly love —the identifying mark of genuine Christians. (John 13:35) After visiting the administrative center of the relief effort, Houston's mayor was moved to say to a group of Witnesses: "You believe in doing what God tells us to do. You're putting your beliefs to work."

MIGHTY VESSELS

READY TO HELP

BY *AWAKE!* WRITER IN FINLAND

SEA GULLS soar through the cloudless sky. The sun is burning. The air is filled with the mild aroma of coffee beans. Finally the hatches of the hold bang shut, sirens howl, and a heavily loaded cargo vessel laboriously sails off. A load of coffee beans has started on its way to Finland, a country of coffee lovers. A few weeks later, however, in the bitter cold of the winter, the vessel carrying these sacks of coffee beans is about to get stuck in the thick ice of the Baltic Sea. What can be done? There is no need to worry, for help is on the way. A mighty vessel appears on the horizon—an icebreaker.

▲ ***The icebreaker "Otso" making a passage***
Finnish Maritime Administration

▼ ***Winter steamer stuck in the ice—about 1890***

Museovirasto

Breaking the Ice

Much of the world's cargo travels by sea. Usually this presents no problem. But how can ships get to harbors when the sea is frozen? This is especially tricky in the busy Baltic Sea, which for many countries is the only passage to the open ocean. For example, during a severe winter, most of Finland's harbors are blocked by ice, and its northernmost harbors may be surrounded by ice for up to six months. This has cost human lives.

In 1867, the crop harvest in northern and central Europe was poor. As none of the water passages to Finland were ice-free until May, there was no way to get relief supplies through until the ice melted. In the book *Through Ice and Snow,* sea captain Seppo Laurell says: "By that time some 110,000 people, or more than five per cent of the population [of Finland], had perished due to starvation."

The nuclear-powered "Taymyr"
Kværner Masa-Yards

Multipurpose icebreakers can also be used in laying cables and pipes
Finnish Maritime Administration

Ice obstructs cargo traffic elsewhere too. In North America this is a common problem on the Great Lakes, on the St. Lawrence River, and along the Canadian coast. The Arctic and Antarctic areas are even more difficult to tackle during the icy winter. There the average thickness of ice is six to ten feet.

Early Attempts at Breaking Channels Through the Ice

In the era of sailing ships, the ice was an almost invincible obstacle. After the first steel-hulled steamships appeared, the situation improved. If the cargo ship was strong enough, it could pass through thin ice by itself. However, such ships were limited, even though some of them were specifically reinforced for ice.

Building icebreakers provided a solution. The world's first icebreaker is said to have been the *City Ice Boat I,* built in the United States in 1837. In Europe the *Eisbrecher* was built in Hamburg, Germany, in 1871. Experience soon taught what kind of vessels coped best with ice, and at the turn of the 20th century, certain fundamental designs had already been established.*

Floating Iron Giants

What is it like when a ship gets trapped in ice? "The ship shivers as if it had a high fever," relates a

* Icebreakers vary in size and construction, depending on where they operate—in harbors, on the open sea, or in the polar regions. This article focuses mainly on the icebreakers used on the open sea.

The "Botnica"
Finnish Maritime Administration

sailor. The hull of an icebreaker has to withstand a pressure many times greater than the hull of a merchant ship. "Crashing into an ice bank is about the same as driving onto a beach with a motorboat," says a worker on an icebreaker. The steel plates in the bow may be well over one inch thick—on polar icebreakers even up to two inches thick—and the body of the ship has specific ice-reinforcement ribs in addition to the regular ones. How strong are such ships? During World War II, when the icebreaker *Tarmo* was hit by a bomb, the navigating deck and most of the cabins were destroyed, but the hull did not even spring a leak.

The shape of the hull is crucial to an ice-breaking vessel. Often the most difficult task is not actually breaking the ice but pushing the broken pieces away. Many icebreakers have a somewhat shallow bow, shaped like a spoon. The vessel breaks the ice with its mass and pushes the blocks to the sides and below. The shape of the hull is carefully designed to minimize friction between the body of the vessel and the ice. In addition, the body is covered with stainless steel or an extremely smooth and durable epoxy paint.

How are these iron giants powered? Gone are the days when sweating men had to shovel coal for the boiler in the engine room. Modern icebreakers are diesel-electric, and their shaft output is similar to that of medium-sized tankers. To equip icebreakers to operate in polar regions without fear of running out of fuel, some are powered by nuclear reactors.

Unique Specifications

If a rowboat gets stuck in the mud, the rower may free it by rocking the boat from side to side. The same principle is applied to icebreakers. In their case, however, it would not be enough even to have the whole crew of about 30 men rush from one side of the ship to the other. The rocking is produced by a special heeling system—water is transferred back and forth between a huge water tank in one side of the hull and another tank in the other side. Why, in some cases, this heeling is accomplished in as little as 15 seconds! The very thought of such swaying is enough to turn a landlubber's face green. Sailors, of course, are in a class of their own.

By the end of the 19th century, someone had thought of placing a propeller in the bow. The propeller's movement produced a stream of water that lessened friction and pushed the ice slush out of the way. Some modern icebreakers have two propellers in the stern and one or two in the bow. In many icebreakers, however, the protruding bow propeller has been replaced by an air-bubbler system. Underwater nozzles along the hull release large volumes of compressed air into the water below the ice, causing powerful bubbling in the water, which reduces friction.

A Look at the Horizon

The warm sun of spring does what all nine mighty icebreakers of Finland fail to do—it breaks the icy chains around all the harbors, even in the northernmost parts of the land. The icebreakers return to their home port, and this means an easy summer for the crew. The expensive, specialty vessels will be idle for several months because their specific construction makes them poorly suited for regular navigation in open water.

However, there is a new generation of vessels. These multipurpose icebreakers operate as conventional icebreakers in the winter, but during the open-water season, they can be used for such things as cable laying, research operations, and maintenance of offshore oil rigs. One such vessel, the *Botnica,* which was built in 1998 for use by the Finnish Maritime Administration, has two azimuth podded drives that rotate 360 degrees and thus operate not only as propellers but also as rudders. The drives make the vessel amazingly maneuverable. This design has been applied to new cruise liners as well.

In the wake of advancing ice-breaking techniques, an idea for a new kind of cargo vessel has come up. When moving forward, the new vessel would plow through the waves in the usual manner. The stern, however, would be used in breaking ice. This "double-acting tanker" would be especially useful in polar areas, where the help of icebreakers is often out of reach. The vessel could cut its own channel through the ice by moving backward.

In the meantime, Finland urgently needs its coffee. The icebreaker spoken of in the opening paragraph of this article has broken the coffee freighter free and is now towing it. The captain of the icebreaker leans calmly on the rail. He then turns toward the navigating bridge. It is time for a cup of hot coffee.

Watching the World

"The Disease We Do Not Have to Have"

"Osteoporosis is the disease we do not have to have," states *The Sun-Herald* of Australia. "It is largely preventable. Yet it is predicted that by 2020, one in three hospital beds will be occupied by women with fractures." A report by Osteoporosis Australia shows that the disease, which makes bones porous and brittle, "is more prevalent than high cholesterol, allergies or the common cold. It costs more than diabetes or asthma. And the death rate in women from hip fractures is greater than the incidence of all female cancers combined." According to Professor Philip Sambrook, estimates show that in Australia half the women and a third of the men will sustain a fracture from osteoporosis during their lifetime. "The best defence," says the paper, "is to build peak bone mass in the first three decades of life through exercise and adequate calcium intake." The risk of suffering from osteoporosis can be greatly reduced by avoiding smoking and excessive alcohol or caffeine consumption. Positive habits include engaging in regular exercise and consuming foods rich in calcium and vitamin D.

A "Saint" That Unties Knots

"In recent years, Saint Jude Thaddaeus, the patron of lost causes; Saint Rita, savior of the desperate; Saint Hedwig, protectress of the indebted; and Saint Expeditus, the patron of urgent causes, have all been in fashion," notes the newspaper *Veja*. Now the latest "saint" to achieve popularity among Brazil's Catholics is "Our Lady Untier of Knots." This unusual title comes from a painting hanging in a chapel in Augsburg, Germany, that depicts the Virgin Mary unraveling the knots in a ribbon. Promoted by media personalities, "Our Lady Untier of Knots" has gained devotees who seek her help to disentangle their knotty health, marital, and financial problems. At the same time, this has generated a lively commerce in medallions, rosaries, images, and car stickers. "The 'Untier' craze is not a bad thing, but it won't last long," predicts Darci Nicioli, administrator of Brazil's largest Catholic shrine.

Profanity Is Escalating

Many North Americans worry that they are "in a losing battle to preserve civility," says an article in *The Toronto Star*. This is especially evident in "the increasing acceptance of cursing." According to P. M. Forni, head of the Johns Hopkins University Civility Project, profanity is now so pervasive that many young people do not think it is wrong and most adults do not seem to notice it or even care. The newspaper reports that according to Professor Timothy Jay, "children begin using profanity as early as age 1, when they gain the ability to absorb words they hear from their parents and on television." Figures from one study reveal that "swear words account for about 10 per cent of an adult's work vocabulary and 13 per cent in leisure environments." Another statistic cited by the *Star* reveals that in the United States, "profane language on television increased more than 500 per cent from 1989 to 1999."

The Gospel in Space

While scientists are still debating the possibility of life in outer space, priests at the Vatican Observatory, reports the *Berliner Morgenpost* newspaper, have come to the conclusion that "earth's inhabitants are not the only creatures of God in the universe. God also created extraterrestrials." As explained by George Coyne, director of the observatory, "the universe is simply far too large for us to be alone." To reach these extraterrestrials with the Gospel, several monasteries have been sending the New Testament into space as an encoded message. What the Vatican would like to know next, says the news-

paper, "is whether Jesus Christ has manifested himself on other planets too." And, adds Coyne, "whether Jesus Christ has also saved the inhabitants" of those planets.

Resetting "Doomsday"

The directors of *The Bulletin of the Atomic Scientists* have pushed the hands of the famous Doomsday Clock "forward two minutes to seven minutes to midnight," reports the Paris daily *International Herald Tribune.* "Concerns over lagging disarmament efforts, the security of existing nuclear stockpiles and terrorism" motivated this change. The clock—the symbol of how near the world is to nuclear annihilation—has been reset 17 times since its inauguration in 1947. After the collapse of the Soviet Union, in 1991, the hands were moved back to 17 minutes before midnight, but over the years the hands have gradually crept closer to midnight. The clock was last advanced in 1998, from 14 to 9 minutes before midnight. Since then, only 3,000 nuclear weapons have been dismantled, leaving over 31,000 in the hands of the nuclear powers.

Switzerland Decides to Join the UN

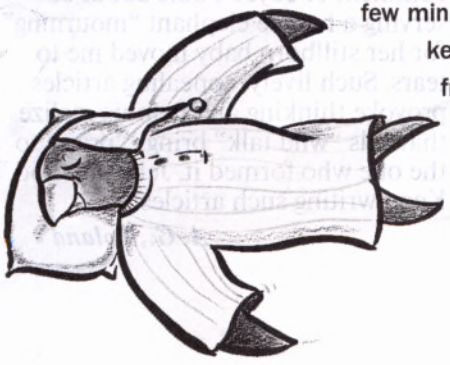
"By a slender margin, neutral Switzerland decided in a countrywide vote . . . to leave behind decades of isolationism and become a member of the United Nations," reports *The New York Times.* The submission of a formal application to the UN General Assembly is required to make Switzerland the 190th member of the organization. When the Swiss last voted on membership in 1986, the proposition was overwhelmingly rejected, "driven by fears that the nation's traditional neutrality would be compromised." What brought about the change? "Although the country is host to the United Nations European headquarters in Geneva and is active in a number of its agencies, the government feared that a continued reluctance to become a member would undercut Switzerland politically and economically, and undermine its mediation efforts in far-flung conflicts," says the *Times.* Switzerland may also have seen a need to improve its image after recent disclosures that Swiss banks had hoarded the accounts of Holocaust victims and that Switzerland had turned away from its borders many refugees who were trying to flee Nazi Germany.

Deadly Steroids

It is estimated that in Poland "about 60 percent of those who practice bodybuilding use steroids," reports the Polish weekly *Wprost.* Teenagers between 17 and 18 years of age start using them early in the year "so that by June they can show off their muscles at outdoor swimming pools." Although the steroids "can be purchased in almost any bodybuilding gym," they are dangerous to the body. "Steroids damage not only the liver but muscles as well," says Professor Janusz Nauman of the Medical University in Warsaw. Other side effects include skin and hair problems, hyperactivity, aggressive behavior, and troublesome emotional disorders. Some side effects of using steroids develop only after years have elapsed. For example, in the case of "athletes from [the former] East Germany, where drugs were taken in huge amounts starting in the 1950's, the effects on health were observed in the 1970's and '80's," says Nauman. And, adds *Wprost,* the use of steroids "increases the possibility of resorting to heroin and other drugs."

How Sleeping Swifts Keep Their Position

Swifts not only sleep while flying but also manage to stay over their territory without being carried away by the wind. To find out how they do it, ornithologists Johan Bäckman and Thomas Alerstam of Sweden's Lund University used radar to track the swifts' nocturnal movements. As reported by the German science magazine *Bild der Wissenschaft,* the researchers observed a certain flight pattern that keeps the swifts in position. The birds climb to high altitudes, up to 10,000 feet, and then fly diagonally to the wind, changing directions rhythmically every few minutes. This rhythmic pattern keeps them moving to and fro over their territory. At low wind speeds, however, the swifts were observed to spend their sleeping time circling.



From Our Readers

Motherhood Thank you for the cover series "Motherhood—Does It Take a Superwoman?" (April 8, 2002) Many today feel that stay-at-home mothers are not as busy as working mothers. Your article helped your readers to see that *all* mothers are working mothers!

T. M., United States

The first thing that caught my eye was the picture of a superwoman on page 2. I wanted to read the article immediately. As a mother of two small children, I can say that the daily routine of a mother was realistically portrayed in the articles.

C. L., Germany

I am a 12-year-old girl, and when I got this magazine, I read it right away. I now realize what my mom does for my dad and me. I appreciate her and help her more now!

A. L., United States

Two years ago I had a baby boy. Until then, I had been a full-time evangelizer with a part-time job. Longing for my previous life-style, I felt unworthy of my role as mother. It was important for me to feel reassured, and that is what I felt as I read these articles.

S. T., Italy

Your admonition to make time for relaxation points out something I've just begun to recognize. I started doing this before reading these articles, but I felt guilty for doing it. Thank you for helping me to see that I need not feel guilty as long as balance is maintained.

C. C., United States

Some mothers feel that they do not receive sufficient recognition for their hard work. These articles gave them recognition they deserve. As a mother with four children, I know how difficult it is to achieve the balance between being a housewife and having a job. The fact that Jehovah used Solomon to pen thoughts about hardworking mothers gives me comfort and encourages me to do my best.

E. S., Germany

As the mother of a three-year-old girl, I deal with feelings of guilt because I am so tired all the time. These articles helped me to see that I am not alone in feeling this way, and they gave some very good suggestions as to what I can do to improve my situation.

K. J., United States

The cover of this magazine shows a mother holding her small baby. It appears that the baby is eating a hot dog. My wife and I just finished taking an infant/child CPR class. The instructor said that eating hot dogs is the number one cause of choking among babies and children. She strongly discouraged letting young children eat hot dogs.

G. E., United States

"Awake!" responds: We agree that eating hot dogs can cause choking in babies and small children. Actually, the child on our cover is sucking on a carrot while in her mother's arms.

Animal Communication Thank you so much for the article "Wild Language—The Secrets of Animal Communication." (April 8, 2002) It made me laugh to read about the bizarre way the wildebeest, or gnu, confuses the enemy. On the other hand, the comment of Joyce Poole about observing a female elephant "mourning" for her stillborn baby moved me to tears. Such lively, appealing articles provoke thinking and help us realize that this "wild talk" brings "praise to the one who formed it, Jehovah God." Keep writing such articles!

A. G., Poland

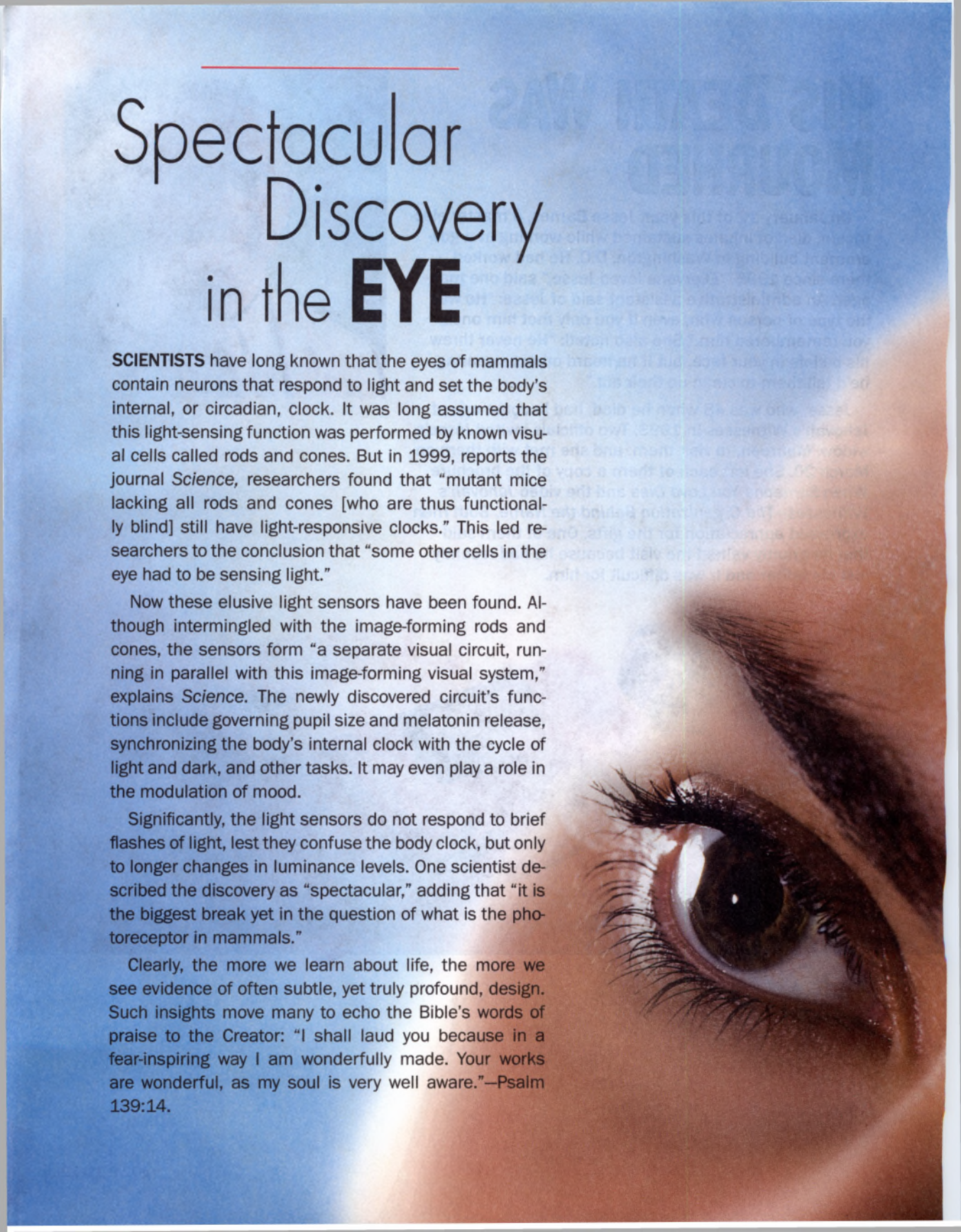
Spectacular Discovery in the **EYE**

SCIENTISTS have long known that the eyes of mammals contain neurons that respond to light and set the body's internal, or circadian, clock. It was long assumed that this light-sensing function was performed by known visual cells called rods and cones. But in 1999, reports the journal *Science,* researchers found that "mutant mice lacking all rods and cones [who are thus functionally blind] still have light-responsive clocks." This led researchers to the conclusion that "some other cells in the eye had to be sensing light."

Now these elusive light sensors have been found. Although intermingled with the image-forming rods and cones, the sensors form "a separate visual circuit, running in parallel with this image-forming visual system," explains *Science.* The newly discovered circuit's functions include governing pupil size and melatonin release, synchronizing the body's internal clock with the cycle of light and dark, and other tasks. It may even play a role in the modulation of mood.

Significantly, the light sensors do not respond to brief flashes of light, lest they confuse the body clock, but only to longer changes in luminance levels. One scientist described the discovery as "spectacular," adding that "it is the biggest break yet in the question of what is the photoreceptor in mammals."

Clearly, the more we learn about life, the more we see evidence of often subtle, yet truly profound, design. Such insights move many to echo the Bible's words of praise to the Creator: "I shall laud you because in a fear-inspiring way I am wonderfully made. Your works are wonderful, as my soul is very well aware."—Psalm 139:14.



His Death Was Mourned

On January 12 of this year, Jesse Barnes, a master electrician, died of injuries sustained while working at a government building in Washington, D.C. He had worked there since 1995. "Everyone loved Jesse," said one manager. An administrative assistant said of Jesse: "He was the type of person who, even if you only met him once, you remembered him." She also noted: "He never threw his beliefs in your face, but if he heard others swearing, he'd tell them to clean up their act."

Jesse, who was 48 when he died, had become one of Jehovah's Witnesses in 1993. Two officials invited Jesse's widow, Maureen, to visit them, and she met with them on March 20. She left each of them a copy of the brochure *When Someone You Love Dies* and the video *Jehovah's Witnesses—The Organization Behind the Name.* Both men expressed appreciation for the gifts. One of them said that he greatly valued the visit because he had recently lost his father and it was difficult for him.