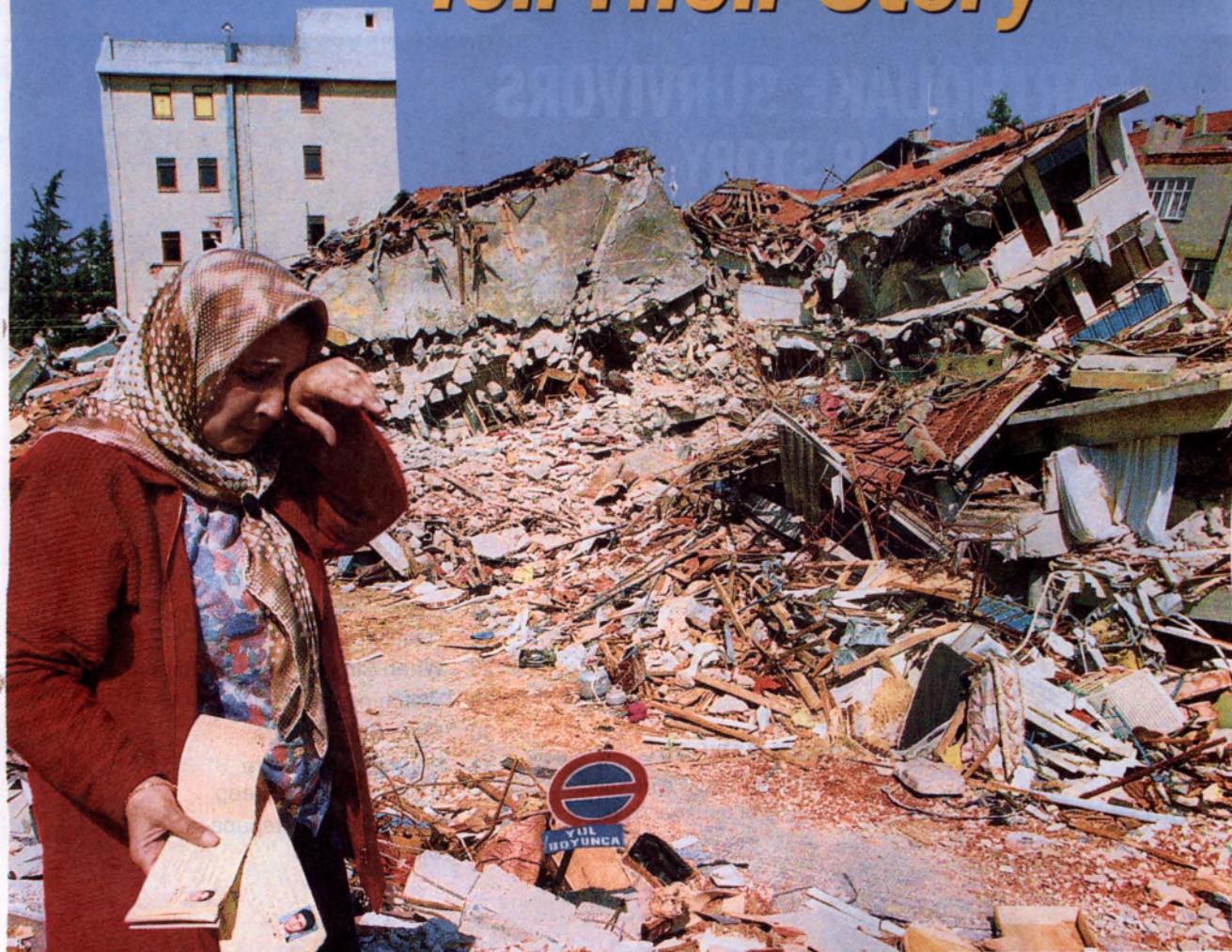


Awake!

MARCH 22, 2002

Earthquake Survivors *Tell Their Story*





EARTHQUAKE SURVIVORS TELL THEIR STORY 3-9

Severe earthquakes cause untold death and destruction.
How have survivors of earthquakes been helped to cope?

COVER: AP Photo/Murad Sezer



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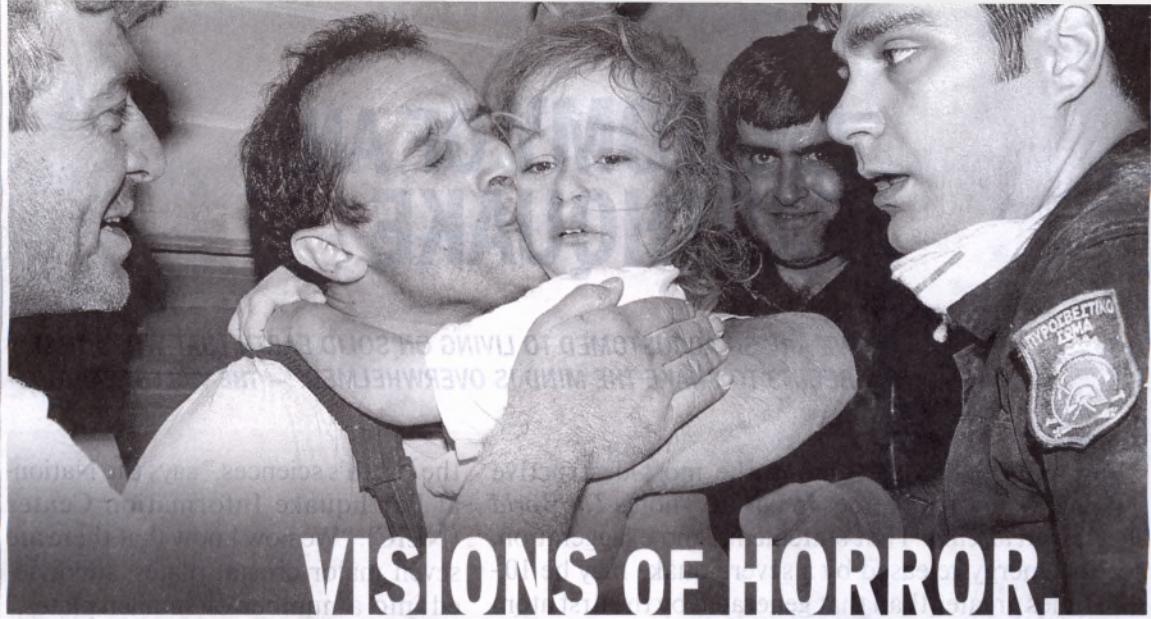
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VISIONS OF HORROR, GLIMMERS OF HOPE

**"ALL AROUND ME BUILDINGS WERE ROCKING AND FLAMES SHOOTING.
AS I RAN PEOPLE ON ALL SIDES WERE CRYING, PRAYING AND CALLING
FOR HELP. I THOUGHT THE END OF THE WORLD HAD COME."**

—G. R., EARTHQUAKE SURVIVOR.

EACH year millions of earthquakes rumble through the crust of our restless planet. Of course, most of these cannot be felt.* Still, on average, nearly 140 earthquakes a year are serious enough to be labeled "strong," "major," or "great." Throughout history, these have caused millions of deaths and an incalculable amount of property damage.

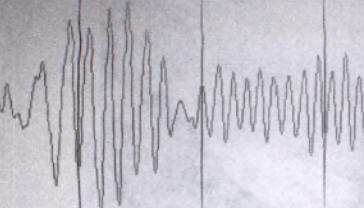
Earthquakes also exact a profound emotional toll on survivors. For example, after two earthquakes rocked El Salvador early in 2001, the coordinator of the mental-health advisory committee of that country's health ministry stated: "People are entering a phase of psychological problems characterized by sadness, despair and anger." Not surprisingly, health workers in El Salvador reported a 73-percent increase in the number of patients suffering from depression and anxiety. In fact, surveys indicated that among the needs of those in relief camps, mental-health attention ran second only to the need for water.

But the story of earthquakes involves more than death, destruction, and despondency. In many cases, these disasters have moved people to demonstrate extraordinary goodwill and self-sacrifice. Indeed, some have worked tirelessly to repair damaged structures and rebuild shattered lives. Such glimmers of hope have shone through even the grimmest visions of horror, as we will see.

Pages 2 and 3: In Athens, Greece, a distraught young woman realizes that her mother is trapped inside a collapsed building. Meanwhile, a father is elated to find that his five-year-old daughter has been rescued

AP Photos/Dimitri Messinis

* This includes very minor earthquakes, thousands of which occur each day.



ANATOMY OF AN EARTHQUAKE

"WE ARE SO ACCUSTOMED TO LIVING ON SOLID EARTH THAT WHEN THAT BEGINS TO SHAKE THE MIND IS OVERWHELMED."—"THE VIOLENT EARTH."

EARTHQUAKES are among the most destructive and powerful forces in nature," notes *The World Book Encyclopedia*. That statement is no exaggeration, for the energy released by a severe quake may be 10,000 times greater than that generated by the first atom bomb! Adding to the terror is the fact that earthquakes can happen in any climate, during any season, and at any time of the day. And although scientists may have some idea *where* powerful temblors are likely to occur, they cannot specify *when*.

Earthquakes occur as a result of masses of rock changing position below the earth's surface. This type of activity goes on continuously. Often, the shock waves that result are not powerful enough to be felt at the earth's surface, but they can be detected and recorded by a seismograph.* At other times, enough rock breaks and enough shift takes place to shake the surface violently.

But why is there constant movement in the earth's crust? "An explanation is to be found in plate tectonics, a concept which has revolutionized thinking in

the Earth's sciences," says the National Earthquake Information Center (NEIC). "We now know that there are seven major crustal plates, subdivided into a number of smaller plates," NEIC adds, "all in constant motion relative to one another, at rates varying from 10 to 130 millimeters [three eighths of an inch to five inches] per year." Most earthquakes, NEIC says, are confined to narrow belts that define the boundaries of the plates. This is where 90 percent of major earthquakes are likely to occur.

Magnitude and Intensity

The severity of an earthquake may be measured by its *magnitude* or its *intensity*. Charles Richter developed a scale in the 1930's for measuring the magnitude of earthquakes. As the number of seismograph stations grew, new scales based on Richter's idea were developed. What is called the

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.

Awake! (ISSN 0005-237X) is published semimonthly by Watchtower Bible and Tract Society of New York, Inc.; M. H. Larson, President; G. F. Simonis, Secretary-Treasurer; 25 Columbia Heights, Brooklyn, NY 11201-2483. Periodicals Postage Paid at Brooklyn, N.Y., and at additional mailing offices. **Changes of address** should reach us 30 days before your moving date. Give us your old and new address (if possible, your old address label).

POSTMASTER: Send address changes to *Awake!*, c/o Watchtower, Wallkill, NY 12589. © 2002 Watch Tower Bible and Tract Society of Pennsylvania. All rights reserved. Printed in U.S.A.

Vol. 83, No. 6 Semimonthly ENGLISH

moment magnitude scale, for example, measures the energy released at the source of the quake.

Of course, these scales do not always reveal the degree of damage inflicted by an earthquake. Consider an earthquake in northern Bolivia in June 1994, with a magnitude of 8.2, which reportedly killed only five people. Yet, the 1976 quake in Tangshan, China—with the smaller 8.0 magnitude—resulted in hundreds of thousands of deaths!

In contrast with magnitude, intensity registration shows the effects that an earthquake has upon people, structures, and the environment. This is a more descriptive measure of the severity of an earthquake in human terms. After all, tremors in themselves do not usually harm people. Instead, collapsing walls, rupturing gas or power lines, falling objects, and the like cause the most injuries and fatalities.

One goal of seismologists is to be able to provide early warnings of earthquake activity. A digital program called the Advanced Seismic Research and Monitoring System is being developed. According to a CNN report, this system—coupled with speedier access and more high-powered software applications—will help officials to “be able to almost

instantly pinpoint areas where the most violent shaking from an earthquake has occurred.” This, in turn, will make it easier for authorities to send help into affected areas.

Obviously, being prepared for an earthquake can reduce injuries, minimize property damage and—most important—save lives. Yet, earthquakes continue to occur. So the question arises: How have people been helped to cope with the aftermath?

HOW MANY EARTHQUAKES?

Descriptor	Magnitude	Average Annually
Great	8 and higher	1
Major	7-7.9	18
Strong	6-6.9	120
Moderate	5-5.9	800
Light	4-4.9	6,200*
Minor	3-3.9	49,000*
Very Minor	<3.0	Magnitude 2-3: about 1,000 per day Magnitude 1-2: about 8,000 per day

* Estimated.
Source: National Earthquake Information Center
By permission of USGS/National Earthquake Information Center, USA
Seismogram on pages 4 and 5: Figure courtesy of the Berkeley Seismological Laboratory

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Publication of *Awake!* is part of a worldwide Bible educational work supported by voluntary donations. Unless otherwise indicated, *New World Translation of the Holy Scriptures—With References* is used.

Would you welcome more information? Write Jehovah's Witnesses at the appropriate address: America, United States of: Wallkill, NY 12589. Australia: Box 280, Ingleburn, NSW 1890. Britain: The Ridgeway, London NW7 1RN. Canada: Box 4100, Halton Hills (Georgetown), Ontario L7G 4Y4. Ghana: P. O. Box GP 760, Accra. Jamaica: P. O. Box 103, Old Harbour, St. Catherine. New Zealand: P.O. Box 75-142, Manurewa. Nigeria: P.M.B. 1090, Benin City, Edo State. South Africa: Private Bag X2067, Krugersdorp, 1740. Zambia: Box 33459, Lusaka 10101. Zimbabwe: Private Bag WG-5001, Westgate.

COPING WITH THE AFTERMATH

"WE HAVE BEEN WALKING SINCE MORNING. WE ARE FLEEING FOR OUR LIVES. THERE IS NO DRINKING WATER, NO FOOD. ALL HOUSES ARE DESTROYED."

—HARJIVAN, SURVIVOR OF A 7.9-MAGNITUDE EARTHQUAKE IN INDIA.

EXPERIENCING the fury of an earthquake is terrifying. "There were books flying all around me from an eight-foot-high wooden wardrobe beside my bed," recalls a survivor of a 1999 quake in Taiwan. "A newly purchased motorcycle helmet found its way off the top of my wardrobe and landed beside my head on my bed. Ironically," she adds, "it could have killed me."

Beyond Survival

Living through an earthquake is frightening, but surviving one is just the beginning. In the hours following the event, relief workers

courageously strive to locate and treat those who are injured. Often, they do so under the threat of aftershocks. "We have to be extremely careful," said one man who contemplated digging through a mountain of dirt that had buried a neighborhood after a recent quake in El Salvador. "If suddenly the ground moves again, the rest of this hill could go."

Sometimes individuals demonstrate extraordinary self-sacrifice in reaching out to victims. For example, when a massive earthquake occurred in India early in 2001, Manu, an elderly man who now lives in the United States, returned to his homeland. "I must go," he reasoned, "not just to help my family, but everyone who is suffering." Manu found conditions to be deplorable in the regions he visited. Nevertheless, he noted: "The courage people show is astounding."

Wrote one journalist: "I don't know anyone living around me who did not give whatever he or she could spare—a day's, a week's or a month's salary, a portion of their savings or whatever they could do without to help."

Of course, it is one thing to clear out the rubble and treat the injured; it is quite another to restore a sense of normalcy to lives that have been turned upside down by a few moments of terror. Consider Delores, a woman who lost her home in the quake in El Salvador. "This is worse than the war," she says. "At least then we had a roof."

BE PREPARED!

- Make sure that water heaters are bolted down and that heavy objects are either on the floor or on lower shelves.
- Teach family members how to turn off electric power as well as gas and water.
- Equip your home with a fire extinguisher and a first-aid kit.
- Keep a portable radio on hand with fresh batteries.
- Hold family drills, and emphasize the need to (1) stay calm, (2) turn off stoves and heaters, (3) stand in a doorway or get under a table or a desk, and (4) stay away from windows, mirrors, and chimneys.



A survivor of the January 2001 earthquake in India holds a picture of his mother, who died and is being cremated

hello seize the moment to tell me about their insomnia and their sadness."

As Dr. Estefan well knows, the emotional aftershocks of an earthquake can be devastating. One woman who volunteered to help construct a relief camp noted that some

people who have jobs don't bother to go to work because they believe that they will die soon.

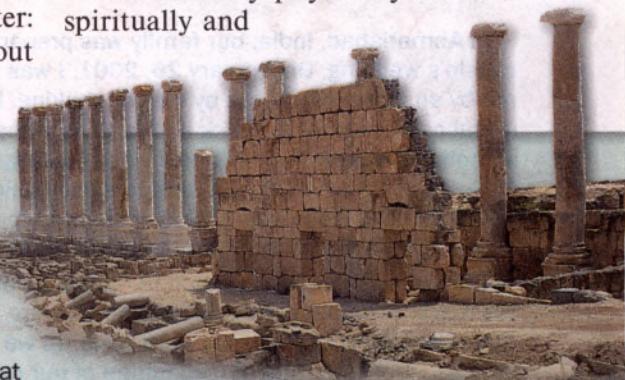
Providing Hope Amid Despair

In times of such crisis, Jehovah's Witnesses make efforts to help survivors not only physically but also spiritually and

EARTHQUAKES IN ISRAEL

Israel has "the longest and most continuous historical record of earthquakes on the face of the earth," writes Professor Amos Nur. The reason is that part of the Great Rift Valley—the fault line between the Mediterranean and the Arabian plates—courses right through Israel, from north to south.

Interestingly, some archaeologists believe that ancient engineers used a special technique to reduce earthquake damage. This coincides with the Bible's description of Solomon's building program: "As for the great courtyard, round about were three rows of hewn stone and a row of beams of cedarwood; and this also for the inner courtyard of the house of Jehovah, and for the porch of the house." (1 Kings 6:36; 7:12) Evidence



**Earthquake ruins in
Bet She'an, Israel**

of this technique of integrating wooden beams into the stone construction has been found in various places—including a gate at Megiddo, thought to be from Solomon's time or earlier. Scholar David M. Rohl believes that these beams may have been "inserted in an attempt to protect the structure from earthquake damage."

emotionally. For example, immediately after the Colombia earthquake referred to earlier, the branch office of Jehovah's Witnesses there organized a local emergency committee. Thousands of Witness volunteers from all parts of the country donated food and money. Soon, some 70 tons of food was sent into the affected area.

Often, spiritual support is most crucial. One morning after the Colombia earthquake, one of Jehovah's Witnesses noticed a particularly dejected-looking woman walking down a street in the devastated city of Armenia. She approached the woman and offered her a tract entitled *What Hope for Dead Loved Ones?**

The woman took the tract home and read it carefully. The next time one of Jehovah's

Witnesses called at her door, she just had to tell her story. The earthquake, it turns out, had destroyed several homes that she owned in the city, which had provided her with a good income. Now she was in poverty. But that was not all. During the earthquake, the house in which she lived with her 25-year-old son had collapsed, killing him. The woman told the Witness at her door that she had never been interested in religion before but that she now had many questions. The tract had given her real hope. Soon a home Bible study was started.

Jehovah's Witnesses are confident that there will be a time when mankind will no longer be threatened by natural disasters, including earthquakes. The following article will explain why.

* Published by Jehovah's Witnesses.

TWO MINUTES OF TERROR

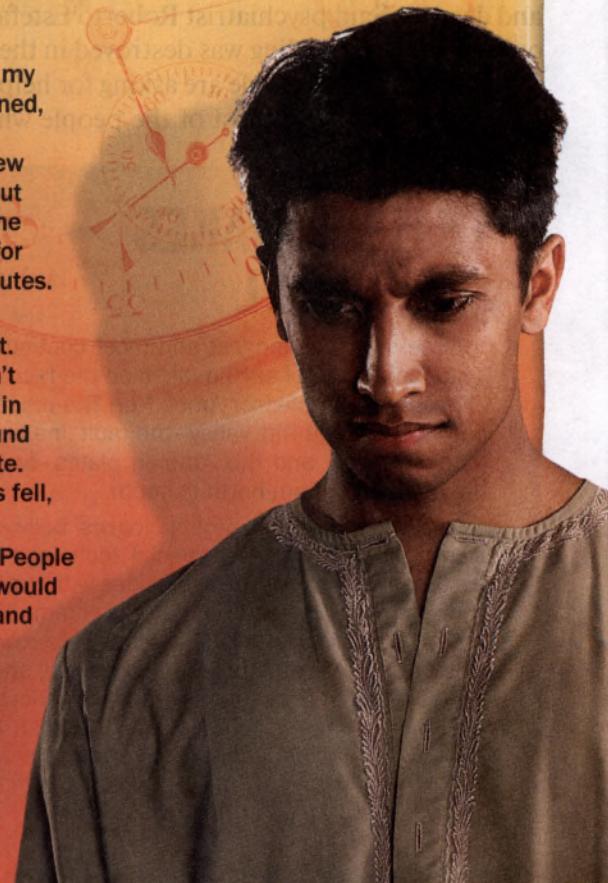
ONE SURVIVOR'S ACCOUNT

In Ahmadabad, India, our family was preparing for my cousin's wedding. On January 26, 2001, I was awakened, not by an alarm clock, but by violent shaking. I heard metal cabinets moving back and forth, and then I knew something was wrong. My uncle was shouting, "Get out of the house!" When we got outdoors, we could see the house shaking from side to side. It seemed to go on for an eternity. In reality, the tremors lasted just two minutes.

The stress seemed too much to handle all at once. We made sure that our family members were all right. Phone and electrical service were gone, so we couldn't immediately determine the condition of our relatives in surrounding towns. After an hour of suspense, we found out that they were safe. Not everyone was as fortunate. In Ahmadabad, for example, over a hundred buildings fell, and more than 500 people lost their lives.

Everyone was struck with terror for several weeks. People went to sleep each night fearing that another quake would occur, as had been predicted. Restoration was slow, and many were left homeless. All of this because of an earthquake that lasted just two minutes but that will live on in our memories forever.

—As told by Samir Saraiya.



EARTHQUAKES, BIBLE PROPHECY, AND YOU

BEFORE his death, Jesus foretold events and situations that would give evidence that this world had entered "the conclusion of the system of things." That period, he said, would be marked by such things as pestilences, food shortages, and large-scale warfare. He also mentioned "great earthquakes" that would occur "in one place after another." (Matthew 24:3, 7; Luke 21:10, 11) Was Jesus referring to our day?

Many say no. They assert that the number of earthquakes has not substantially increased in recent decades. In fact, the U.S. National Earthquake Information Center reports that earthquakes of 7.0 magnitude and greater remained "fairly constant" throughout the 20th century.*

Note, though, that the fulfillment of Jesus' prophecy does not require an increase in the *number or power* of earthquakes. All Jesus said was that there would be great earthquakes in one place after another. Furthermore, he stated that these events would mark the "beginning of pangs of distress." (Matthew 24:8) Distress is measured, not by the number of earthquakes or how they rate on the Richter scale, but by the effect that they have upon people.

Earthquakes have indeed caused much dis-

treess in our day. In fact, during the 20th century, millions have been killed or left homeless by these disasters. Experts say that many of these deaths could have been prevented. "In developing countries," reports BBC News, "building regulations frequently take second place to the demands for cheap, quickly built housing to meet the needs of rapid urbanisation." Commenting on two recent tragedies, Ben Wisner, an expert in urban disasters, states: "It wasn't earthquakes that killed these people. It was a combination of human error, indifference, corruption, and greed."

Yes, sometimes the deadliest factors in an earthquake are human selfishness and negligence. Interestingly, such qualities come to the fore in another Bible prophecy concerning "the last days" of this system. During that time, the Bible states, people would be "self-centered, lovers of money," and "callous." (2 Timothy 3:1-5, *The Amplified Bible*) Along with Jesus' words regarding the conclusion of the system of things, this prophecy provides clear evidence that we are nearing the time when God will bring relief to distressed humanity from all present causes of pain and suffering—including great earthquakes.—Psalm 37:11.

Would you like to learn more about this Bible-based hope? Contact Jehovah's Witnesses in your area, or write to the appropriate address on page 5.

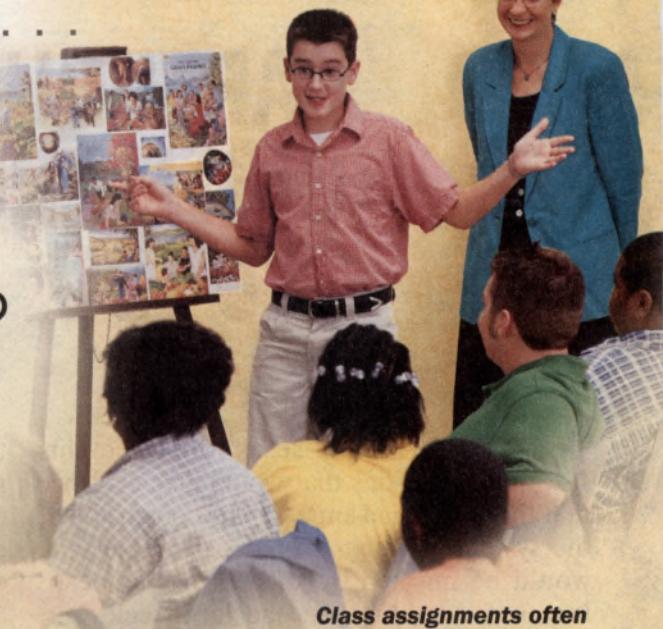
* Some say that any reports of an increase in the number of earthquakes are simply due to advances in technology, which enable more seismic events to be detected.

Young People Ask . . .

How Can I Preach to My Schoolmates?

"I was out preaching when suddenly I ran into someone I knew. I was paralyzed! The person I was working with had to jump in and speak for me."—Alberto.

Class assignments often provide opportunities for sharing Bible truths



Do not be afraid to identify yourself as a Christian

YOUNG people often feel it is not "cool" to discuss religion. Among true Christians, however, young ones appreciate their God-given privilege of sharing their faith with others. Thousands of young Witnesses of Jehovah thus share in the door-to-door preaching work. But some do so with the dread that they might encounter someone they know from school. "I still get nervous meeting people I went to school with," says Jennifer, even though she graduated from high school (secondary school) some years ago.

If you are a young Christian, you may feel the same way sometimes. Of course, all of us fear rejection, so it's perfectly normal to feel a little anxiety when it comes to talking about religion with a schoolmate.* But there is no reason to let fear paralyze you. Do you remem-

* See the article "Young People Ask . . . What if I Meet Someone From School?," appearing in our issue of February 22, 2002.

"I knew that one of my classmates lived on this road, so I had my brother talk at all the doors. After a while he got kind of stressed out and asked me to do the next door. I knocked, and—oh, no—it was he! I was so scared!"—James.

ber the man whom the Bible calls “Joseph from Arimathea”? He believed the things he learned from Jesus. Yet, the Bible describes Joseph as “a disciple of Jesus but a secret one out of his fear of the Jews.” (John 19:38) Now how would you feel about a friend who wanted to keep your friendship secret? (Luke 12:8, 9) It’s no surprise, then, that God expects all Christians to make “public declaration” of their faith. (Romans 10:10) That would include talking to young ones in your school.

Joseph of Arimathea overcame his fears, at least to the extent of seeking permission to bury Jesus' body. How can you overcome *your* fears?

Developing Eagerness to Preach

The apostle Paul certainly wasn't shy about sharing his faith with others. At Romans 1:15, he describes himself as eager to declare the Bible's message. What caused such eagerness? He says, as recorded in verse 16: "I am not ashamed of the good news; it is, in fact, God's power for salvation to everyone having faith." What about you? Have you really *proved* the truth to yourself? (Romans 12:2) Are you personally convinced that the Bible's message is "God's power for salvation"?

Simply attending Christian meetings with your parents is not enough. "It's easy just to go to meetings," says a youth named Deborah, "because your parents tell you to do so. But when people asked me questions about the Bible, I didn't know how to explain myself." A youth named Mi Young likewise admits: "We have to prove to ourselves that this is the truth."

What can motivate you to share your knowledge of the Bible with others? Studying it on your own. A youth named Sean says: "When you start to do your own personal study of the

Bible, you begin to make the truth your own. You're studying for yourself." True, not everyone is studious by nature. "I don't like to read," admits Shevon. "So at first it was hard for me to read *The Watchtower* and *Awake!* or to read the Bible daily. But as time went on, I started to do so."

What results from such diligent study? The apostle Paul says: "Faith follows the thing heard." (Romans 10:17) As your faith and conviction grow, your attitude is sure to change. A Brazilian youth named Elisângela concluded: "Being a Christian is an honor, not something to be ashamed of." Indeed, as your faith grows, you find yourself compelled to talk to others—including your classmates. Paul said: "We . . . exercise faith and therefore we speak." (2 Corinthians 4:13) Besides, how could you be "clean from the blood" of others if you withheld life-giving knowledge from the young ones you see every day?—Acts 20:26, 27.

Some young Christians, though, feel ill-equipped to talk to others about the Bible. "If you don't know what to say," says a youth named Joshua, "trying to preach is not very much fun." Again, getting a deeper understanding of the Bible will help you to handle it competently. (2 Timothy 2:15) In congregations of Jehovah's Witnesses, youths can approach the congregation elders and request personal assistance in developing teaching skills. Says a German youth named Matthias: "When I started really speaking with people—not just offering Bible literature—I started to enjoy preaching."

Finally, you can pray for God to help you speak with boldness. (Acts 4:29) The apostle Paul personally experienced God's help in this regard. At 1 Thessalonians 2:2, he says: "We mustered up boldness by means of our

God to speak to you the good news of God with a great deal of struggling." According to one reference work, this statement may be rendered, "God took fear out of our hearts." So why not pray and ask God to take fear out of your heart?

Identifying Yourself

In harmony with that prayer, you can take a very bold step. Advises a British youth named Chic: "Tell your schoolmates that you're a Christian." You do not want to be a 'secret disciple.' A youth named Rebecca admits that she was once terrified of running into someone she knew in the preaching work. But she says she discovered that "if you tell them you're a

"When you start to do your own personal study of the Bible, you begin to make the truth your own."—Sean.

Christian and that you go from door to door, they'll sometimes ask, 'Well, will you ever come to my door?"

But why wait for some chance encounter? Look for opportunities to share your faith in school. Remember the questions asked by the apostle Paul: "How . . . will they put faith in him of whom they have not heard? How, in turn, will they hear without someone to preach?" (Romans 10:14) You are in the very best position to help your classmates to hear. A youth named Iraida observes: "School is a preaching territory that only we can reach." Many youths thus take advantage of their situation by preaching informally.

Sometimes, though, there are class assignments that provide you an opportunity to share Bible truths. A British girl named Jaimie relates: "We were discussing evolution in science class, and I stated my beliefs. One of the boys ridiculed me and said that Jehovah's

Witnesses are inferior and don't deserve to be in the school system. Right away, though, the other kids in class began to stick up for me." Evidently, her reputation as an exemplary Christian paid off. Jaimie adds: "As a result, I ended up placing a copy of the book *Is There a Creator Who Cares About You?* with a classmate."^{*}

A 14-year-old girl in Romania named Roxana relates a similar experience: "My teacher announced that there would be a class discussion about alcohol, tobacco, and drugs. So I brought in the March 22, 2000, issue of *Awake!* on the subject 'How You Can Quit Smoking.' A classmate saw the magazine, took it, and refused to return it to me. After reading it, she said that she was determined to quit smoking."

You may not always meet with such a favorable response. But Ecclesiastes 11:6 urges us: "In the morning sow your seed and until the evening do not let your hand rest; for you are not knowing where this will have success." If nothing else, sharing your beliefs at school will lay the groundwork for a more pleasant discussion should you ever encounter a schoolmate in the house-to-house ministry. Says a British youth named Jessica: "Witnessing to those you know from school is actually easier because you already have a relationship with them." You may be surprised at how curious some of your schoolmates may be about your beliefs.

True, not all will receive you in a kindly way. But Jesus gave this practical advice: "Whichever anyone does not take you in or listen to your words, on going out of that house . . . shake the dust off your feet." (Matthew 10:14) In other words, you don't have to take the rejection personally. Simply leave peacefully and look for someone more willing to listen. Sooner or later you'll find honesthearted ones who are hungering for the truth and willing to listen. Would it not be rewarding if one of them was a fellow student? If so, you'll be glad you overcame your fear of sharing your faith with classmates.

* Published by Jehovah's Witnesses.

Keeping Tabs on Wildlife

IMAGINE having a miniature radio transmitter attached to your back so that your every move can be monitored and analyzed. Such is the lot of a wandering albatross named Mrs. Gibson. Her tiny transmitter allows researchers to spy on her by using satellites that pick up her signals—as well as those of other similarly equipped birds—and transmit them back to earth. The resulting data has produced some astonishing revelations about these magnificent birds, which, it is hoped, will contribute to their preservation.

According to a report from La Trobe University in Victoria, Australia, researchers discovered that wandering albatross fly an average of 200 miles a day, with occasional flights of over 600 miles in a day. With a wingspan of more than 11 feet, the largest spread of any living bird, these spectacular gliders fly over the seas in a series of arcs, covering distances in excess of 20,000 miles over several months. Similar studies in the United States reveal that a Laysan albatross made four treks from Tern Island, northwest of Honolulu, to the Aleutian Islands—a 4,000-mile round-trip—to bring home food for its single chick.

These high-tech studies may have also revealed why the number of female wandering albatross has fallen more rapidly than that of the males. Flight paths showed that breeding males tended to fish closer to Antarctica, while breeding females usually foraged farther north, in the domain of longline fishing

boats. The birds lunged for the bait set behind these boats, got caught, and then drowned. In some breeding populations, males have outnumbered females by 2 to 1. Other albatross species have also been affected. In fact, in the mid-1990's, about 50,000 birds a year drowned behind longliners in waters off Australia and New Zealand, putting the various species at risk of extinction. The wandering albatross, in fact, has been declared an endangered species in Australia. These findings have led to changes in fishing techniques and have reduced the death toll of wandering albatross. However, the species has continued to decline in a number of major breeding grounds.

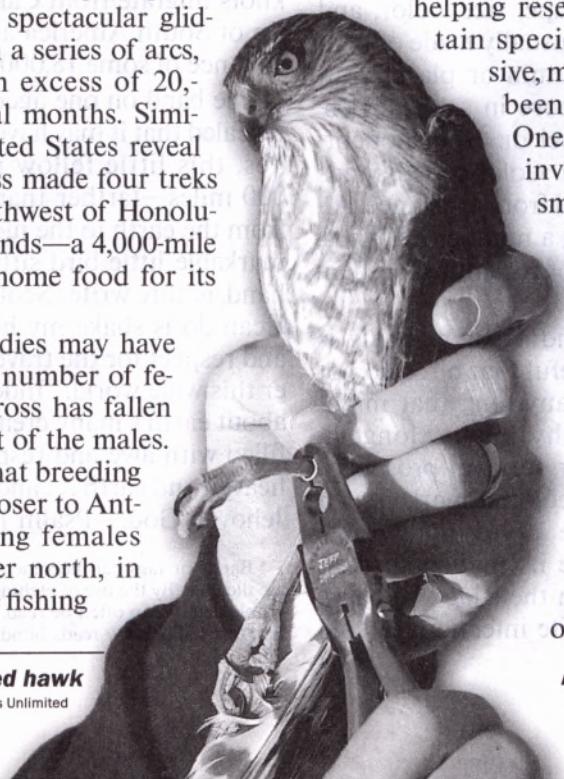
Bird Banding

While miniature electronic devices are helping researchers to monitor certain species of birds, less expensive, more simple methods have been in use for many years. One is bird banding, which involves carefully fitting a small metal or plastic band, like an ankle bracelet, around a bird's leg.

As a formal research tool, says *Smithsonian* magazine, bird banding began in 1899 when Danish schoolteacher Hans Christian Mortensen "crafted his own metal bands, inscribed with his name and address, and placed them on 165 young starlings."

Banding a sharp-shinned hawk

© Jane McAlonan/Visuals Unlimited



Nowadays, bird banding, called ringing in Europe, is practiced internationally and provides valuable data on the dispersal of birds and on their migration habits, behavior, social structure, population sizes, and survival and productivity rates. Where hunting is permitted, banding enables governments to formulate regulations for the long-term management of game birds. Banding also reveals how birds are affected by diseases and chemical toxins. In fact, some birds can carry human diseases, such as encephalitis and Lyme disease, so data on the birds' biology and habits can also be useful in protecting our health.

Is Banding Cruel?

Bird banding is closely regulated in the countries where it is practiced, banders usually having to be licensed. In Australia, says the Australian Nature Conservation Agency, "banders are carefully trained how to catch, handle and band birds without injuring them. Training normally takes two years and a great deal of practice." Similar regulations exist in Europe as well as in Canada, the United States, and other countries.

Bird bands vary in shape, size, color, and material. Most bands are usually made of light materials, such as aluminum or plastic, but for long-lived birds or those in saltwater environments, stainless steel or other noncorroding materials are used. Color-coded bands allow birds to be identified from a distance. Although this means fitting a number of bands, it spares birds the stress of recapture for identification.

Whatever form of banding or marking is used, researchers are careful that birds do not experience irritation or anything that might affect their behavior, physiology, longevity, social life, ecology, or survival prospects. For example, a brightly colored marker such as a wing tag could make a bird more visible to predators or influence its mating success. Some species defecate on their legs, so banding these birds could invite infection. In cold

regions, ice can build up on bands and be a potential hazard, especially for waterfowl. These are just some of the things involved in marking birds. But even so, they reveal the scope of scientific knowledge of bird biology and behavior that is required for the program to be effective and, at the same time, humane.

What if You Find a Banded or Tagged Animal?

Sometimes bands or tags may have a telephone number or an address inscribed, enabling you to contact the owner or banding authority.* You can then let the owner know where and when the tag was obtained and perhaps other details as well. In the case of a fish, for example, a biologist can then determine how far and fast it has traveled since it was tagged and released.

Thanks to the work of researchers around the world and the efforts of conscientious people who report the tags and bands they find, amazing details about wildlife are being gathered. Consider the example of the red knot, a four- to seven-ounce bird of the sandpiper family. Scientists now know that some red knots migrate from Canada's far north to the tip of South America and back every year—a distance of some 18,000 miles!

The band on one aged but healthy red knot revealed that it may have done this for 15 years. Yes, this little fellow may have flown 270,000 miles—farther than the average distance from the earth to the moon! With this truly remarkable little bird sitting in the palm of his hand, nature writer Scott Weidensaul said: "All I can do is shake my head with mingled awe and respect for the travelers that stitch together this wide world." Indeed, the more we learn about earth's many creatures, the more we are filled with awe and respect for "the Maker of heaven and earth . . . and of all that is in them," Jehovah God.—Psalm 146:5, 6.

* Bands or tags can become so worn down that the details are illegible. By the use of etching, however, these seemingly invisible details can often be read. In the United States, the Bird Banding Laboratory reads hundreds of such bands every year.



Tagging a black bear with ear tags; a spaghetti tag on a damselfish; tail tags on alligators

FORMS OF MARKING AND TRACKING

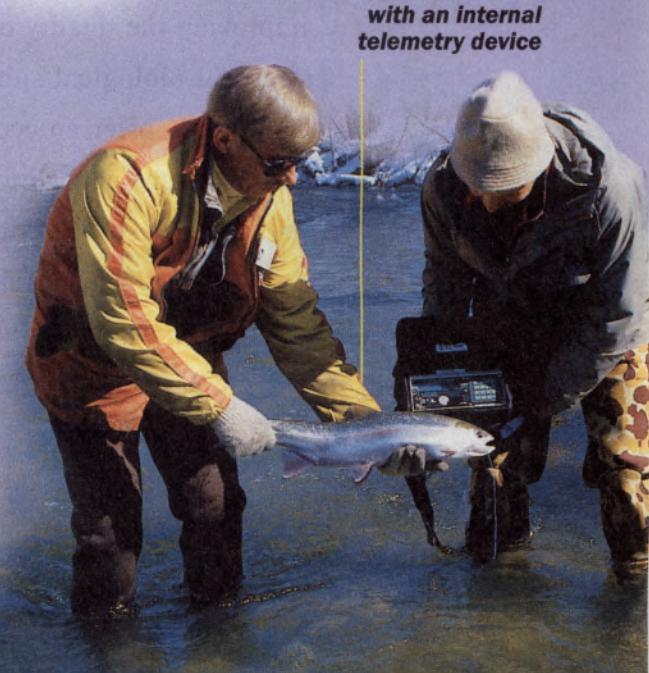
Many creatures besides birds are marked for study. The marking techniques employed depend on the scientific objectives as well as the physical characteristics and habits of the animals involved. Besides leg bands, researchers use flags, streamers, tags, paints, tattoos, dyes, brands, collars, radio tracking devices, microcomputers, and stainless steel darts (with coded tags attached) as well as toe, ear, and tail clipping and various other techniques and devices. Some of these are quite inexpensive. Others are more costly, such as the \$15,000 miniature electronic apparatus, with camcorder, that is used to study the diving habits of seals.

An electronic device called a passive integrated transponder can be inserted under an anesthetized animal's skin or inside its body and later read externally with a special instrument. To study bluefin tuna, scientists insert a tiny computer called an archival tag, or smart tag, into a fish. For up to nine years, these microchips collect and store data on temperature, depth, light intensity, and time. When the tag is returned, it furnishes a wealth of data, including its host's travels, which can be calculated by comparing daily light readings with time data.

Snakes can be marked by clipping certain scales; turtles by notching the shell; lizards by toe clipping; and alligators and crocodiles either by toe clipping or by the removal of scutes (horny plates) from the tail. Some animals have sufficient natural variation in their appearance that individuals can be identified simply by photographs.



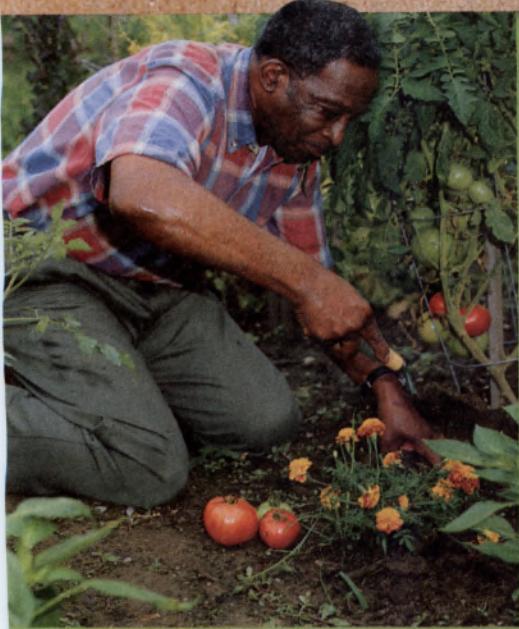
Peregrine falcon with a satellite transmitter



Rainbow trout fitted with an internal telemetry device

Gardening

the Organic Way



GRAB a handful of soil from your vegetable garden. Has it been so drenched with herbicides, insecticides, rodenticides, and fungicides that it seems virtually sterile? Or does it teem with earthworms, insects, and microorganisms of all sorts? If your soil is pulsing with life, chances are that, knowingly or unknowingly, you are applying the principles of organic gardening.

Organic gardening often involves methods of improving the quality of garden soil using natural biological substances. One of its aims is to foster an ecosystem in which plants are strong enough to resist pests and diseases. In countries where synthetic chemicals are commonly used in gardening, interest in organic gardening is growing. Why? For several reasons.



First of all, pesticide residues on fruits and vegetables have at times posed serious health hazards. To illustrate, the book *Pesticide Alert* reported that "in the summer of 1985, nearly 1,000 people in several Western states [of the United States] and Canada were poisoned by residues of the pesticide Temik in watermelons."

In addition, many people see organic gardening as a way of protecting the environment. Some pests have become immune to repeated applications of chemical pesticides, so scientists have developed poisons that are even more dangerous. These potent chemicals have then leached into the groundwater and have contaminated our precious water supply.

Another advantage of organic gardening is that less waste is dumped into our landfills. How is that possible? Food scraps and yard wastes make up a considerable portion of our garbage. Instead of being thrown out, these organic elements can be piled up and allowed to decompose, yielding a rich compound called compost. Such a mixture may not be pleasant to think about, but to a plant it is a gourmet's delight!

Finally, some view organic gardening as a way to get exercise, enjoy the sunshine, work with the soil, and watch tiny seeds grow into

healthy plants. Does organic gardening sound appealing to you? Then let's get started! First, we will take a look at the soil in your garden.

How Does Your Garden Grow?

Many gardens contain either clay soil or sandy soil. Sandy soil consists of large particles that allow water and nutrients to drain away too rapidly to be of benefit to the root system. Clay soil, on the other hand, is made up of tiny layers that are so closely bound together that either the water cannot penetrate the hard surface, and so runs off, or it soaks in only to get trapped, thereby suffocating the roots of the plants.

Plant roots thrive in soil that has a balance of particles that hold on to enough moisture to keep roots from drying out while allowing excess water to drain away. Gardeners call this mixture loam. In such soil, air circulates freely, allowing microorganisms to go about their work of adding nutrients to the soil.

Large amounts of organic matter—compost—should be added to both clay and sandy soils to achieve a balance. When it is spaded into the ground, compost conditions the soil. Since, like a sponge, it holds on to moisture, less watering is needed. Compost comes complete with millions of friendly bacteria that

Clay soil



Sandy soil



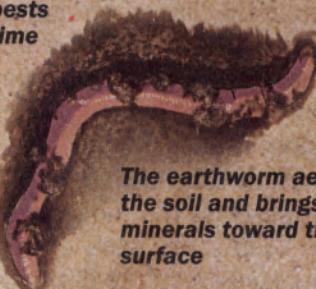
Loam



Your Garden's Friends



A toad can eat upwards of 10,000 insect pests in three months' time



The earthworm aerates the soil and brings various minerals toward the surface



A house wren was observed feeding "500 spiders and caterpillars to its young during one summer afternoon"



The ladybug's favorite food is the aphid, a destructive insect



will continue to break down decaying matter, turning the matter into nutrients that plants need in order to grow vigorously. Compost also helps balance the soil so that it is neither too acidic nor too alkaline.

When tilled into the earth, deep-rooted cover crops, such as clover and alfalfa, break up heavy soils and increase organic matter. Mulch—for example, a layer of grass clippings or sawdust placed on the soil sur-

◀ When it is spaded into the ground, compost conditions the soil



face—is also useful for changing the composition of the soil.

The amazing earthworm is an outstanding player in improving the soil in your garden. As it tunnels deep into the ground—as far down as 12 feet—the earthworm aerates the soil, brings various minerals toward the surface, and provides better drainage for water. In the process, it also leaves behind castings that, according to the book *Step by Step Organic Vegetable Gardening*, are “five times as rich in nitrogen, phosphorus, and potassium [as] the surrounding soil.”

Toads, Birds, and Bugs —Your Garden’s Friends

“But what about garden pests?” you may ask. “How can I get rid of them without using pesticides?” Don’t forget that pesticides kill off more than unwanted pests. They also eliminate such helpful organisms as earthworms and fungi. Remember, too, that toads are garden-friendly. A toad can eat upwards of 10,000 insect pests in three months’ time. Toads are not fussy eaters. Their diet includes such enemies of plants as crickets, squash bugs, tent caterpillars, armyworms, gypsy-moth caterpillars, and slugs.

Birds are also effective at controlling garden pests. A house wren was observed feeding “500 spiders and caterpillars to its young during one summer afternoon,” according to the book *Gardening Without Poisons*. If you would like to invite a few wrens or other insect-eating birds to your garden, hang some bird food or nesting materials in plain sight. Before long, you may well see that your “invitation” has been accepted! And bugs? Many garden-friendly insects prey on destructive ones. If you purchase ladybugs and release them in your garden, they will immediately look for their favorite food, aphids. Praying mantis egg cases can likewise be bought and placed in the garden. When the eggs hatch, the mantises will devour virtually every insect that dares cross their path.

Plants and Pest Control

You can use certain plants to control the pest population of your garden. Place plants that garden pests avoid next to the plants that need protection. For example, nematodes, which attack the roots of many plants and weaken them, are careful to keep their distance from marigolds. And white cabbage butterflies are repelled by rosemary, sage, or thyme, when these are planted near cabbage. A word of caution is in order, though: Some plants attract garden pests.

Crop rotation is a practical method of pest and disease control. Rather than grow the same type of plant in the same spot year after year, you may wish to rotate the plants in your garden. In that way you will break the cycle of disease and pest infestations.

Organic gardening can be challenging, requiring time and patience. To build your soil into a healthy state by organic means can take many months. You may suffer setbacks, and when you do, you may be tempted to reach for a chemical spray. However, before you do so, stop and think about the long-term benefits of avoiding chemical poisons. If you are patient, though, before long you may have a garden that produces tasty organically grown vegetables that are less subject to pest and disease problems than others. No, your garden will not be perfect, but you may find that you are delighted with the results. So if you enjoy gardening, why not try growing your own organic garden?

In Our Next Issue

- Motherhood—Does It Take a Superwoman?
- Should Christians Expect Divine Protection?
- Wild Language—The Secrets of Animal Communication

I Lost My Unborn Baby

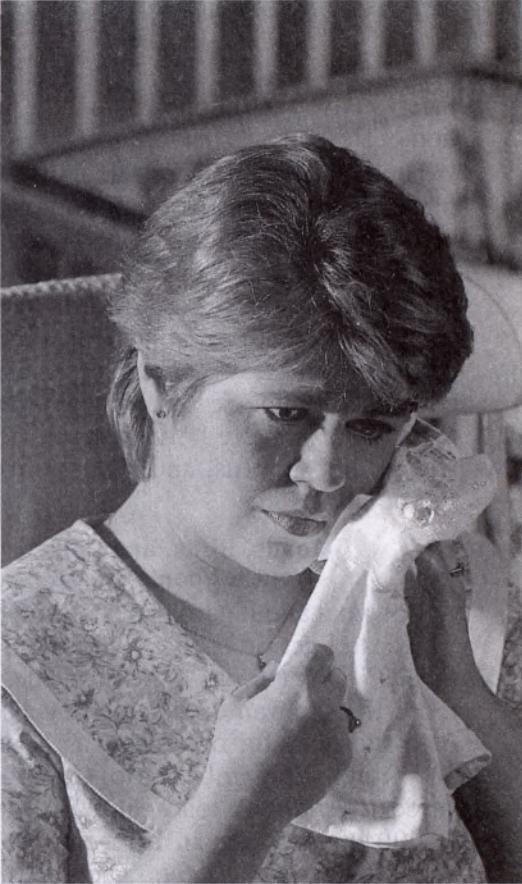
MONDAY, April 10, 2000, was a warm and sunny day, so I set out to do some errands. I was just entering the second trimester of pregnancy, and although I did not feel very energetic, I was happy to be outdoors. Then, while waiting in the checkout line at a grocery store, I had the feeling that something was wrong with me.

My fears were confirmed when I got home. I was bleeding—something that had not happened during my two previous pregnancies—and it terrified me! I called my doctor, but he suggested that I wait and come in the next day, since I had an appointment then anyway. Before my husband and I put our two children to bed that night, we prayed together, asking Jehovah to give us strength in whatever way we might need it. Eventually, I fell asleep.

But about two o'clock, I woke up in intense pain. Gradually the pain subsided, but just as I was falling asleep again, it recurred, this time coming in regular waves. The bleeding also increased, and I realized that I was having contractions. My mind raced, trying to figure out if I had done something to cause this to happen, but I could not think of anything I had done wrong.

By five o'clock in the morning, I knew that I had to get to the hospital. When my husband and I arrived, we were relieved to find ourselves in the hands of very kind, helpful, and empathetic emergency-room staff. Then, two hours later, the doctor gave us the news we dreaded: I had lost my baby.

Because of the earlier symptoms, I was prepared for this outcome and took the news reasonably well. Additionally, my husband was at my side the whole time and proved to be very supportive. But now that we would be going home without a baby, we wondered what we would tell our two children, Kaitlyn, who was six years old, and David, who was four.



What Do We Tell Our Children?

The children had gone to bed aware that something was wrong, but how would we tell them that their future little brother or sister had died? We decided to be open and honest. My mother helped us to that end by telling the children that the baby would not be coming home with us. When we arrived, they ran to meet us and gave us big hugs and kisses. Their first question was, "Is the baby OK?" I couldn't answer, but my husband, holding us in a tight circle, said: "The baby has died." We held one another and cried, which helped our healing to begin.

We were not quite prepared, though, for our children's later reactions. For instance, about two weeks after my miscarriage, it was an-

nounced at the local congregation of Jehovah's Witnesses that an elderly Witness and close friend of our family had passed away. David, the four-year-old, sobbed uncontrollably, so my husband carried him outside. After calming down, David asked why his friend had died. Then he asked why the baby had died. Next, he said to his father: "Are you going to die?" He also wanted to know why Jehovah God had not yet destroyed Satan and started to "fix things up." Indeed, we were surprised to see how much was going through his young mind.

Kaitlyn also asked many questions. When playing with her dolls, she often pretended that one doll was sick, while the other dolls became nurses or family members. She set up a cardboard box as a doll hospital and occasionally pretended that one of her dolls had died. Our children's questions and games gave us many opportunities to teach them important lessons about life and how the Bible can help us to cope with trials. We also reminded them of God's purpose to make the earth a beautiful paradise, free from all forms of suffering and pain—even death.—Revelation 21:3, 4.

How I Coped With the Loss

When I first returned home from the hospital, I felt emotionally numb and disoriented. All around me were things that needed to be done, but I did not know where to start. I called a couple of friends who had been through the same experience, and they were very comforting. One dear friend sent us flowers and offered to take the children for the afternoon. I appreciated her warm concern and practical help so much!

I sorted out family photos into albums. I looked at and held the unworn baby clothes—the only tangible reminders of the baby I had lost. For weeks I was on an emotional roller coaster. Some days I could not stop crying—even with all the support I had from family and friends. At times, I thought I was losing my mind. Being around friends who were pregnant was particularly difficult. Previously, I had imagined a miscarriage to be a mere "blip" in a woman's life, something we got over without too many problems. How wrong I was!*

* Research shows that each person responds in a unique way to miscarriage. Some feel confused, others disappointed, still others overwhelmingly sad. Grief is a natural reaction to a serious loss such as miscarriage, say researchers, and is a part of the healing process.

Frequency and Causes of Miscarriage

"Studies indicate that 15 to 20 percent of all diagnosed pregnancies end in miscarriage," says *The World Book Encyclopedia*. "But the risk of miscarriage is highest during the first two weeks following conception (fertilization), a time at which most women do not even know they are pregnant." Another reference states that over "80 percent of miscarriages occur in the first 12 weeks of pregnancy," of which at least half are thought to be caused by defects in the chromosomes of the fetus. These defects are not the result of similar defects in the chromosomes of the mother or father.

Other causes of miscarriage may stem from the mother's health. Medical authorities point to hormonal and immune system disorders, infections, and abnormalities in the cervix or the uterus of the mother. Chronic diseases such as diabetes (if poorly controlled) and high blood pressure may also be factors.

According to experts, miscarriage is not necessarily caused by exercising, lifting heavy objects, or having sexual relations. It is unlikely that a fall, a minor blow, or a sudden fright will cause miscarriage. One reference says: "The fetus is unlikely to be harmed by an injury unless the injury is serious enough to threaten your own life." How well the design of the womb testifies to a wise and loving Creator!—Psalm 139:13, 14.

Isaiah 40:11 Love—The Best Cure

Along with the passing of time, an effective cure was the love shown by my husband and by fellow Christians. One Witness made dinner and brought it over. A congregation elder and his wife brought flowers and a loving card, and they stayed for the evening. We knew how busy they were, so their thoughtfulness touched our hearts. Many other friends sent cards or flowers. The simple words "We're thinking of you" meant so much! One member of the congregation wrote: "We view life as Jehovah does—as something most precious. If he knows when a sparrow falls to the ground, he surely knows when a human fetus falls." My cousin wrote: "We are so amazed at the miracle of birth and life, and we are equally surprised when it doesn't work out."

While at the Kingdom Hall a few weeks later, I felt weepy and had to leave just before the meeting began. Two dear friends who noticed my tearful exit sat with me in the car, held my hand, and made me laugh. Soon all three of us went back inside. What a joy to have friends that stick "closer than a brother!"—Proverbs 18:24.

As the news spread, I was surprised to learn how many fellow Witnesses had been through the same experience. Even some whom I had not been so close to previously were able to offer special consolation and encouragement. Their loving support in my hour of need reminded me of the Biblical saying: "A true companion is loving all the time, and is a brother that is born for when there is distress."—Proverbs 17:17.

Comfort From God's Word

The Memorial of Christ's death came the week after my miscarriage. One evening as we were reading the Bible accounts about Jesus' last days, it suddenly occurred to me: 'Jehovah knows the pain of loss. He lost his own son!' Because Jehovah is our heavenly Father, I sometimes forget how understanding he is and how much empathy he has for his servants—male and female. In that instant I felt

an overwhelming sense of relief. I felt closer to Jehovah than ever before.

I also derived much encouragement from Bible-based publications, particularly past issues of the *Watchtower* and *Awake!* magazines that dealt with the loss of a loved one. For example, the articles on "Facing the Loss of a Child" in the August 8, 1987, issue of *Awake!* were very helpful, as was the brochure *When Someone You Love Dies.**

An End to Grief

As time went by, I knew that I was healing when I could laugh without feeling guilty and when I could have a conversation without it coming back around to the baby I had lost. Even so, I bumped into emotional land mines on occasion, such as when I saw friends who had not heard about the miscarriage or when a family with a new baby visited our Kingdom Hall.

Then one morning I woke up feeling that the clouds had at last lifted. Even before I opened my eyes, I had a sense of healing—a peace and calm that I had not felt for months. Still, when I found myself pregnant about a year after I lost the baby, thoughts about the possibility of another miscarriage surfaced. Happily, I gave birth to a healthy baby boy in October 2001.

I still grieve for the baby I lost. Yet, the whole episode has increased my appreciation for life, for my family, for fellow Christians, and for God—who comforts us. The experience has also underscored the poignant truth that God does not take our children but that "time and unforeseen occurrence befall [us] all."—Ecclesiastes 9:11.

How I look forward to the time when God will eliminate all mourning, outcry, and pain, including the physical and emotional pain of miscarriage! (Isaiah 65:17-23) Then all obedient humans will be able to say: "Death, where is your victory? Death, where is your sting?"—1 Corinthians 15:55; Isaiah 25:8.
—Contributed.

* Published by Jehovah's Witnesses.

How Family and Friends Can Help

Sometimes it is hard to know just what to say or do when a family member or a friend suffers a miscarriage. People react differently to such a loss, so there is no single formula for offering comfort and help. Consider, however, the following suggestions.*

Practical things you can do to help:

- ◆ Offer to look after older children.
- ◆ Prepare a meal and bring it to the family.
- ◆ Be there for the father too. As one father said, "they don't make many cards for dads in this situation."

Helpful things to say:

- ◆ *"I'm so sorry to hear about your miscarriage."*

These simple words mean a lot, and they can open the door for further comforting words.

- ◆ *"It's OK to cry."*

Tears are often near the surface in the first weeks or even months after a miscarriage. Assure the person that you do not think any less of her for showing her emotions.

- ◆ *"May I call you again next week to see how you're doing?"*

Initially, sufferers may receive a lot of sympathy, but as time goes by and they are still in pain, they may feel that others have forgotten them. It is nice for them to know that your support is ongoing. Feelings can surface for weeks or months. They may even well up after a successful pregnancy.

- ◆ *"I don't really know what to say."*

Saying that is often better than saying nothing. Both your honesty and the fact that you are there reflect your concern.

What not to say:

- ◆ *"You can always have another baby."*

While this may be true, it may be perceived as reflecting a lack of empathy. The parents did not want just any baby, they wanted *that* baby. Before they can think

about having another one, they will likely need to grieve for the baby they lost.

- ◆ *"There was probably something wrong with it."*

Although this may be so, it's not very comforting. In the mother's mind, she was carrying a healthy baby.

- ◆ *"At least you didn't really know the baby. It would have been much worse if it had occurred later."*

Most women bond with their unborn babies very early on. So when such a baby dies, grief usually follows. This grief is enhanced by the fact that no one else "knew" the baby as the mother did.

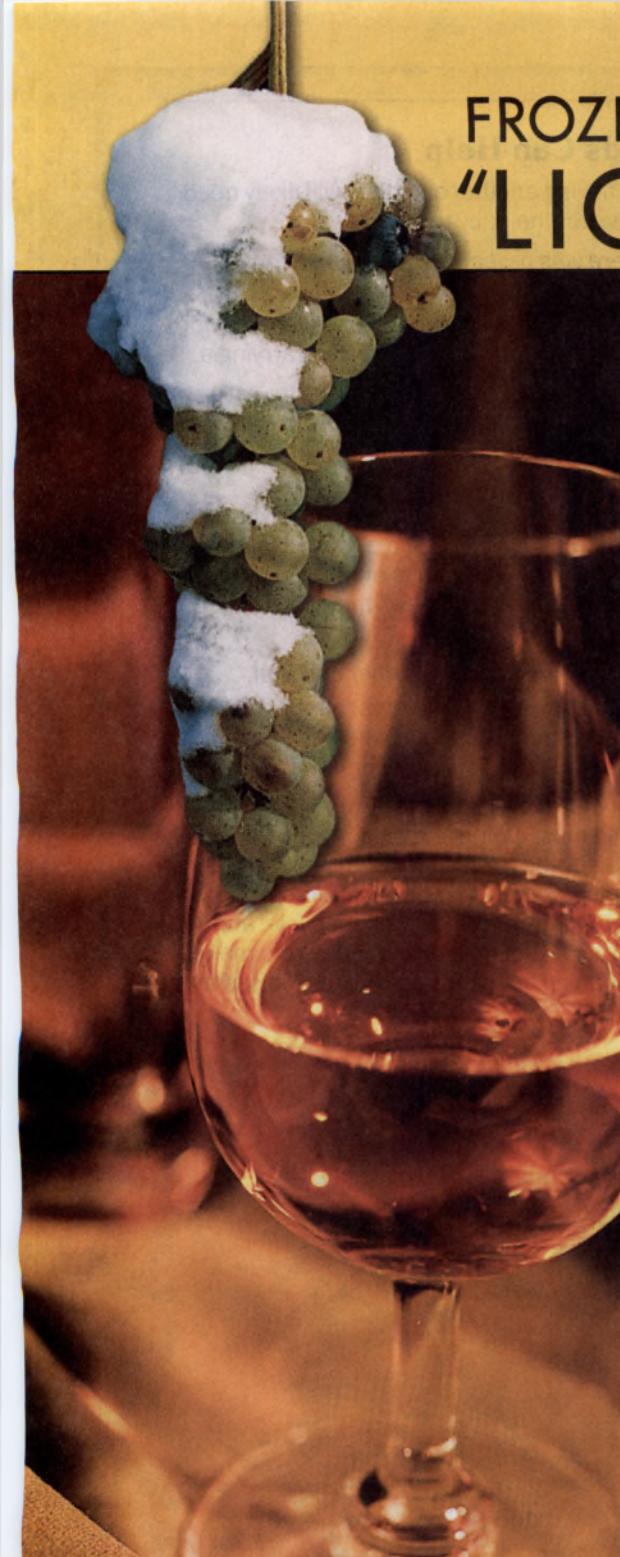
- ◆ *"At least you have your other children."*

To the grieving parents, this may be the equivalent of saying to someone who has lost a limb: "At least you have your other one."

Of course, it must be acknowledged that even the most caring and sincere people occasionally say the wrong thing. (James 3:2) Hence, discerning women who have suffered a miscarriage would want to show Christian love and not harbor ill feelings toward those who make well-meaning but clumsy remarks.—Colossians 3:13.



* Adapted from *A Guide to Coping With Miscarriage*, prepared by the Wellington, New Zealand, Miscarriage Support Group.



FROZEN GRAPES THAT YIELD “LIQUID GOLD”

BY AWAKE! WRITER IN CANADA

A frosty winter's day in Canada's Niagara region invites scores of hardy workers to brave the elements and head for the vineyard. Cold winds can make the temperature seem like minus 40 degrees Fahrenheit. Why are these harvesters so willing to go out in such harsh weather to gather frozen, shriveled grapes that are as hard as marbles? Because those withered grapes yield an intensely sweet wine with the color of gold—icewine.

Timing and Temperature

American writer Mark Twain called accident “the greatest of all inventors.” So it was in Franconia, Germany, in 1794 when vintners pressed juice from frozen grapes after an ice storm. The grapes yielded a wine with a remarkably high concentration of sugars; yet, its high acidity balanced the wine's sweetness. Producing icewine on a yearly basis, though, presents special challenges to the wine maker. The temperature must be below 19 degrees Fahrenheit for several days if the juice is to freeze properly. A quick thaw will dilute the sweet juice. If it gets too cold, the hard grapes will yield very little when pressed. “It's tricky,” says one Niagara wine maker. “It has to be just right.”

The climate in southern Canada, especially in the Niagara region, is ideal for producing icewine. Temperatures will predictably fall below 19 degrees sometime between November and February. Wine makers have been especially successful in making icewine from Riesling and Vidal grapes, although other varieties have also been used. While other countries also produce icewine, Canada has become the world's largest producer, garnering high awards at several international wine competitions.

Why So Sweet?

The intense sweetness of icewine is due to the concentration of sugars within the grapes' juice. Grapes, which are 80 percent water, are picked

Grapes: © Bogner Photography



and pressed while frozen. Vintners must press the grapes outside or keep the winery doors open to ensure that the grapes stay frozen. Most of the water, which freezes at a higher temperature than the sugars, is trapped as ice. So when the frozen grapes are pressed, the juice that comes out has a high concentration of sugars. This juice is, as one wine columnist put it, "miraculously sweet."

Interestingly, although Canada is known for its formidable winters, Niagara is more southerly than the famous Burgundy region in France. Therefore, with many hours of sunshine and high temperatures in July—when the vines' growth is the most active—Niagara is ideally situated for producing an icewine with a high concentration of sugars. In the autumn the climate varies considerably, which dehydrates the grapes and intensifies the sweetness.

Tasting "Liquid Gold"

Two pounds of normal grapes will generally yield one 750-milliliter bottle of wine. However, depending on wind and on winter sunshine, two pounds of dehydrated icewine grapes may only yield one fifth of a bottle or even less! Therefore, icewine can be quite expensive and is often sold in half-bottles (375-milliliter bottles).

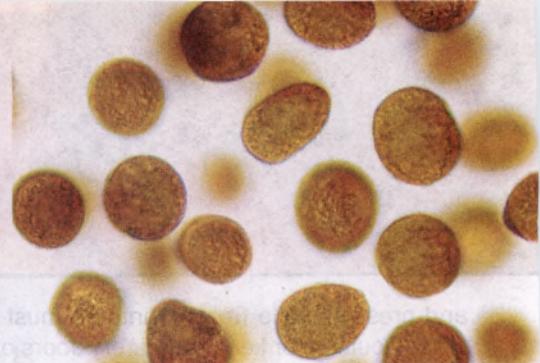
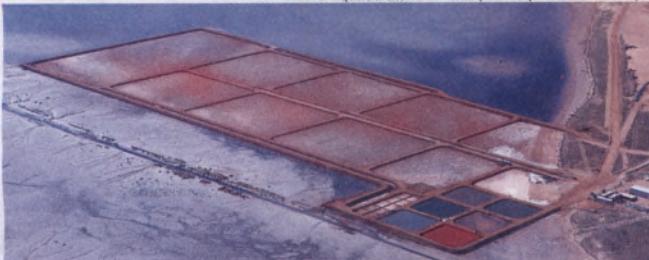
According to one wine maker, icewine's bouquet "recalls lychee nuts," while its flavor includes "tropical fruits, with shadings of peach nectar and mango." Though the sweetness and intensity of flavor may initially be overpowering, "the balance is achieved by the acidity, which gives a clean, dry finish."

The popularity of icewine is not limited to Canada. Exported widely, especially to East Asia, icewine has been embraced as a sweet alternative to cognac.

Interestingly, Niagara wineries have reported that several individuals have volunteered to participate in the frigid harvest. Their wages? A half-bottle of "liquid gold."

▼ Julianne Hayes, BCWine.com





When Simple Is Not So Simple

The theory of chemical evolution proposes that life on earth developed by spontaneous chemical reaction billions of years ago.

This theory is not that an accident directly transformed lifeless matter into birds, reptiles, or other complex life-forms. Rather, the claim is that a series of spontaneous chemical reactions eventually resulted in very simple life-forms such as algae and other single-celled organisms.

Based on what is now known about these single-celled organisms, is it reasonable to assume that they are so simple that they could have appeared spontaneously? For example, how simple are single-celled algae? Let's examine one type in particular, the unicellular green algae of the genus *Dunaliella* of the order Volvocales.

Unique Single-Celled Organisms

The *Dunaliella* cells are ovoid, or egg-shaped, and very small—about ten microns long. Placed end to end, it would take about 2,500 of them to make one inch. Each cell has two whiplike flagella at one end, which allow it to swim. Similar to plants, *Dunaliella* cells use photosynthesis to provide energy. They produce food from carbon dioxide, minerals, and other nutrients absorbed into the cell, and they reproduce by cell division.

Dunaliella can live even in a saturated salt solution. It is one of the very few or-

ganisms of any kind that can live and propagate in the Dead Sea, which has a salt concentration about eight times that of seawater. This so-called simple organism can also survive sudden changes in the salt concentration of its environment.

Consider, for instance, *Dunaliella bardawil*, found in shallow salt marshes in the Sinai desert. The water in these marshes can be diluted quickly during a thunderstorm or can reach saturated salt concentration when the extreme desert heat evaporates the water. Thanks in part to its ability to produce and accumulate glycerol in just the right amount, this tiny alga can tolerate such extreme changes. *Dunaliella bardawil* is able to synthesize glycerol very rapidly, starting within minutes of a change in salt concentration, either producing or eliminating glycerol as needed in order to adapt. This is important because in some habitats the salt concentration can change considerably within a matter of hours.

Living in shallow marshes in the desert, *Dunaliella bardawil* is exposed to intense sunlight. This would damage the cell were it not for the protective screening provided by a pigment in the cell. When grown under favorable nutritional conditions, as when ample nitrogen is



Dunaliella

© F. J. Post/Visuals Unlimited

Far left: Commercial production of beta-carotene with the use of "Dunaliella"

Left: Magnified orange-colored "Dunaliella" culture, showing high levels of beta-carotene

available, a *Dunaliella* culture is bright green, with the green pigment chlorophyll providing the protective screen. Under conditions of nitrogen deficiency and high salt concentration, temperature, and light intensity, the culture changes from green to orange or red. Why? Under such harsh conditions, a complicated biochemical process takes place. The chlorophyll content drops to a low level, and an alternative pigment, beta-carotene, is produced instead. Were it not for its unique ability to produce this pigment, the cell would die. The appearance of large amounts of beta-carotene—up to 10 percent of the alga's dry weight under these conditions—accounts for the change in color.

In the United States and Australia, to produce natural beta-carotene for the human nutrition market, *Dunaliella* has been grown commercially in large ponds. For example, there are large production facilities in southern and western Australia. Beta-carotene can also be produced synthetically. However, only two companies have the very costly and complex biochemical plants capable of producing it at production scale. What has taken humans decades and huge investments in research, development, and production facilities, *Dunaliella* accomplishes very easily. This simple alga does it with a miniature factory too small to see, in immediate response to the changing requirements of its environment.

Another unique ability of the genus *Dunaliella* is found in a species called *Dunaliella acidophila*, which was first isolated in 1963 in naturally occurring acidic sulfur springs and soils. These environments were characterized by a high concentration of sulfuric acid. In laboratory studies this species of *Dunaliella* can grow in a solution of sulfuric acid, which is about 100 times more acidic than lemon juice. On the other

hand, *Dunaliella bardawil* can survive in high alkaline environments. This demonstrates the extreme range of ecological adaptability of *Dunaliella*.

Some Points to Ponder

The unusual abilities of *Dunaliella* are remarkable. Yet, these are only a small part of the astounding array of properties used by single-celled organisms to survive and thrive in varying and sometimes hostile environments. These properties enable *Dunaliella* to respond to growth needs, take in food selectively, exclude harmful substances, excrete wastes, evade or overcome disease, escape predators, reproduce, and so forth. Humans use about 100 trillion cells to accomplish these tasks!

Is it reasonable to say that this single-celled alga is merely a simple, primitive life-form that by happenstance came about from a few amino acids in an organic soup? Is it logical to ascribe these wonders of nature to pure chance? How much more reasonable it is to credit the existence of living things to a masterful Designer who created life for a purpose. Such intelligence and craftsmanship, far beyond our ability to comprehend fully, are necessary to account for the vastly complex and interactive nature of living things.

A careful examination of the Bible, uncluttered by religious or scientific dogma, reveals satisfying answers to questions concerning the origin of life. Millions of people, including many trained in the sciences, have had their lives enriched by such an examination.*

* We encourage our readers to examine the publications *Life—How Did It Get Here? By Evolution or by Creation?* and *Is There a Creator Who Cares About You?*, published by Jehovah's Witnesses.

Image from www.cimc.cornell.edu/Pages/dunaLTSEM.htm. Used with permission.



A scanning electron microscope image showing nucleus (N), chloroplast (C), and Golgi (G)

Watching the World

Resurgence of Sleeping Sickness

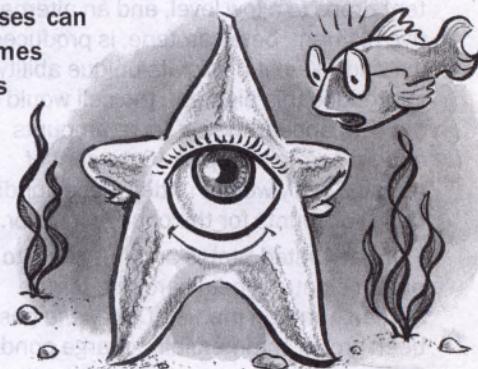
"Researchers have warned that sleeping sickness has returned to alarming levels in parts of Africa," reports the *British Medical Journal*. Pierre Cattand, of the Association Against Trypanosomiasis in Africa, says: "Sixty million people are considered at risk, but only three to four million are under surveillance, yielding some 45 000 new cases a year. It is estimated that at least 300 000 to 500 000 are presently affected." Considered almost eradicated in the 1960's, the disease is transmitted to humans by the tsetse fly. Areas said to be most at risk and in need of international help are Angola, the Democratic Republic of Congo, and southern Sudan.

Czechs Turn Their Backs on Religion

Figures published by the Statistical Office of the Czech Republic indicate that many people within Czech society have turned their backs on religion over the past ten years. In 2001, for example, only 2.7 million Czechs identified themselves as Roman Catholics, compared with 4 million in 1991. Within the same period of time, the Evangelical Church and the Hussite Church also suffered losses of 32 percent and 46 percent respectively. Why the downturn? Shortly after the fall of Communism, the Czechs felt free to identify themselves as church members. Today, however, nearly 60 percent of its population claim to be nonreligious. What is now the Czech Republic, once the

One Big Eye

The brittle star, also known as the serpent star, was thought to survive in the murky ocean depths without eyes. Researchers were puzzled over how this relative of the starfish seemed to be able to detect predators and then flee from them. "Now scientists have discovered its secret," reports *The New York Times*. "Its entire skeleton forms a big eye." The brittle star uses an array of beadlike lenses to form what is thought to be one big compound eye. In addition, its tiny lenses can focus light at least 10 times as well as the microlenses now made in laboratories," says the report. "This study shows how great materials can be formed by nature, far beyond current technology," states Dr. Joanna Aizenberg, the lead author of the study.



home of the well-known religious Reformer Jan Hus, has become one of the least religious countries in Europe.

Vanishing Work Ethic

"Fifty-five percent of the top executives interviewed [in the United States] say that erosion of the work ethic will have a major negative effect on corporate performance in the future," reports *The Futurist* magazine. A number of factors may cause such a decline, says the magazine, including children who "watched their parents remain loyal to their employers, only to be downsized out of work." This has led many of the post-baby-boom generation to view work as "a means to their ends: money, fun, and leisure." The article states that for this reason, "job security and

high pay are not the motivators they once were." Two present-day symptoms of the vanishing work ethic are increasing tardiness and abuse of sick leave among workers.

On-Line Grave Service

An on-line service now makes it possible to visit virtual graves in cyberspace, reports *The Japan Times*. Friends and relatives can pay their respects to the deceased on the Internet. An image of a gravestone appears on the computer screen along with a photo and profile of the deceased. A space is provided so that visitors can leave messages. To accommodate Buddhist visitors, offerings of fruit, flowers, incense sticks, and alcoholic drinks can be made at the virtual grave by clicking the mouse. According

to Tadashi Watanabe, president of the on-line memorial services firm, "some say it is a very good idea for people who can't visit graves so often, such as those living abroad."

Arctic Warning

"Up to 80 per cent of the planet's delicate Arctic region will be seriously damaged by the middle of this century if industrial development there does not slow down," states *The Globe and Mail* newspaper of Canada. A report by the UN Environment Programme comments on the cumulative effects of human development on the entire Arctic region. According to the report, if industrial development continues at the same rate as occurred from 1940 to 1990, the results will be devastating. It is said that the damage has the potential of spreading to other regions too, since many Arctic animals are migratory. "Already," says the paper, "be-

tween 10 per cent and 15 per cent of the world's Arctic region is [adversely] affected by industrial development."

Rising Childhood Obesity

"The number of overweight toddlers has nearly doubled in the past decade," says *The Times* of London, commenting on a recent survey published in the *British Medical Journal*. "More than one in five children under the age of four is overweight and nearly one in ten is classified as obese." Dr. Peter Bundred of the University of Liverpool says that many mothers give their toddlers "ready-made meals which have a higher fat content," and entertain them by putting them in front of the TV. When they reach school years, many of these children will ride to school rather than walk and will watch TV after school rather than play outdoors. "For the first time we are seeing rapid increases

in weight throughout the childhood years," Bundred said.

Informed Consent Reaffirmed

Ten years after a first decree, dated January 1991, the Italian Ministry of Health has reiterated that blood transfusions cannot be administered before the patient has given his informed consent. The decree, dated January 25, 2001, and published in the *Gazzetta Ufficiale della Repubblica Italiana* (Official Gazette of the Italian Republic), states: "On being informed that transfusions of blood or blood components and/or administration of blood derivatives may not be free of risks, the recipient of such procedures must express prior consent or dissent in writing."

Mothers-to-Be Under Assault

"Assaults by male partners are now recognised to cause more harm to mother and child than medical conditions screened for in pregnancy," says *The Independent* of London. "A study of domestic violence in Britain by the Royal College of Obstetricians . . . showed that one-third of assaults on women took place for the first time when they were pregnant. There is growing evidence that jealousy, provoked by the prospective arrival of a baby, drives some men to violence." "We were shocked when we saw the UK figures," said Professor James Drife of the Royal College of Obstetricians. A similar study in the United States found the cause of 1 in 5 deaths among pregnant women in that country to be murder, making it "the most common cause of death among pregnant women [there]."

Hardy Bacteria

The earth is teeming with life, even several miles underground, reports the *National Post* of Canada. "These bacteria can be so deep within the Earth's surface that it would take 50,000 years for rainwater to get down to them," states Professor Terry Beveridge of the University of Guelph. "There is no light, no photosynthesis, no complex sugars or proteins to feed on." How do the bacteria survive? Researchers have discovered that the bacterium *Shewanella* attaches to iron oxide, transfers electrons to the mineral, and derives metabolic energy from the enzymatic reduction of iron. Scientists estimate that tens of thousands of different microbes live deep underground, but less than 10 percent have been fully identified.



From Our Readers

Hate My brother came to visit me recently. I had no idea that he was a self-proclaimed bigot. He spoke of different races and vehemently expressed his disdain for them. I wanted to help him, but I didn't

know how to approach the subject. As soon as I saw the August 8, 2001, issue with the series "Breaking the Cycle of Hate," I knew it was an answer to my prayer.

L. B., United States



What you wrote was too much for a reasonable person to accept. You said: "The Bible itself says that imperfect humans are born with bad traits and defects. (Genesis 6:5; Deuteronomy 32:5) Of course, those words apply to all humans." But these scriptures were addressed to two special groups at specific times and at specific places. By no means can they be applied to all humans.

D. C., Czech Republic

"Awake!" responds: True, these words did have specific application to the people who lived before the Flood and to the nation of Israel. However, the Bible repeatedly makes it clear that "all have sinned and fall short of the glory of God." (Romans 3:23; 5:12; Job 14:4; Psalm 51:5) The Israelites and the people living before the Flood are thus cited as examples of human imperfection.

Diaries You do not know how happy I was to receive the article "The Diary—A Trustworthy Friend." (August 8, 2001) I am 20 years old and have been keeping a diary since I was 11. You can imagine how I feel when I read of my pranks, my first adolescent crushes, my poems, my embarrassments, and even the day of my baptism and the emotions I felt that day.

L. C., Italy

As a victim of childhood abuse, I have been helped by my diary to know myself better and to deal with emotional pain. I have seen growth in my spirituality.

E. L., United States

Scleroderma Yesterday I had emergency surgery that will probably leave me with impaired vision in my left eye. I was in a state of shock and depression. When I got home, the August 8, 2001, issue had arrived with Marc Holland's account, "My Fight With Scleroderma." I was encouraged by his reaction to this awful disease, particularly his faith and determination to continue serving Jehovah. It made my problem seem far less significant.

L. B., United States

Prayer Thank you for the article "Young People Ask . . . How Can Prayer Help Me?" (July 22, 2001) Reading how prayer has helped many young people to face their problems encourages me to open up more to Jehovah myself.

D. B., Italy

The article helped me to realize that I need a closer relationship with God. At my age, 16, it is extremely difficult. There are many temptations and peer pressure. I'm wondering if there's some way that I could have a Bible.

M. A., United States

"Awake!" responds: Arrangements were made for Jehovah's Witnesses to call on our reader and supply her with a Bible.

I liked the expressions of young Paul, who said he asked Jehovah for peace of mind. I have always asked Jehovah to help me to stay balanced in my day-to-day life and in the decisions I have to make. Now I shall also ask for peace of mind. We can learn a lot from our young people. I am 62 years old.

M. P., Australia

Brighter Days Invite a Better Night's Sleep

DO YOU have trouble sleeping? The problem could be a lack of exposure to bright light during the day, especially if you are elderly. Researchers in Japan recently conducted a study of nursing-home residents who suffered from insomnia, and they found that the poor quality of the subjects' sleep was related to their limited daily exposure to environmental light. At the same time, blood tests revealed that these elderly residents had low levels of the hormone melatonin.

Melatonin is secreted by the pineal gland in the brain. Under normal circumstances, the daily rhythm of melatonin secretion causes concentrations in the blood to be "high during the nighttime and nearly undetectable during the daytime," says the report in *The Journal of Clinical Endocrinology & Metabolism*. However, when the elderly are not exposed to enough light during the day, blood melatonin levels fall. It seems that as far as the body is concerned, this blurs the distinction between day and night, which the researchers believe affects sleep quality.

When the elderly insomniacs were exposed to four hours of bright artificial light near the middle of the day (ten o'clock

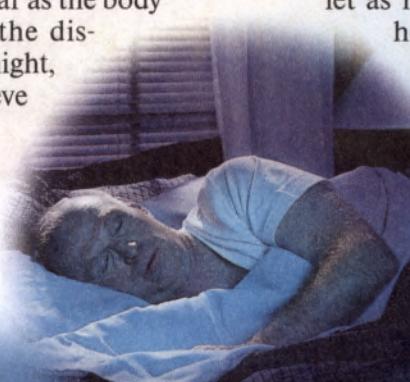
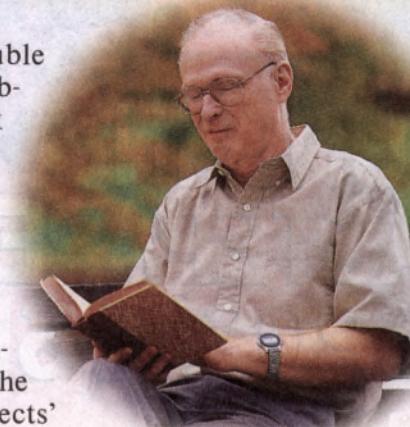
to noon and two o'clock to four) for four weeks, their melatonin secretion rose "to levels similar to those in the young control group," says the report.* At the same time, their sleep quality improved.

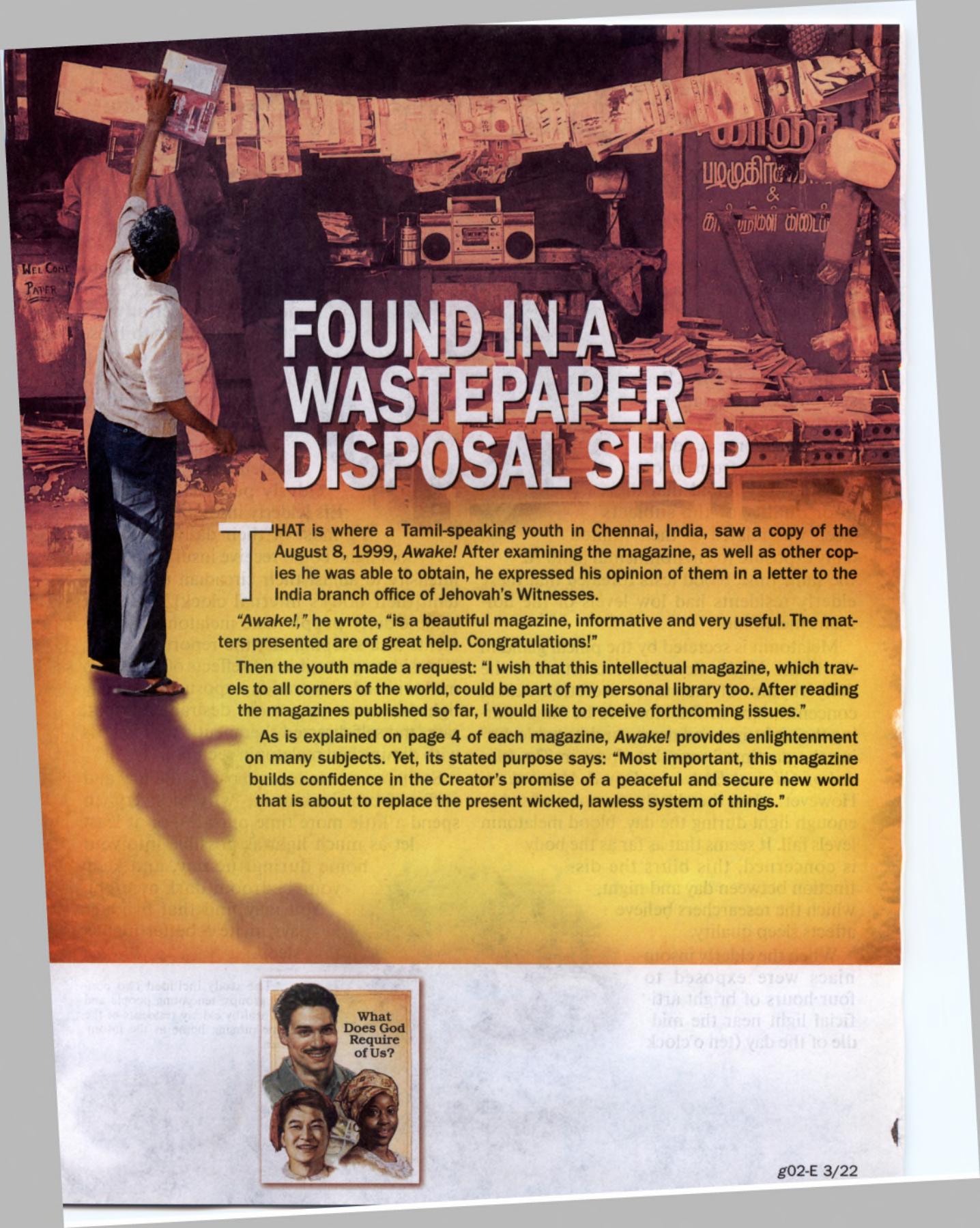
These findings led the researchers to "assume that elderly persons, especially EIs [elderly insomniacs], spending most of their daily life under room light, could receive insufficient light intensity to adjust their circadian timing system [their body's internal clock]." Because some elderly people take melatonin supplements as a sleeping aid, the report observes: "Considering possible side effects of long-term melatonin administration, exposure to midday light may provide a more desirable, potent, safe, and self-directed therapeutic tool for EIs with diminished melatonin secretion."

So if you are indoors most of the day and suffer from insomnia, why not try to spend a little more time outside—or at least let as much light as possible into your home during the day, and keep your bedroom dark at night.

You may find that brighter days invite a better night's sleep.

* The study included two control groups: ten young people and ten healthy elderly residents of the same nursing home as the insomniacs.





FOUND IN A WASTEPAPER DISPOSAL SHOP

THAT is where a Tamil-speaking youth in Chennai, India, saw a copy of the August 8, 1999, *Awake!* After examining the magazine, as well as other copies he was able to obtain, he expressed his opinion of them in a letter to the India branch office of Jehovah's Witnesses.

"*Awake!*," he wrote, "is a beautiful magazine, informative and very useful. The matters presented are of great help. Congratulations!"

Then the youth made a request: "I wish that this intellectual magazine, which travels to all corners of the world, could be part of my personal library too. After reading the magazines published so far, I would like to receive forthcoming issues."

As is explained on page 4 of each magazine, *Awake!* provides enlightenment on many subjects. Yet, its stated purpose says: "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."

