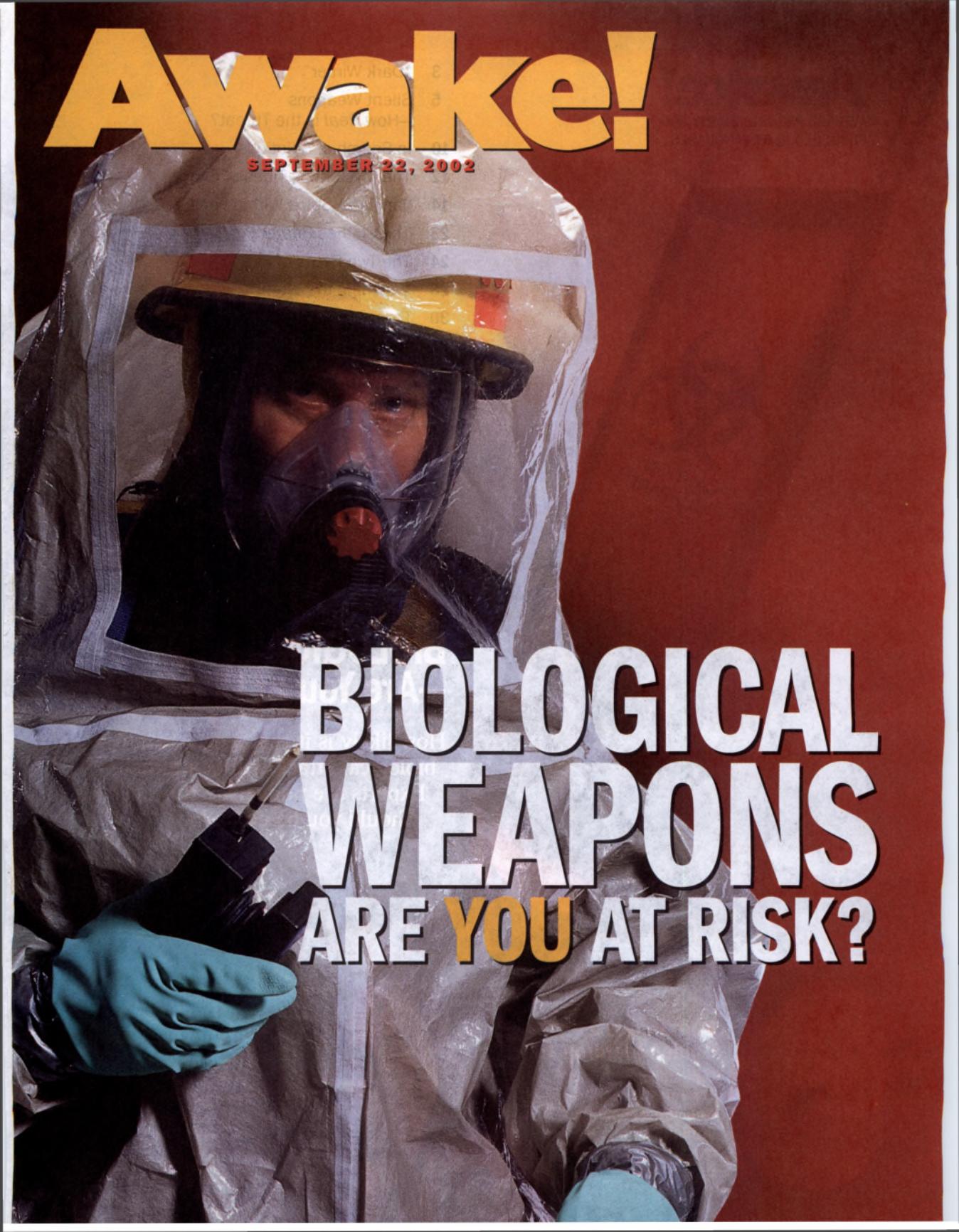


Awake!

SEPTEMBER 22, 2002

A black and white photograph of a person wearing a full-body protective suit and a respirator mask with a clear plastic visor. The person is holding a small vial or test tube in their gloved hand. The background is dark and textured.

BIOLOGICAL WEAPONS ARE YOU AT RISK?

Awake!

AVERAGE PRINTING 21,153,000
PUBLISHED IN 87 LANGUAGES



- 3 "Dark Winter"
- 5 Silent Weapons
—How Real Is the Threat?
- 10 In Search of Solutions
- 12 The Mysterious Tides of Evripos
- 14 Vanilla—A Spice With a Long History
- 23 The Clothes Beaters of Bamako
- 24 The Two Faces of Fire
- 28 Watching the World
- 30 From Our Readers
- 31 "Perfect Light"
- 32 Happy Family Life
Is Possible!

BIOLOGICAL WEAPONS **—Are You at Risk? 3-11**

How likely is it that a catastrophic biological attack will be unleashed?

Experts are pondering this question.
Should you be concerned?

Captured in a Golden Teardrop 16

Can amber and insects entombed in it tell us something about the distant past?



Why Doesn't My Parent Love Me? 20

Few things wound more deeply than rejection by a parent. How can a young person succeed in life even when a parent's support is lacking?



"DARK WINTER"

IMAGINE the following scenario. Terrorists secretly release smallpox virus in three shopping malls in the United States. The virus infects unsuspecting shoppers. Soon—in a little over a week—doctors recognize the disease in 20 people. In the days that follow, the virus spreads to others. There is panic. Riots rage. The health-care system is overwhelmed. Borders close. The economy reels. Twenty-one days after the initial release, the disease has spread to 25 states and 10 other countries. By then, 16,000 people have been infected and 1,000 have died. Doctors estimate that in another three weeks, the number of people infected will rise to 300,000. One third of them will die.

This is not the plot of a science-fiction movie. It was a computer-simulated exercise, forecasting what would probably develop if such an outbreak occurred. The exercise, conducted by a group of prestigious think tanks, took place in June 2001. It was termed "Dark Winter."

For many, "Dark Winter" took on a new and ominous meaning after the violence of September 11, 2001. The attacks on the World Trade Center in New York City and on the Pentagon in Washington, D.C., dramatically showed that there exist ruthless and hate-driven people bent on the mass destruction of human life. Further, the attacks proved that the United States and, by extension, every other nation are vulnerable to such attacks. We live in a world where determined terrorists can, in an instant, snuff out the lives of thousands of people.

Swiftly following the September 11 attacks, U.S. politicians and employees of the news media became the targets of letters containing anthrax, a deadly bacterium. People were fearful. Fueling such fears, the media along with experts speculated that terrorists might attack with pathogens more lethal than anthrax—plague or smallpox, for example. Perhaps certain “rogue states” were already mass-producing such material in secret laboratories. Consider a sampling of what has been written recently:

“The World Medical Association recognizes the growing threat that biological weapons might be used to cause devastating epidemics that could spread internationally. All countries are potentially at risk. The release of organisms such as smallpox, plague, and anthrax could prove catastrophic in terms of the resulting illnesses and deaths compounded by the panic such outbreaks would generate.”—American Medical Association.

“Unlike bombs and nerve gases, bioweapons have finesse: the disease incubation period makes the calamity build slowly and imperceptibly. At first a few people trickle into hospitals. Their symptoms might baffle doctors or mimic those of more common illnesses. By the time health care workers realize what is going on, entire cities could be infected.”—*Scientific American* magazine.

“If the smallpox virus were released today, the majority of the world’s population would be defenseless, and given the virus’ 30 percent kill rate, nearly two billion people could die.”—*Foreign Affairs* magazine.

‘All countries at risk. Entire cities infected. Two billion people might die.’ These are alarming statements. Yet, just how likely is it that a catastrophic biological attack will be unleashed? Experts ponder this question. The following article will help you to understand some of the issues involved.

Military personnel respond to a simulated biological attack



DoD photo by Cpl. Branden P. O'Brien,
U.S. Marine Corps

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.



SILENT WEAPONS

HOW REAL IS THE THREAT?

ATTEMPTS to kill by disease in times of war are not new. During the 14th century, in eastern Europe, the corpses of plague victims were catapulted over the walls of a city under siege. In an incident 400 years later, British officers deliberately gave smallpox-infected blankets to American Indians at a peace parley during the French and Indian War. This triggered an epidemic that contributed to the Indian surrender. However, it was not until the end of the 19th century that it was discovered that microbes cause infectious disease. This understanding opened new and terrifying possibilities for the weaponizing of disease.

Of course, medical and scientific advances have also led to the development of drugs and vaccines. These have been highly successful in the treatment and prevention of disease. Yet, despite these advances, infectious disease remains a formidable enemy, killing more than 17 million people each year—about 50,000

each day. It is a chilling irony: While men and women of brilliance have devoted their lives to the conquest of disease in humans, others with equal zeal and skill have focused on the conquest of humans by means of disease.

Attempts to Ban Biological Weapons

For more than 25 years, the United States, the former Soviet Union, and several other nations ambitiously pursued the development of biological weapons. But in 1972 the nations agreed to ban these weapons. Some countries, however, secretly continued development and research, amassing stockpiles of deadly biological agents, along with the means to deliver them.

What led to the official ban on such weapons? According to the thinking of the early 1970's, biological agents, though highly lethal, are poor battlefield weapons. One reason for this is that their effect is not immediate

Semimonthly Languages: Afrikaans, Arabic, Cebuano, Croatian, Czech,[#] Danish,[#] Dutch, English,[#] Estonian, Finnish,[#] French, German,[#] Greek, Hungarian, Iloko, Indonesian, Italian,[#] Japanese,[#] Korean,[#] Latvian, Lithuanian, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Slovak, Slovenian, Spanish,[#] Swahili, Swedish,[#] Tagalog, Ukrainian
[#]Audiocassettes also available.

Monthly Languages: Albanian, Amharic, Bulgarian, Chichewa, Chinese, Chinese (Simplified), Ewe, Georgian, Hebrew, Hiligaynon, Igbo, Macedonian, Malagasy, Malayalam, Maltese, Myanmar, Nepali, Papiamento (Aruba), Papiamento (Curaçao), Sepedi, Sesotho, Shona, Sinhala, Tamil, Thai, Tsonga, Tswana, Turkish, Twi, Xhosa, Yoruba, Zulu

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 300001, Edo State. **South Africa:** Private Bag X2067, Krugersdorp, 1740. **Zambia:** Box 33459, Lusaka 10101. **Zimbabwe:** Private Bag WG-5001, Westgate.

—it takes time for symptoms to appear. Another reason is that their effectiveness depends on fluctuations of wind and weather. Further, nations realized that if one nation used bioweapons against another nation, the target nation would likely retaliate with its own arsenal of bioweapons or with nuclear weapons. Finally, many people felt a moral repugnance against deliberately deploying living organisms to disable or kill fellow humans.

None of these reasons are likely to deter people who are seething with hatred and who are willing to act outside traditional moral standards. To those bent on indiscriminate killing, biological weapons have enormous appeal. Bioweapons can be secretly developed and deployed. The identity of the attacker can be concealed, and if the attacker is known, it is not easy to retaliate against a terrorist network with cells in many countries. Moreover, a silent, invisible, slow-acting, and deadly biological attack can destabilize a population through panic alone. Attacks against crops or livestock can cause food shortages and economic disaster.

Another incentive is the relatively low cost of biological weapons development. One analysis compared the cost of using various weapons to kill the unprotected civilians in an area of one square mile. The estimated cost using conventional weapons was put at \$5,000, nuclear weapons \$2,000, nerve-gas weapons \$1,500, and biological weapons \$2.50.

What Is Biological Warfare?

The term "biological warfare" refers to the deliberate spreading of disease among humans, animals, or plants. Disease occurs when the target population is infected by living microorganisms. These organisms multiply (some producing toxins), and in time the symptoms of the disease become evident. Some biological weapons cause incapacitation, others death. Still others can be used to attack and destroy crops.

Technological Hurdles for Terrorists

Reports in the media say that some terrorist groups have experimented with biological weapons. Yet, there is a huge difference between experimenting with biological weapons and launching an effective attack with them.

To be successful, a terrorist or terrorist organization has to overcome formidable technical challenges. First, the terrorist has to obtain a sufficiently lethal strain of a disease pathogen. Second, he must know how to handle and store the pathogen correctly and safely. Third, he must know how to produce it in bulk. Tiny amounts of a microorganism are lethal

enough to ravage a field of crops, a herd of animals, or a city of people, assuming the pathogen is delivered precisely to the target. However, biological agents do not survive well outside the laboratory. In reality only a fraction of the biological agent would reach the target population, so vastly larger amounts would be needed to launch a catastrophic attack.

There is more. The terrorist must understand how to keep the pathogen alive and potent during transport from the place where it is kept to the place where it will be released. Finally, he needs to know how to disperse the pathogen effectively. This involves ensuring that the pathogen is delivered to the target in the right particle size, over a large enough geographical area, and in sufficient concentration to cause mass infection. It took more than ten years for a highly trained team of U.S. germ-warfare researchers to produce a reliable bioweapons delivery system. Once a biological agent has been dispersed into the atmosphere, it is exposed to sunlight and varying temperatures, which can cause the microorganism to die. Weaponizing an agent, therefore, calls for detailed knowledge of the behavior of biological organisms in the air.



Recently, anthrax-laced letters caused widespread fear

were used, no more than three people were killed or injured.

Recognizing the difficulties involved in launching a successful biological attack, the British American Security Information Council stated: "Though governments face a multitude of threats of chemical and biological terrorism most analysts believe that the catastrophic scenarios involving mass casualties, though possible, are highly unlikely to occur." But while the probability may be low, the consequences of such an attack could be horrendous.

The Bad News

So far, we have presented the positive news: Both technological difficulties and history argue against the likelihood of catastrophic biological attacks. The bad news, simply stated, is this: History is not a clear guide to the future. Though past attacks have largely failed, future ones may succeed.

There are concerns. Growing numbers of terrorists seem determined to kill large numbers of people. Not only is the technological sophistication of terrorist groups growing but some terrorist groups have financial and technical resources that are comparable to those of some governments.

Experts do not seem to worry about nations handing over biological weapons to terrorist groups. One analyst said: "Governments, however ruthless, ambi-

Considering the array of technological hurdles involved, it is not surprising that few terrorist attacks with biological weapons have been attempted. What is more, those attempts produced few casualties. Recently, anthrax-laced letters killed five people in the United States. That is tragic enough, but the casualties were fewer than might have occurred from a small explosive or even a pistol. Researchers calculate that since 1975, in 96 percent of the attacks worldwide in which chemical or biological agents

tious, and ideologically extreme, will be reluctant to pass on unconventional weapons to terrorist groups over which they cannot have full control; the governments may be tempted to use such arms themselves in a first strike, but it is more probable that they would employ them in blackmail than in actual warfare." What does worry experts is that highly trained scientists may be recruited with lucrative offers to work for terrorist groups.

Disease by Design

Advances in biotechnology are also a matter of concern. Scientists already have the know-how to alter existing pathogens to make them extraordinarily lethal yet easier to handle. They can genetically alter harmless microorganisms to produce toxins. Organisms can also be manipulated so that they will escape standard detection methods. Further, microorganisms can be designed to

Chemical/biological aerial bombs destroyed after the Gulf War



resist antibiotics, standard vaccines, and therapies. Scientists who defected from the former Soviet Union, for example, claimed to have developed a form of plague that was resistant to 16 antibiotics.

Future developments in biotechnology and genetic engineering are expected to expand the options. Scientists can reshuffle the genetic

deck to redesign or fashion a multitude of biological weapons—deadlier, harder, and easier to produce and deliver. They could be tailored so that their effects would be more easily predicted and controlled. Pathogens might be designed to die after a predetermined number of cell divisions—they would kill and then vanish.

BIOWEAPON FACT SHEET

Anthrax: An infectious disease caused by a spore-forming bacterium. Early symptoms of inhalation anthrax may resemble a common cold. After several days, symptoms progress to severe breathing problems and shock. This form of anthrax is often fatal.



In people exposed to anthrax, infection can be prevented with antibiotics. Early treatment is vital; delay reduces the chances for survival.

Direct person-to-person spread of anthrax is extremely unlikely and may not occur at all.

In the second half of the 20th century, anthrax was developed as a weapon by several countries, including the United States and the former Soviet Union. The number of nations thought to have biological weapons programs has risen from 10 in 1989 to 17 in 1995. It is unclear how many of these countries are working with anthrax. According to one assessment by the U.S. government, the release of 220 pounds of aerosolized anthrax over a major city could be as lethal as a hydrogen bomb.



Botulism: A muscle-paralyzing disease caused by a toxin-producing bacterium. The symptoms of foodborne botulism include double or blurred vision, drooping eyelids, slurred speech, difficulty swallowing, and dry mouth. Muscle weakness descends through the body from the shoulders down. Paralysis of breathing muscles can cause death. Botulism is not spread from one person to another.

An antitoxin, if administered early enough, reduces the severity of the symptoms and the likelihood of death.

Botulinum toxin is a prime choice as a bioweapon not only because it is one of the most poisonous substances known but also because it is relatively easy to produce and transport. In addition, those infected require prolonged intensive care. Several countries are suspected of developing botulinum toxin as a biological weapon.

Anthrax
bacterium and
spherical spore

Anthrax victim: CDC, Atlanta, Ga.; anthrax bacterium:
©Dr. Gary Gaugler, Photo Researchers; botulism bacterium:
CDC/Courtesy of Larry Stauffer, Oregon State Public Health
Laboratory

Extraordinary weapons of stealth might also be developed in the future. For example, highly specific weapons could disable the immune system itself—rather than being infected with a specific disease, a victim would be susceptible to many diseases. If such a lethal AIDS-like virus surfaces, who is to know whether the source is a natural mutation or a

genetic manipulation concocted in the laboratory of an enemy?

Technological advances have changed the thinking of military minds. One U.S. naval officer wrote: "Weaponeers have only just begun to explore the potential of the biotechnological revolution. It is sobering to realize that far more development lies ahead than behind."



Plague: A highly infectious disease caused by a bacterium. The first signs of the lethal pneumonic plague are fever, headache, weakness, and cough. Septic shock will follow, and without early treatment with antibiotics, death is almost certain.

The disease passes from person to person through saliva droplets.

During the 14th century, within five years plague killed about 13 million people in China and 20 million to 30 million in Europe.

During the 1950's and 1960's, both the United States and the former Soviet Union developed techniques to spread pneumonic plague. Thousands of scientists are believed to have worked on weaponizing plague.

Sources: U.S. Centers for Disease Control and Prevention, Johns Hopkins Center for Civilian Biodefense Studies.

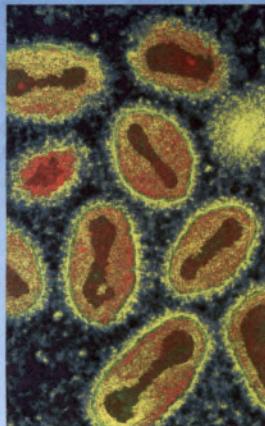
Plague bacterium: Copyright Dennis Kunkel Microscopy, Inc.; smallpox virus: ©Meckes, Gelderblom, Eye of Science, Photo Researchers; smallpox victim: CDC/NIP/Barbara Rice

Smallpox: A highly infectious disease caused by a virus. Initial symptoms include high fever, fatigue, headaches, and backaches. Later, painful lesions appear that become pus filled. One in three victims dies.

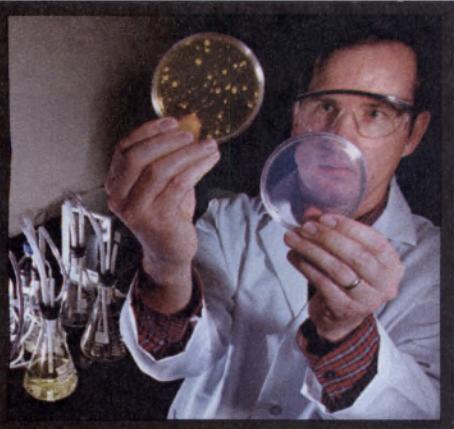
Smallpox was eliminated worldwide in 1977. Routine smallpox vaccination ended in the mid 1970's. The level of immunity, if any, among people who were vaccinated before then is uncertain. There is no proven treatment for smallpox.

The disease spreads from person to person via infected saliva droplets. Contaminated clothing or bed linen may also spread the virus.

Beginning in 1980, the Soviet Union launched a successful program to produce large amounts of smallpox and to adapt it for delivery by intercontinental ballistic missiles. Efforts were also made to develop strains of smallpox that were more virulent and contagious.



IN SEARCH OF SOLUTIONS



Researchers are developing ways of neutralizing anthrax

Photo courtesy of Sandia National Laboratories

Bioweapons Conference, November 19, 2001, Switzerland

AP Photo/Donald Stumpf



BEGINNING in 1972 more than one hundred nations signed an international treaty prohibiting the development, production, and stockpiling of biological weapons. This treaty, called the Biological and Toxin Weapons Convention (BTWC), was the first ever to ban an entire class of weapons. Its flaw was that it failed to outline a way to determine that nations were obeying the rules.

It is difficult to verify that countries are not developing biological weapons, since the same techniques and knowledge used for peaceful purposes can also be used to develop biological weapons. This “dual use” characteristic of biotechnology makes it easy to hide weapons development in fermentation plants and laboratories that appear to be pursuing legitimate civilian activities.

To resolve the difficulties of verification, delegates of various nations began to negotiate a binding protocol in 1995. For more than six years, they deliberated on what concrete measures could be taken to ensure that nations complied with the BTWC. On December 7, 2001, a three-week conference attended by 144 parties to the 1972 treaty ended in disarray. The problem was that the United States did not agree to the key proposals about how to verify compliance with the BTWC. Allowing outsiders to check their military and industrial facilities, the United States asserted, would expose them to spying.

What Lies Ahead

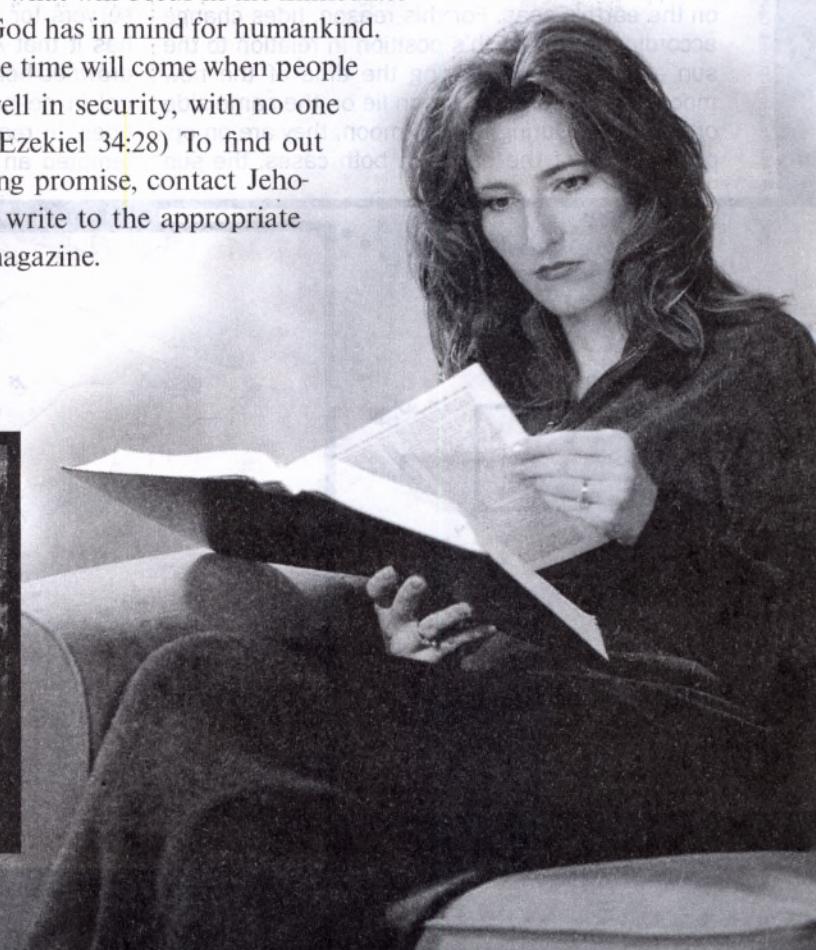
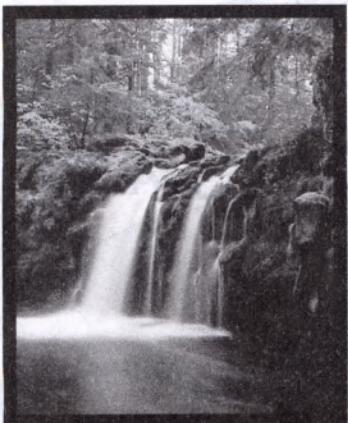
Biotechnology has enormous potential for both good and evil. Other major technologies—metallurgy, explosives, internal combustion, aviation, electronics—have all been exploited not only for peaceful purposes but also for hostile ones. Is this to be true of biotechnology? Many believe the answer to that question is yes.

A 1999 report by the U.S. Commission on National Security said: “Individuals as well as groups . . . will gain power and influence, and many will have at their disposal alarming means of destruction. . . . There will be a greater incidence of ad hoc cells and individuals, often moved by religious zeal, seemingly irrational cultish beliefs, or seething resentment. Terrorists can now exploit technologies that were once the sole preserve of major states and pose attacks against large domestic population centers.”

Though we do not know what will occur in the immediate future, we do know what God has in mind for humankind. The Bible promises that the time will come when people on earth “will actually dwell in security, with no one to make them tremble.” (Ezekiel 34:28) To find out more about that comforting promise, contact Jehovah’s Witnesses locally or write to the appropriate address on page 5 of this magazine.



**The Bible promises
the time when all will
“dwell in security”**



THE MYSTERIOUS TIDES OF EVRIPOS

BY AWAKE! WRITER IN GREECE

ON THE eastern side of Greece, near the city of Khalkis, a narrow strait divides the mainland from the island of Évvoia. This is the channel of Evripos. It measures five miles long and varies in width from one mile to only 130 feet. At its shallowest point, it is only 20 feet deep. The name Evripos, meaning "Swift Current," well describes the sometimes violent flow of the channel's waters, which often attain a speed of nearly 14 miles per hour. Strangely, however, on some days the current seems to vacillate weakly, or it may even stop altogether! Many visitors to Khalkis come to a small bridge over the channel to observe this unusual tidal phenomenon.

Tides occur because the sun and the moon pull on the earth's seas. For this reason, tides change according to the earth's position in relation to the sun and the moon. During the time of the new moon, the sun and the moon lie on the same side of the earth. During the full moon, they are on opposite sides of the earth. In both cases, the sun

and the moon work together, producing the highest tides.

The Evripos channel usually experiences two high tides and two low tides about every 24 hours. The current flows in one direction for 6 hours and 13 minutes, pauses briefly, and then reverses itself and flows in the opposite direction. It follows this regular pattern for 23 or 24 days of the lunar month. However, during the final four or five days of the month, unusual things happen. On some days the current may not change at all. On others, it may reverse itself as many as 14 times!

Attempts to Explain the Phenomenon

The phenomenon of Evripos has perplexed observers for thousands of years. Popular tradition has it that Aristotle, of the fourth century B.C.E., drowned here when he threw himself into the channel in despair over not solving the riddle of the tides. In reality, rather than drown himself, he attempted an explanation of the tides. In his work



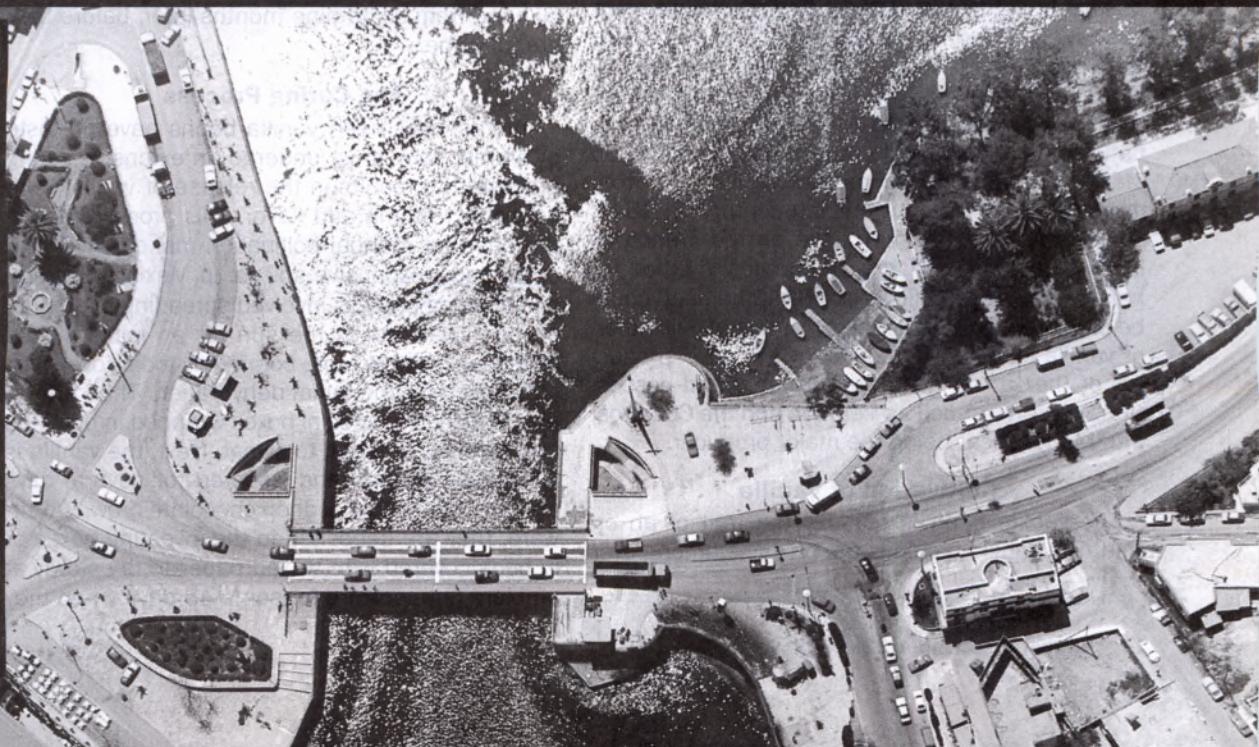
Meteorologica, he wrote: "It seems as if the sea flows through the narrow gap because of the surrounding land. It flows from a smaller body of water into a larger body because of the oscillating of the ground." Aristotle mistakenly thought that the ground itself swayed because of the waves of the sea and because of the earthquakes that are prevalent in the area. About a century later, Greek astronomer Eratosthenes recognized that "on each side [of the channel] the sea has a different level." He thought that the currents occurred because the two banks of the strait differed in height.

Even today, the irregularity of the tides of Evripis is not fully understood. But it seems clear that the regular current results from a difference in water level at the two ends of the channel. This causes the water to rush down from the higher level to the lower level. The difference can be as much as 16 inches, and it is visible from the bridge at Khalkís.

Why the Difference?

How can the difference in water level be explained? The incoming tidal stream from the eastern Mediterranean splits into two branches when it reaches Évvoia Island. The western branch flows into the southern end of the channel. However,

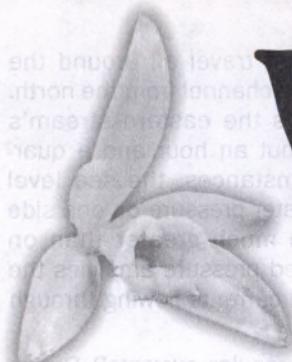
Aerial photo of the Strait of Evripis



the eastern branch must travel all around the island before entering the channel from the north. This longer route delays the eastern stream's arrival at Evripis by about an hour and a quarter. Under these circumstances, the sea level and consequently the water pressure on one side of the channel can be much greater than on the other side. The added pressure amplifies the force of the regular tidal currents flowing through Evripis.

But what about the irregular currents? During the first and the last quarters of the moon, the gravity of the sun works against the moon's gravity instead of reinforcing it. While the moon is producing a low tide, the pull of the sun is working toward causing a high tide. As a result, at these times there is less difference between the sea levels in the northern and the southern ends of the channel. Thus, the force of the current is diminished. Sometimes, when the wind gets involved, the current is completely neutralized and comes to a halt.

There is, of course, even more that could be told about the current's intriguing, mysterious behavior. If you are ever in Greece, come to Évvoia and observe for yourself the fascinating phenomenon of the tides of Evripis!



VANILLA

A SPICE WITH A LONG HISTORY

BY AWAKE! WRITER IN MEXICO

THE Aztecs called it *tliixochitl*, "black flower," alluding to the color of the cured fruit. They used vanilla to flavor their cacao-based drink *xocoatl*, or chocolate. Montezuma, the Aztec emperor of Mexico, is said to have served it to the Spanish conquistador Hernán Cortés in 1520. Cortés then introduced cacao and vanilla beans to Europe. Vanilla-flavored hot chocolate became the rage in European courts, but it was not until 1602 that Hugh Morgan, apothecary to Queen Elizabeth I, suggested using vanilla as a flavoring for other things. Then, in the 1700's, vanilla began to be used in alcoholic beverages, tobacco, and perfumes.

However, long before the advent of the Aztec Empire, the Totonac Indians of Veracruz, Mexico, were growing, harvesting, and curing vanilla beans.* It was not until the early 1800's that the vanilla plant was taken to Europe for cultivation and from there to islands of the Indian Ocean. But attempts by horticulturists to produce fruit from the plant were largely unsuccessful because of the absence of its natural pollinators, bees of the genus *Melipona*. So Mexico had a monopoly on the vanilla trade from the 16th century until the 19th century. In 1841, Edmond Albius, a former slave on the French island of Réunion, perfected a practical method for hand-pollinating the flowers so that the bean could be produced. This led to the commercial cultivation of vanilla outside Mexico. Today the main producers of the vanilla bean are former island possessions of France, such as Réunion and the Comoros, with Madagascar being the major producer.

Cultivation of Vanilla

The vanilla bean is actually the fruit of an orchid. The vanilla orchid is the only one among over

20,000 varieties of orchids that produces something edible. The plant is a climbing vine that must have some type of support and partial shade. In the wild it usually climbs on trees in wet, tropical lowland forests. In Mexico traditional plantations use native plants such as the *pichoco* as props, but orange trees have recently been used for this purpose with some success.

The vanilla orchid produces waxy greenish-yellow flowers that grow in clusters. Each flower opens only one day a year for a few hours. It is fascinating to watch the Totonac Indians do the delicate work of pollinating the flowers. They pollinate just a few from each cluster so as not to sap the energy of the plant, which could weaken it and make it prone to disease. The resulting long green pods, or beans, containing diminutive seeds, are harvested by hand from six to nine months later, before they are fully ripe.

The Curing Process

Interestingly, fresh vanilla beans have no taste or aroma. They must undergo an extensive curing process that results in the release of vanillin with its distinct aroma and flavor. This processing and the need for manual pollination make vanilla one of the most expensive spices. In Mexico the traditional curing process involved spreading the beans on dark blankets in the sun for an initial killing, called sun wilting. More commonly today, oven wilting is used for the initial dehydration. Then the vanilla is placed in special boxes wrapped in blankets and esteras, or mats, to sweat. Next, the vanilla is alternately sunned and sweated for several days until the beans turn a deep chocolate-brown. Afterward, they are deposited in the sweating boxes or in beds covered with waxed paper to dry slowly at ambient temperature for some 45 days. Then they

* The vanilla bean is native also to Central America.

are conditioned for about three months in closed containers to develop their full aroma. Thus, producing vanilla is quite a labor-intensive project.

Natural Vanilla or Artificial?

Vanillin has also been produced synthetically from wood-pulp by-products. Reading the labels of products supposedly made from vanilla may surprise you. In the United States, for example, while ice cream labeled "vanilla" is made from pure vanilla extract and/or vanilla beans, ice cream labeled "vanilla flavored" may contain up to 42 percent artificial flavorings, and ice cream labeled "artificially flavored" contains imitation flavorings only. But as gourmets will attest, there is no substitute for the flavor of true vanilla.

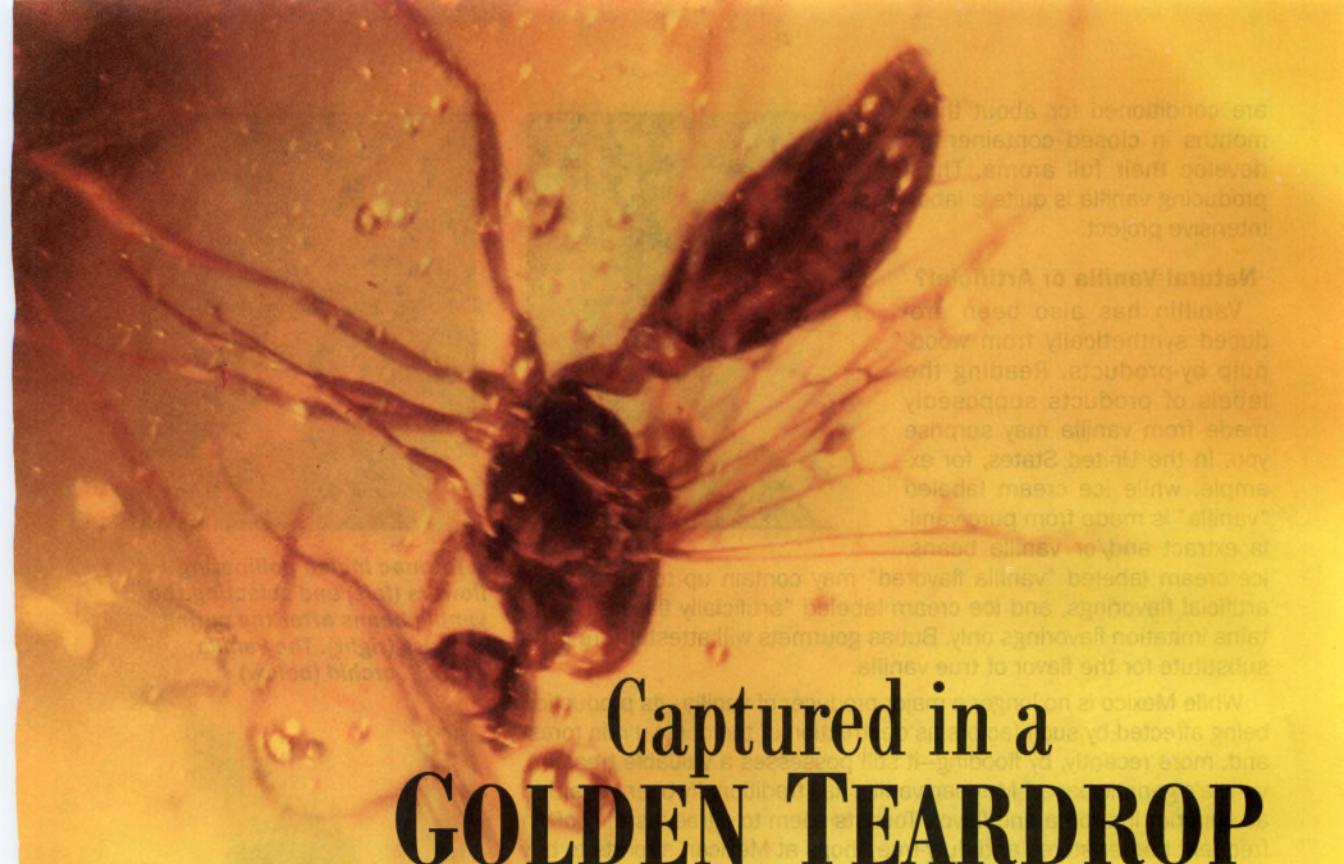
While Mexico is no longer a major producer of vanilla—its production being affected by such factors as destruction of the coastal rain forest and, more recently, by flooding—it still possesses a valuable treasure, vanilla's genetic base.* Mexican vanilla has traditionally been regarded as superior in aroma and flavor. Tourists seem to agree, as they often frequent border stores and duty-free shops at Mexican airports to buy natural vanilla extract at comparatively low prices. The next time you try ice cream made of natural vanilla, think of its long history and the work involved in producing it, and enjoy the flavor!

* The vanilla plantations in Réunion, Madagascar, Mauritius, and the Seychelles are said to derive their vanilla from a single cutting introduced into Réunion from the Jardin des Plantes in Paris.



A Totonac Indian pollinating flowers (left) and selecting the vanilla beans after the curing process (right). The vanilla orchid (below)





Captured in a GOLDEN TEARDROP

BY AWAKE! WRITER IN THE DOMINICAN REPUBLIC

AN ANT scurries along a tree trunk, oblivious to the danger ahead. Suddenly, one leg becomes stuck, then another, until the ant is trapped in the tree's honeylike resin. One more golden droplet trickles down, and the ant is engulfed. Escape becomes impossible. Finally, the sticky mass containing the ant falls to the ground. Rain washes the imprisoned ant into a river, where it is buried in silt. Millenniums later the ant is discovered, perfectly preserved in a golden teardrop. The resin has hardened into amber—one of man's most precious treasures.

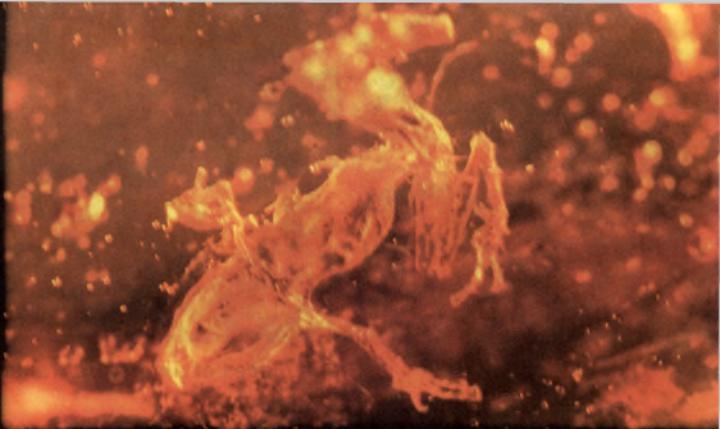
How much do we know about amber? Can amber and insects entombed in it tell us something about the distant past? Do they hold the key to recreating long-extinct forms of life?

Gold of the North

For thousands of years, man has been intrigued by amber's mysterious origins and its

warm, golden beauty. Besides, amber seemed to display amazing powers! About 600 B.C.E., Greek scientist Thales observed that when amber is rubbed with cloth, it acquires the ability to attract feathers or small pieces of straw. This "amazing power" is static electricity. In fact, in some languages the word for "electricity" is derived from the Greek word for amber—*elektron*. It was more than two thousand years later that English physician William Gilbert discovered that substances other than amber can also produce static electricity.

Sometime between 54 and 60 C.E., Roman Emperor Nero sent an army officer to search for the source of this precious substance. Traveling northward, he found it—the Baltic Coast—and returned with hundreds of pounds of amber. In Rome amber was valued for its beauty and its supposed ability to pro-



Various insects as well as frogs have been found encased in amber

tect its bearer from harm. It was also an ingredient in medicines and ointments. Roman historian Pliny reported that amber was so popular that a carved amber figurine was valued more highly than a healthy slave!

The earliest civilizations of northern Europe used amber, sometimes called the gold of the north, to barter for iron, copper, and other goods from the south. During the Middle Ages, in Europe trade in and the manufacture of amber were strictly controlled by the Teutonic Knights, who had recently returned from the Crusades. Unauthorized collecting of amber was punishable by death.

Meanwhile, on the Caribbean island of Quisqueya, now the Dominican Republic and Haiti, the Taino Indians had also discovered amber. When Columbus first visited Quisqueya in 1492, he presented a young island chief with a strand of shiny amber beads. It has been said that Columbus was surprised when he received in return a pair of shoes decorated with amber beads!

What Is Amber?

Amber from the Dominican Republic is the hardened resin of an extinct species of broad-leaved tropical tree. Certain related species, known locally as *algarroba*, still grow in the Caribbean area, as well as in Central and

South America. However, the species closest to the ancient Dominican "amber tree" is found only in East Africa. Amber from the Baltic region in Europe comes from a coniferous tree.

How is amber formed? First, the bark of the tree is somehow opened—a limb is broken, the trunk is gashed, or the tree is attacked by wood-boring beetles. Then the viscous resin oozes to the surface to seal the wound. Insects or other small creatures unfortunate enough to be caught in the resin eventually become totally immersed in it. Unlike the tree's sap, which is composed of water and nutrients, the resin consists of compounds of terpenes, alcohols, and esters. These chemicals seem to act as desiccants and antibiotics. They embalm any encapsulated insects and plants. Under the right environmental conditions, the resin slowly hardens into amber, preserving its contents intact for millenniums. Therefore, amber is the fossilized resin from ancient trees.

Finding the Lost Treasure

Although amber is found all over the globe, only about 20 areas contain enough amber to make mining it profitable. At present, most amber is mined in the Baltic region of Eastern Europe, in the Dominican Republic, and in some parts of Mexico.

Mining amber is a painstaking task. Many scientists believe that for the resin to turn into amber, it has to be buried underground,



Small pieces of amber are transformed into polished gems

usually in wet clay or sandy sediment. Many mines in the Dominican Republic are located in high, rugged terrain covered with lush, subtropical forest. They may be accessible only by foot or burro via steep mountain trails.

Some mines are broad, deep pits. But others are narrow tunnels up to 600 feet long. Because machinery and explosives can fracture amber, miners must laboriously chip away the hard sandstone and heavy clay by hand, using chisels, picks, and shovels. Often a candle serves as the miner's only source of light.

From Crusty Rock to Polished Gem

After the amber is removed from the surrounding rock, the miner takes it into bright sunlight, washes it, and chips off its rocky crust on one end. He then moistens the exposed surface with oil to make it possible to look into the amber. He is looking for inclusions—fossilized vertebrates, insects, or other organic material that may be contained within the amber. An insect may be visible in 1 out of 100 pieces of Dominican amber. In contrast, insects appear in only 1 out of 1,000 pieces of Baltic amber. In part, this is because Baltic

amber is usually opaque, whereas more than 90 percent of Dominican amber is transparent.

The amber is carefully sorted according to size, shape, color, and content. Most of the thousands of pieces of amber unearthed each week are small. But not all. One piece of Dominican amber weighs about 17.5 pounds! Small pieces with no inclusions are used for jewelry, while the most valuable pieces are reserved for private collectors or museums.

Amber appears most commonly in warm shades of yellow and gold. A few pieces of blue amber are mined each month in the Dominican Republic. Green amber is an even rarer find. It is thought that this variety of colors is due to variations in the chemical composition of the resin and of the minerals in the surrounding soil.

Visions of an Ancient Forest

Because of its unique characteristics, amber and its "prisoners" have outlasted the lush tropical ecosystem from which they came. The organic material in most fossils has become petrified—its original structure being replaced by minerals. On the other hand,

amber is itself organic, as are any animals or plants it may contain. If it is transparent, its ancient treasures can be studied and photographed in three dimensions without damaging them. Thus, amber has been called a golden window to the past because it contains a record not only of the insects and small vertebrates but also of the plants and climate of long-vanished ecosystems.



What are the most valuable inclusions? Much depends on the perspective of the collector. Some of the most costly inclusions are those known among amber lovers as the three treasures—scorpions, lizards, and frogs. Because they are larger and stronger than many insects, most could have easily freed themselves from entrapment in the resin. Those that were trapped were usually very small or perhaps had been weakened by disease or injured by predators. How rare are such finds? Very rare! One collector estimates that only 30 to 40 scorpions, 10 to 20 lizards, and 8 or 9 frogs have ever been discovered. Those that are found are precious indeed. A piece of Dominican amber containing a small frog was discovered in 1997, and it has been valued at over \$50,000.

For some scientists, other kinds of inclusions are even more fascinating. Because insects were often trapped quickly, many pieces of amber contain “snapshots” of ancient history. Indications of insect behavior, such as that of a predator and its prey, can be observed. Some specimens containing eggs, emerging larvae, spider cocoons with embryos, or newly hatched spiders allow scientists to study the stages of insect development. One piece of amber, kept in a museum in Stuttgart, Germany, contains an ancient colony of 2,000 ants.

Similarly, information about the flora of the ancient forest can be gleaned from inclusions. Flowers, mushrooms, moss, leaves, and seeds preserved in amber have made it possible to identify many ancient plants and trees. Moreover, scientists are fairly certain that fig trees were also present, even though none of their leaves or twigs have been found. Why? Because several species of wasp have been discovered in amber—wasps that are known to live only in figs. Therefore, it is reasonable to assume that fig trees also grew in the forest.

Reconstructing the Past?

Some years ago a popular motion picture was based on the premise that dinosaurs could

be reproduced from the DNA of dinosaur blood found in mosquitoes encased in amber. Many scientists doubt that this is really possible. All living things have their own DNA, which contains the encoded instructions that determine their inherited characteristics. However, though scientific experiments have recovered small fragments of DNA from some insects and plants found in amber, these experiments fall far short of reproducing extinct creatures.

Not only is the recovered DNA damaged but it is also incomplete. By one estimate, the recoverable fragments are perhaps less than one millionth of the total information in the organism's genetic code. The task of reconstructing that code completely has been compared to reconstructing a book having thousands of pages from one jumbled, incomplete sentence.*

In any case, the idea of cloning dinosaurs has inspired renewed interest in amber, and there are now amber exhibitions in museums around the globe. At the Amber World Museum in Santo Domingo, Dominican Republic, visitors can enjoy interactive displays and study amber under powerful microscopes. In a workshop at the museum, skilled artisans convert crude amber into beautiful jewelry and gems displaying fossils.

Amber has fascinated mankind for many centuries. Today, amber is treasured for its warm, mysterious beauty. It also provides us with valuable insight into the past.

* For more information about genetics, see *Awake!* of March 22, 1995, pages 3-10.

In Our Next Issue

- **Single-Parent Families Can Succeed**
- **The Great Irish Famine
—An Epic of Death and Emigration**
- **Thrill Seekers
—Why the Fatal Attraction?**

Young People Ask . . .

Why Doesn't My Parent Love Me?

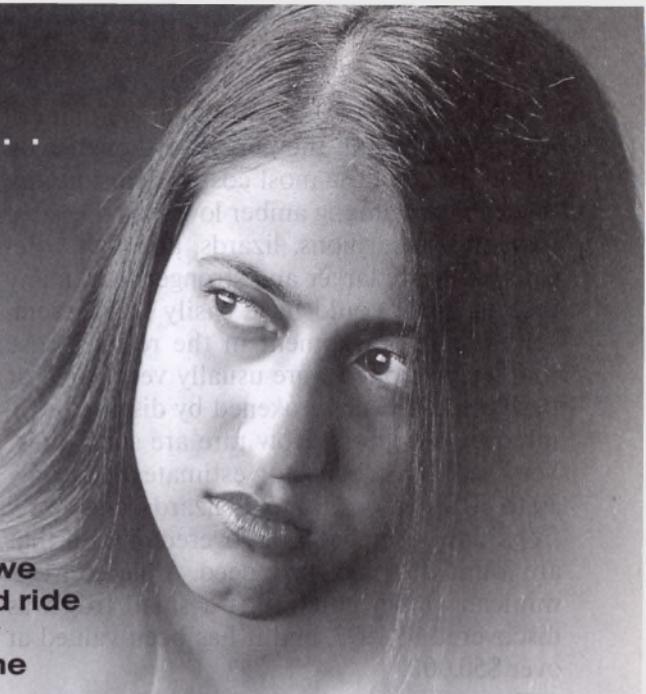
"Before my dad divorced my mom, we used to go to the beach, eat out, and ride around in his car. Then it completely stopped. My dad changed. I guess he divorced me too."—Karen.*

FAR too many young people suffer similar feelings. Like Karen, they sense that a parent no longer loves them—or never did. We do not mean here the passing negative feelings that may arise as a result of temporary friction between youths and their parents; nor do we refer to the resentment that sometimes arises in response to parental discipline. Rather, in some cases parents are guilty of genuine neglect, failing to give their children needed attention and discipline. In other cases there is a pattern of severe, harsh treatment, perhaps involving cruel words or physical blows.

Few things wound more deeply than rejection by a parent. "It made me feel unwanted and neglected," Karen says. If you have ever been in such a difficult position, consider some suggestions on how to cope with your feelings. Be assured that even if your parent's support is lacking, you can succeed in life!

Understanding Your Parent

To begin with, it is right for you to expect your parent to love you. A parent's love for a



child should be as natural and reliable as the rising of the sun. God expects parents to show such love. (Colossians 3:21; Titus 2:4) So why do parents sometimes neglect, abandon, or mistreat their children?

One contributing factor may be their own experiences in life. Ask yourself, 'Where did my parents learn about raising children?' In many cases parents can only draw on their own childhood experiences with *their* parents. And in our harsh modern world, with unprecedented numbers of people "having no natural affection," such training is often deeply flawed. (2 Timothy 3:1-5) At times, the result is a terrible chain reaction, with parents mistreating their children just as they were once mistreated.

Additionally, parents may be profoundly unhappy for any number of reasons. Some try to escape misery and frustration by immersing themselves in work, alcohol, or drugs. William and Joan, for example, grew up with an alcoholic father. "It was hard for my father to commend us," Joan says. "The worst, though, was his anger when he got to drinking. He would yell all evening at my mother. I was often afraid." Even if parents are not overtly abusive,

* Some of the names have been changed.

their behavior may leave them with little energy to give their children needed love and attention.

William feels that he understands what was behind his father's erratic behavior. "My father grew up in Berlin, Germany, during World War II," he explains. "As a boy, he experienced untold horrors and saw a lot of death. He had to struggle for his life every day just to get something to eat. I feel that my father was seriously affected by what he went through." Indeed, the Bible acknowledges that people under severe oppression may act irrationally.—Ecclesiastes 7:7.

Do William and Joan feel that their father's experiences excuse the way he treated them? "No," says William. "His background is no excuse for the heavy drinking and poor conduct. However, being aware of it has helped me to have more insight into my father's behavior."

Your accepting the fact that your parents are imperfect and learning something about their background can go a long way toward helping you to understand them. Proverbs 19:11 says: "The insight of a man certainly slows down his anger."

Coping With Your Feelings

There are other negative feelings that may afflict you because of the situation at home. For example, the lack of attention from both of her parents made Patricia feel "worthless and unlovable." LaNeisha found it hard to trust men in general after her father left when she was just eight years old. And Shayla found herself craving attention from virtually anyone she met, just to replace the void left by a mother whose life was "controlled by drugs."

Anger and jealousy can also be problems. When Karen saw her remarried father showing his new family the love that she longed for herself, it made her feel "very jealous at one point." At times, Leilani

even felt that she hated her parents. "I constantly fought with them," she says.

All these feelings are understandable, given the circumstances. How, though, can you constructively cope with such negative emotions? Consider the following suggestions.

- **Draw close to Jehovah God.** (James 4:8) You can do that through personal Bible reading and regular association with his people. As you see the way Jehovah deals with others, you will come to know that he is loyal. You can trust him. "Can a wife forget her sucking so that she should not pity the son of her belly?" Jehovah asked the Israelites. "Even these women can forget, yet I myself shall not forget you," he promised. (Isaiah 49:15) So pray regularly to God. Do not worry about getting your words just right. He understands you. (Romans 8:26) Realize that Jehovah loves you even when it seems that no one else does.—Psalm 27:10.

- **Confide in a trusted adult.** Make friends with spiritually mature ones. Openly express your feelings and concerns to them. In the Christian congregation of Jehovah's Witnesses, you can find spiritual fathers and mothers. (Mark 10:29, 30) You may need to take the initiative, though, to open up to them. Others will not know what you are feeling unless you tell them. The relief that comes from unburdening your heart can be a real comfort to you.
—1 Samuel 1:12-18.

Do You Feel . . .

- **That you have little value or worth?**
- **That it is unsafe or unwise to trust others?**
- **That you need constant reassurance?**
- **That your anger or jealousy is out of control?**

If your answer to such questions is yes, talk things over with a trusted parent, elder, or spiritually mature friend as soon as possible.

• **Keep busy by doing things for others.**

To ward off the danger of self-pity, try not to dwell on the negative aspects of your situation. Rather, learn to appreciate what you have. Open the door to a world of opportunities by “keeping an eye, not in personal interest upon just your own matters, but also in personal interest upon those of the others.” (Philippians 2:4) Set spiritual goals, and then work hard to pursue them with a positive attitude. Serving the needs of others in the Christian ministry is an excellent way to keep your focus on others instead of yourself.

• **Continue to show respect to your parents.** Always remember to stick to Bible principles and standards. That includes showing your parents honor. (Ephesians 6:1, 2) Such honor would rule out adopting a vengeful, vindictive attitude. Remember, no amount of apparent wrongdoing on a parent’s part can ever justify wrongdoing on your part. So leave matters in the hands of Jehovah. (Romans 12:17-21) He is “a lover of justice” and has very strong protective feelings toward chil-

dren. (Psalm 37:28; Exodus 22:22-24) As you continue to show your parents the proper respect, try to cultivate the fruitage of God’s spirit—above all, that of love.—Galatians 5:22, 23.

You Can Succeed

There is no doubt that the lack of a parent’s love can hurt. But parental failure need not determine the kind of person you will become. You can choose a happy, successful outcome for yourself by putting the foregoing Bible principles to work in your life.

William, quoted earlier, is a full-time volunteer at a branch office of Jehovah’s Witnesses. He says: “Jehovah has given us many provisions to help us cope with these tragic situations. What a privilege to have such a loving and caring heavenly Father!” His sister, Joan, is a full-time pioneer minister, serving where there is a greater need for evangelizers. “Growing up, we saw a clear distinction ‘between one serving God and one who has not served him,’” she says. (Malachi 3:18) “Our experiences gave us a strong determination to fight for the truth and make it our own.”

The same can be true in your case. “Those sowing seed with tears will reap even with a joyful cry,” the Bible says. (Psalm 126:5) How is that verse relevant? Well, if you work hard to apply right principles under difficult conditions, your tears will eventually be replaced with joy as you experience God’s blessing.

So keep working at drawing closer to Jehovah God. (Hebrews 6:10; 11:6) Even if you have suffered years of anxiety, frustration, and guilt, these feelings may gradually be eased and replaced with “the peace of God that excels all thought.”—Philippians 4:6, 7.

Take positive steps to cope with your feelings



THE Clothes Beaters OF BAMAKO

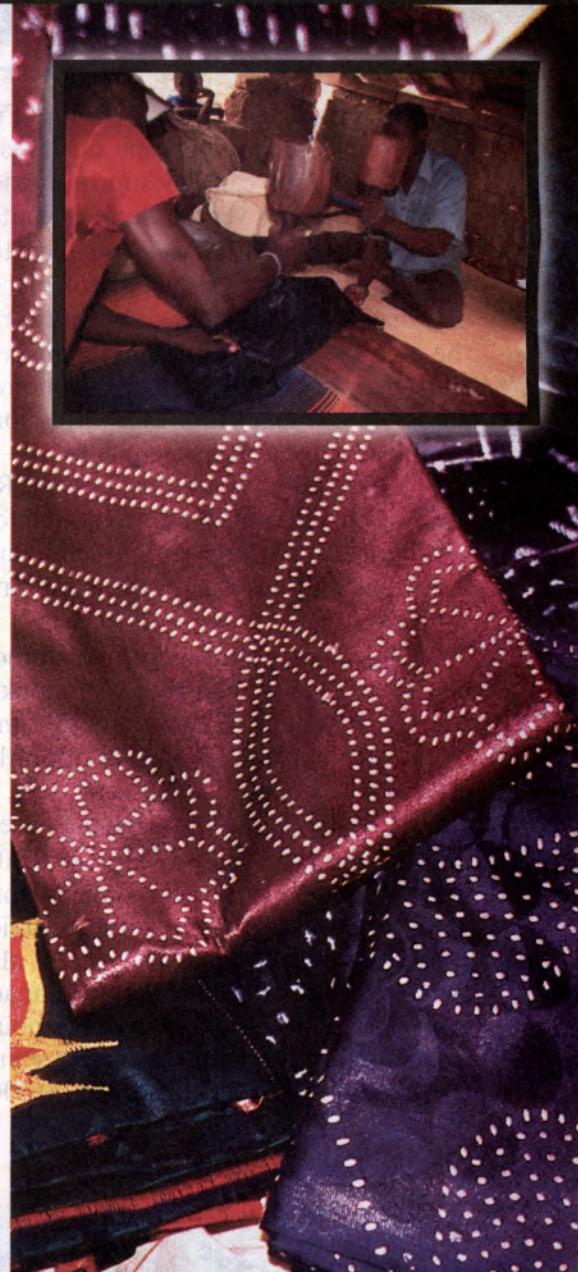
In Bamako, the capital of the West African country of Mali, a steady rhythmic beat can be heard throughout the day. This is not, however, produced by musicians. Rather, the drumlike pounding resonates from the small huts of the clothes beaters. But why would anyone beat clothes?

The clothes beaters are the last step in a unique textile process. It all begins with a piece of white cloth or an article of clothing. Usually it is dyed in a variety of colors and patterns. Then it is dipped in a thick solution made of powdered manioc root or sap from various gum trees. After it is sun dried, the material becomes as stiff as a board. At this point, it is ready for the last step—the clothes beaters.

The main job of the clothes beaters is to hammer the now rigid material until it is wrinkle free. Inside their little huts, you typically find two young men sitting across from each other; between them is a log cut from a shea tree. The men lightly wax the fabric and stretch it over the log. Then, using large mallets also fashioned from the shea tree, they pound the material. Alternating their blows in skillful harmony, each one strikes where the other misses.

Why not simply use an iron? For one thing, the heat from an iron would cause the fabric to fade more quickly. Also, an iron would not produce colors as vibrant as the clothes beaters do. This is because each stroke of the mallet leaves behind a glossy shine that intensifies the color. After a thorough battering, the material can look so bright that you would think it was freshly painted.

So if you are walking through the streets of this city and hear what seems to be the steady beat of drums, look closely at the huts around you. The sound may not be coming from drums at all; it could be the clothes beaters of Bamako.



THE TWO FACES OF FIRE

BY AWAKE! WRITER IN AUSTRALIA

FIRE can be a friend or a foe. Fire can rejuvenate a landscape or devastate it. Large fires can develop into extremely destructive forces very difficult to control.

One example of the widespread destructive fury generated by fire is what took place in Indonesia in 1997. In that year bushfires ravaged the country, causing immense damage to the land, people's health, and the economy. And devastating smoke from those fires spread to neighboring countries—eight in all—affecting an estimated 75 million people. Reports indicate that 20 million were treated for such conditions as asthma, emphysema, and cardiovascular diseases as well as eye and skin problems.

In Singapore, pollution rose to ominous levels. The city was blanketed by smoke. "We are all prisoners in our homes," lamented one resident, afraid to venture out of her air-conditioned house. On the worst days, people could not see the sun through the haze.

The following year, 1998, saw 8,000 residents of British Columbia, Canada, forced to leave their homes as an inferno rapidly approached. That fire was just one of almost a thousand that raged throughout Canada that year—115 of which were at some point considered to be out of control. One fire in northern Alberta, Canada, consumed 90,000 acres of forest. A resident remarked: "It looked

like a nuclear bomb had gone off. There was this humongous black cloud hanging over the community."

Fire's Dangerous Face

Fire is one of the powerful forces of nature. A raging bushfire can reshape the land, change the balance of plant species, alter the wildlife community, and threaten life and property.

A severe fire can promote erosion. When ground is bared to heavy rains, which often follow a hot summer, exposed soil is washed away. Plant species are affected by this. Some of the more sensitive species suffer and die, while others adapt well. Unfortunately, those that thrive are usually noxious weeds, which tend to take over the landscape at the expense of native flora.

Animals that rely on specific native plants are then also threatened. In Australia native mammals such as koalas and brush-tailed possums are endangered species that could easily face extinction if too much of their native habitat is destroyed by fire. Over the past 200 years, the Australian continent has lost 75 percent of its rain forests, 66 percent of its tree cover, 19 mammal species, and 68 native plant species, most of which are not found anywhere else in the world.

As cities have encroached farther into the surrounding bush, people have become increasingly vulnerable to the devastating ef-

fests of bushfire. In December 1997, more than 600,000 acres were in flames as hundreds of fires raged in suburbs of Sydney, Australia, and in several small towns around the Blue Mountains. About half of those fires burned out of control. The fire-services commissioner said that they were the worst fires he had seen in 30 years. Hundreds were forced to evacuate their homes, some losing them to the flames. The fires also claimed two lives. Beginning in late December 2001, bushfires thought to have been caused by arsonists devastated 1.9 million acres of bush.

When Fire Threatens

Several factors can be responsible for out-of-control fires. One natural factor is the El Niño-related weather pattern, a climatic phenomenon that periodically causes hot, dry weather conditions around the world. Any land that comes under El Niño's unseasonably dry spells has the ideal ingredients for starting a fire.

More frequently, the thoughtless activities of humans are to blame for raging fires. De-

liberately setting the landscape ablaze is considered a criminal offense in many countries. It has been estimated that arson or accidents have started over half of the fires in state forests in New South Wales, Australia.

The irresponsible treatment of the environment is another factor that can lead to serious fires. Through deforestation and logging, forests are becoming more flammable. The fuel layer that a fire depends on is increased by the woody debris that often results from logging operations. Logging also opens up the leaf canopy, allowing sunlight to penetrate the fuel layer, drying it out. Once a spark ignites this volatile combination, the resulting fire can easily get out of control.

Economic considerations can also exacerbate the problem of major fires. In Indonesia slash-and-burn farming has been used for centuries in agriculture with little effect on the balance of nature. When farmers use fire carefully and in a controlled manner, it has about the same effect on the environment as natural fires. In recent times, however, traditional slash-and-burn farming has increased in scale,

Stunned elk avoid a fire sweeping through Montana's Bitterroot River valley



John McColligan, BLM, Alaska Fire Service

becoming industrialized. With the growing worldwide demand for such products as palm oil, forests have been razed to be replaced by fast-growing, cash-earning plants. The easiest and cheapest way to clear the land is by burning the natural vegetation. Thus, people burn thousands of acres with scant regard for the long-term benefits of retaining adequate forest areas.

Fire's Friendly Face

Although fire can wreak havoc and destruction, it can also have a very positive effect on many species of plants and animals. In fact, it can even play an essential role in keeping nature's balance. How does it do this?

Fire is one of man's oldest friends. It has kept him warm, given him light, and cooked his food. Indigenous Australians have used fire for centuries as part of their daily routine. Fire is so important to the native Yanyuwa people that they have more than a dozen words to describe the different types of fire and their effects. For example, they might use the word *kambambara* when speaking of a bushfire or wildfire. The word *warrman* is used to describe well-burned country, which is good for hunting. Smoke billowing upward and forming a cloud is known as *rrumarri*.

These indigenous people use what has been called fire-stick farming to manage the land they live on. They use small, low-intensity fires to reduce the buildup of dead, dry plant matter, which is the main fuel for wildfires. Controlled use of fire in this way has enabled the Aborigines to live off the land effectively while maintaining the habitat of plants and animals. It has also decreased the risk of people being caught in dangerous wildfires.

The Value of Prescribed Burning

When European settlers came to Australia a little more than 200 years ago, this delicate balance between man, nature, and fire began to be disturbed. From the European viewpoint, fire was something to be suppressed. Fires became less frequent, but because of the buildup

of fuel, the fires that did occur became more intense and hard to control. In recent times, however, governments have learned from the practices of native Australians and have developed a strategy called prescribed burning. This method allows fires to burn in a controlled way to prevent more disastrous conflagrations. Small fires are lit outside of the bushfire season. These fires are slow moving, have low flames, and remove litter without disturbing the trees. Generally, the evening dew puts them out.

The aim of bushfire management using prescribed burning is to protect life and property while also maintaining the diversity of native plants and animals. And prescribed burning reduces the aggressive spread of some intro-

A prescribed burn in Australia



Photo provided courtesy of Queensland Rural Fire Service

duced weeds. It also helps to maintain diversity of habitats needed for the conservation of native animals.

Certain species of plants seem to rely on fire to help germinate their seeds. Some have such hard outer shells that fire is needed to crack them open to allow moisture to seep in. Research indicates that the smoke from a fire also helps seed germination. There are some 70 components in smoke that are thought to be possible triggers for seed germination, an important one being nitrogen dioxide.

Freshly burned land results in soils that are rich in such nutrients as nitrogen and phosphorus. The fire releases nutrients stored in leaf litter, allows more sunlight to penetrate to the ground, and creates an ideal seedbed for new plants to take root. Wattles, or acacias, for example, reseed after a fire and tend to thrive in the conditions that a fire leaves behind.

Many animals also seem to benefit from postfire conditions, especially from the new growth of vegetation, which they find more tender and succulent. Some species of kangaroos and wallabies favor frequently burned forest and are said to be fire dependent. This is because the plants they rely on for food and shelter are in turn dependent on fire for regeneration and maintenance.

Still Much to Learn

The two faces of fire are becoming better understood, but fire's interaction with the environment is complex, and there is still much to learn. How fire affects specific species of plants and animals is something that needs more study. How fire interacts with and affects our ecology on a broader scale also needs more research. Some questions to be answered are: Do fires contribute to the greenhouse effect? What impact does the smoke from fires have on weather patterns? How do fires behave?

Currently, there are computer programs, called models, that are designed to predict fire behavior. They work by interpreting data on

fuel as well as on temperature, wind speed, and other weather conditions. Unfortunately, at present the models are not always accurate, and they cannot predict unusual phenomena such as fire flashes or sudden blowups. In the Sydney fires of 1997, two experienced fire fighters lost their lives as a result of one of these flashes, which are appropriately termed "fingers of death."

Large fires can be especially difficult to predict because they can generate their own weather, including strong winds, clouds, and even thunderstorms. Their winds can change direction or speed suddenly, making the fire unstable. Researchers hope to improve current models by including these factors along with other information, such as the type and slope of the terrain and the fuel distribution.

One project toward this end in the United States is being undertaken by the National Center for Atmospheric Research (NCAR) in Colorado. NCAR has outfitted a C-130 transport aircraft with state-of-the-art scientific equipment and seven on-board computer workstations, all protected by heavy insulation. The aircraft has been designed to fly over a raging fire and take data samples with sensors fitted on the wings. This data is then sent to the computers for processing. The plane has an infrared camera called Thermacam, which can show the relative intensity of each part of the fire. In these ways NCAR scientists are learning to improve current fire behavior models.

It is hoped that these improved models will enable experts to control fires more safely. The ability to predict accurately what a fire will do could also reduce the risks that fire fighters face to protect the community.

Yes, fire can be a devastating and destructive enemy when out of control, but it can also be a good friend. It plays an essential part in the cycles of nature that the Creator has put in place to rejuvenate the earth and to keep a balanced variety of plant and animal life.

Watching the World

Tracking the Great White Shark

"The largest predatory fish, the great white shark, has been tracked by satellite and found to migrate thousands of miles across open ocean," says *The Daily Telegraph* of London. This finding, published in *Nature* magazine, has shattered earlier beliefs about great whites. Although found worldwide, the shark was thought to keep to coastlines, hunting seals and sea lions and never straying far from its home territory. Recently, however, when researchers in California tagged four males and two females, they found that one shark traveled as far as the Hawaiian Islands—2,280 miles from the California coast—covering at least 43 miles per day. The study also revealed that great whites, while rarely diving more than 90 feet near the coast, sometimes dive very deep out in the open ocean.

Economic Woes Spill Over Into Clinics

Economic woes related to the sharp fall in the value of Argentina's currency are sending Argentinians to hospitals and clinics in droves with stress-related health problems, taxing these facilities beyond their capacity, reports the newspaper *Clarín*. Health problems include "headaches, hypertension, ulcers, gastritis, insomnia, and anxiety." Some people faint "without neurological causes," said one medical professional. Consultations for stress, depression, and fear increased 300 percent in just a few days in one clinic. Besides having to cope with

Artificial Bug Eyes

"Robotic insect eyes designed by Australian scientists have been bought by NASA for use on a Mars probe," reports the newspaper *The Australian*. Researchers at the Australian National University based the design of the artificial sensors on the eyes of locusts. The report says that "the university's biorobotic vision laboratory has spent years observing how locusts, bees and dragonflies use vision to control their flight. They have deduced the rules that govern flight and created mathematical algorithms to replicate them." NASA wants to attach the artificial locust eyes to a tiny probe that will "dart just above the craggy Mars terrain without crashing or colliding, just like an insect." If successful, the probe will "examine the rock stratification of the grandest canyon in the solar system—the 4000km-long [2,500 mile], 7km-deep [4 mile] Valles Marineris, in a bid to reveal the geological history of the red planet."



crowded waiting rooms, doctors and nurses also have to contend with patients who are angry because of the financial crisis. Some patients have even physically attacked doctors and nurses. One nurse was hit in the head.

Fastest Roller Coaster

"The world's fastest roller coaster opened at the Fujiyuk Highland amusement park," reports Japan's *IHT Asahi Shimbun* newspaper. "Reaching 172 kilometers per hour (106 miles per hour) from a standing start in under two seconds is not for the fainthearted. It is like being fired from a rocket. Riders can experience the gravi-

tational pull that is normally the domain of fighter pilots." Heith Robertson, project director of the company that built the ride, said: "A plane, when it is launched can have a force of 2.5 Gs [2.5 times the force of gravity]. Here you have 3.6 Gs." The roller coaster rides on "the wheels of small airplanes" and is powered by three air compressors that generate 50,000 horsepower, which is "comparable to a small rocket."

Tobacco-Related Heart Disease in India

"Senior cardiologists [in India] say the incidence of coronary artery disease is rising," comments Mumbai Newsline.

"According to Dr. Ashwin Mehta, director of cardiology at Jaslok Hospital, Indians have a genetic predisposition to getting heart diseases." Of special concern is that more young people are experiencing "heart problems because of increased smoking." Dr. P. L. Tiwari, consultant cardiologist at Bombay Hospital, believes that unless radical action is taken, India will one day lead the world in heart patients. In neighboring Bangladesh, over 70 percent of the men aged 35 to 49 are smokers, says *The Times of India*, and "the rate of smoking increased as income decreased." On the average, each smoker "spends more than twice as much on cigarettes as per capita expenditure on clothing, housing, health and education combined." It is estimated that

10.5 million malnourished people in this poor country could have an adequate diet if the money spent on tobacco were diverted to food.

Tall Buildings—Still In Demand

"The collapse of the twin towers jolted architects and engineers into a new and frightening awareness," states *U.S. News and World Report*. "Notwithstanding temporary skittishness, the demand for skyscrapers will not dry up." One reason is that land in some areas is scarce and very expensive. In addition, cities want boasting rights. Ultra-tall buildings are "about putting a place on the map, about modernity and such," says William Mitchell, dean of the school of architecture and planning at the Massachusetts Institute of Technology. However, architects are debating how to make

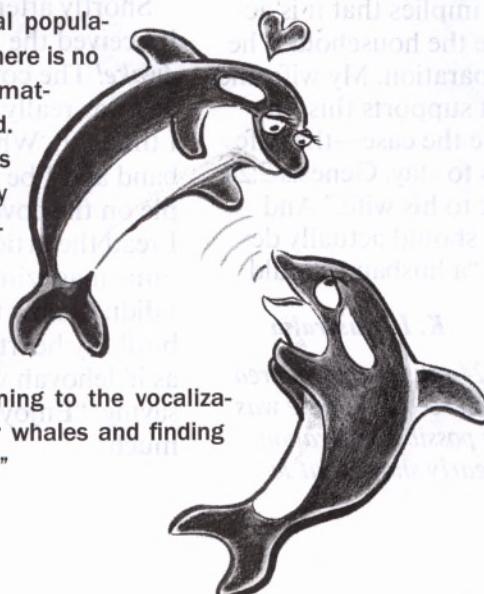
their buildings safer. Buildings can be hardened against attack by blast-resistant walls and windows, but these add weight and are cost prohibitive. In China, building codes require an open-air, empty "refuge floor" every 15 stories. Building codes in other locales stipulate an elevator, all the way to the top, that is designed just for fire fighters as well as pressurized staircases that would keep smoke out. Already, designers of the Shanghai World Financial Center, which could become the world's tallest building, are incorporating extra precautions into their design.

Ambient Noise and Hearing Disorders

"Every fifth school-age child and every third adult Pole have hearing problems," says the Polish weekly *Polityka*. Surveys reveal that the biggest nuisances include traffic noise and loud audio, video, and household equipment. A report on the state of the environment said that the increase of traffic in Warsaw has already raised the noise level on one of the main streets to 100 decibels. The screams of children at play reach the same levels. Amplifying equipment at discos can attain noise levels as high as 120 decibels, which is just a little below the pain threshold of 130 to 140 decibels. These loud noises, say specialists, are a direct cause of hearing disorders. Professor Henryk Skarzyński, an otolaryngologist at the Institute of Physiology and Pathology of Hearing, notes: "Hearing disorders translate into serious social ailments. People affected by them are more irritable, have learning difficulties, [and] learn foreign languages with more difficulty."

Killer Whales Attracted by Dialects

"How do killer whales that spend their entire lives within the same small pods manage to avoid inbreeding?" asks *The Vancouver Sun* of Canada. "Based on seven years of genetic research and 340 DNA samples from killer whales in B.C. [British Columbia] and Alaska, Vancouver Aquarium senior scientist Lance Barrett-Lennard has found that females breed exclusively with males from other pods," but not outside the local population, or group of pods. "There is no evidence of incestuous mating," says Barrett-Lennard. "Almost all the mating is between pods with very different dialects." The article adds that "killer whales choose a mate as distantly related as possible, a process that is probably based on listening to the vocalizations, or dialect, of other whales and finding those that are least alike."



From Our Readers

Wedding Day I greatly appreciated the cover series "The Wedding Day—Making It a Joyful Beginning." (February 8, 2002) Since I am young, I am preparing my mind for the important step of marriage. These articles helped me to understand how to make the preparations without the stress that is common to many young couples and also how to keep the union happy. Please never stop giving attention to those of us who are making an effort to put into practice what Jehovah wants from his servants.



F. C., Italy

It never ceases to amaze me how Jehovah provides guidance just when I need it most. The February 8, 2002, issue of *Awake!* is no exception. My fiancé and I have been planning our wedding these past few months, and we were beginning to feel the tension. The opening articles reminded us that these planning months really are wonderful and that anxiety only causes heartache.

H. M., Australia

Page 10 of your cover series implies that it is acceptable for a husband to leave the household if he believes he has grounds for separation. My wife and I find nothing in the Bible that supports this. In fact, the opposite appears to be the case—the wife can leave, but the husband has to stay. Genesis 2:24 states that a man should "stick to his wife." And 1 Corinthians 7:11 says, "if she should actually depart," but then the verse adds, "a husband should not leave his wife."

K. L. Australia

"Awake!" responds: Genesis 2:24 must be considered in its context. The divine injunction recorded there was not set out as direction regarding possible separation. Paul's letter to the Corinthians clearly shows that Je-

hovah holds marriage in high esteem, and a couple should make every effort to preserve their marriage. Apparently, though, it was not Paul's intent to create two standards—one for the wife and another for the husband. Verses 10 and 11 urge both husband and wife not to depart, if at all possible. Reasonably, then, what applies to a wife would also apply to a husband.

Kea "Kea—Clown of the Mountains" (February 8, 2002) was such a fun article to read that I couldn't help but laugh out loud. Jehovah must indeed be a happy God!

Only a truly loving Creator could bring something to life that gives so much pleasure to mankind. I look forward to the day when I will get to know that funny bird, the kea, personally. Thank you very much not only for this article but also for the many other interesting and faith-strengthening articles you write.

R. R., Germany

Shortly after my husband left me, I received the February 8, 2002, *Awake!* The cover on the wedding day was really hard for me to take. I thought, 'Why couldn't my husband and I be happy like the couple on the cover?' However, when I read the article on the kea in the same magazine, I laughed out loud. I didn't know there was such a cute bird! My heart was refreshed. It was as if Jehovah were encouraging me, saying: "Enjoy life!" Thank you so much.

M. Y., Japan

"Perfect Light"



IF YOU have ever touched an electric light bulb that has been on for a while, you know that it can get very hot. The heat produced by the bulb results from wasted energy. A typical light bulb gives off only 10 percent of its energy as light, while 90 percent is wasted as heat. In comparison, the tiny light-producing insect called the firefly (see above, enlarged) is nearly 100 percent efficient.

Fireflies waste so little energy as heat that the light they produce has been termed "perfect light." How do they do it? The abdomen of a firefly contains an organic substance known as luciferin. When oxygen is drawn into the abdomen through

a tube called the abdominal trachea, it mixes with luciferin, and the resulting chemical reaction gives off a pale-yellow to reddish-green glow.

The cells that produce the firefly's light also contain uric-acid crystals, which help to reflect the light away from the insect's abdomen. Scientists say that fireflies use their light to attract mates and that different species of fireflies flash different patterns and rhythms.

Would you not agree that the way in which these tiny creatures are made gives praise to their Creator, Jehovah God? Yes, as the psalmist declared, "every breathing thing—let it praise Jah." —Psalm 150:6.

A WOMAN from the city of Maladzyechna, in Belarus, wrote to the branch office of Jehovah's Witnesses in Russia. She explained that she had a husband and two children. She wrote: "My husband and I love each other. However, I noticed that the longer we lived together, the more we got aggravated and argued, seemingly without any reason at all. A few months ago, a stranger stopped me on the street and gave me a tract entitled *Enjoy Family Life*. At first, my attention was drawn to the beautiful illustration of a happy family. Later I read the text and gave it to my husband to read.

"Like a miracle, our family life has not only improved but, I would say, changed to the very core. We now understand that being happy is not so dif-

ficult. All that is needed is a little earnest, heartfelt warmth and giving. What is necessary is to live according to God's commandments, to love God and love people, including family and strangers."

She concluded: "Life has become easier and happier. We want to continue to study the Bible and to teach our children."

Happy Family Life Is Possible!

