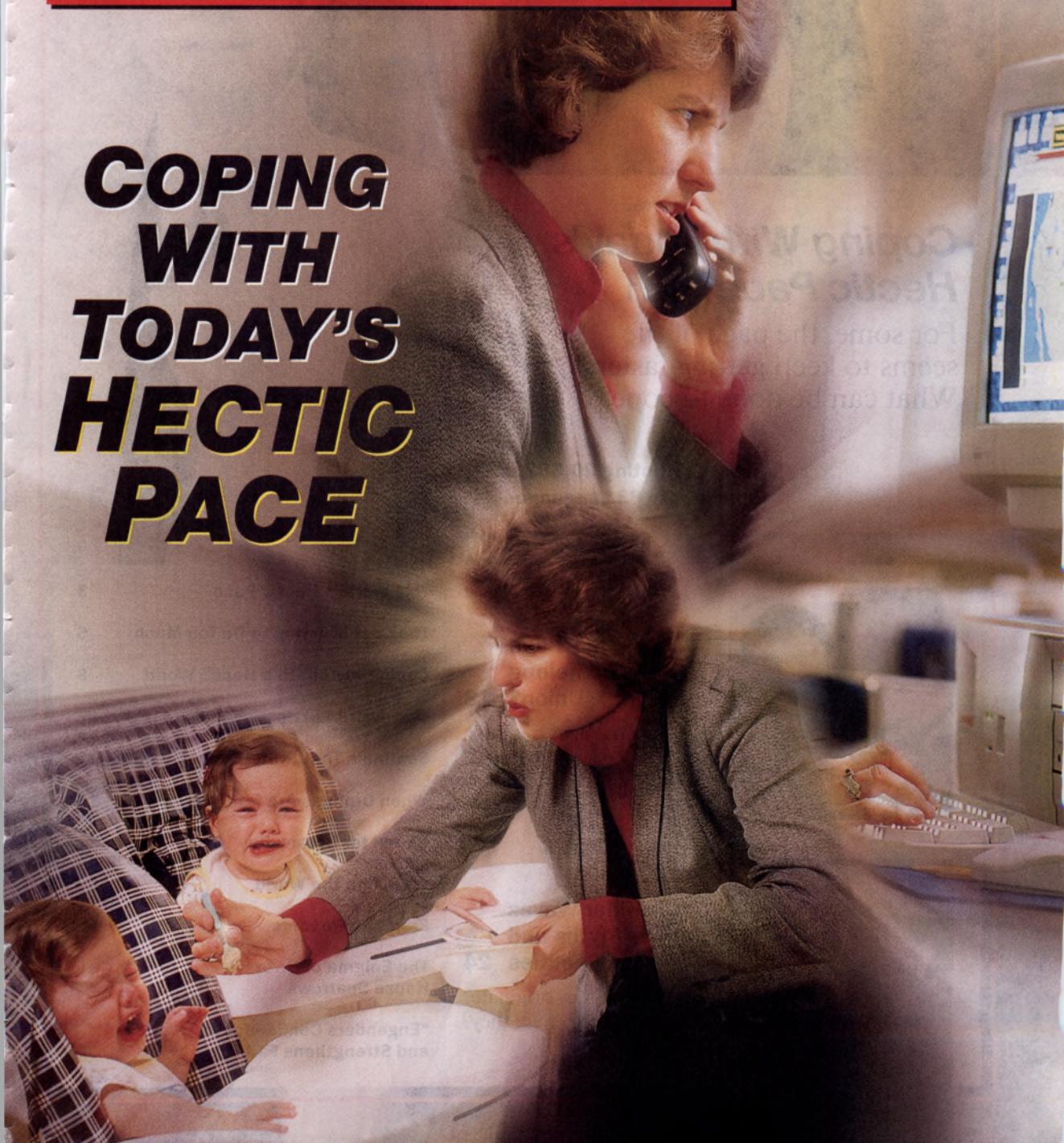


# **Awake!**

February 8, 2001

## **COPING WITH TODAY'S HECTIC PACE**



## **Coping With Today's Hectic Pace** 3-11

For some, the pace of life seems to keep getting faster. What can be done to cope?

**Average Printing 20,682,000  
Published in 83 Languages**



### **Should Marriage Be a Lifelong Union? 18**

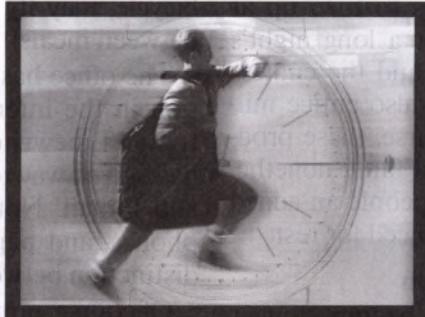
What does the Bible say about this?



### **Killer Waves —Myths and Realities 24**

How do they originate?  
How destructive are they?

<b>This World's Hectic Pace</b>	<b>3</b>
<b>The Cost of Trying to Do Too Much</b>	<b>5</b>
<b>Coping Joyfully in a Hectic World</b>	<b>8</b>
<b>Crossword Puzzle</b>	<b>12</b>
<b>Sentinels That Protect Your Health</b>	<b>13</b>
<b>When Oranges Are Not Orange</b>	<b>16</b>
<b>Bound for Botany Bay</b>	<b>20</b>
<b>Watching the World</b>	<b>28</b>
<b>From Our Readers</b>	<b>30</b>
<b>The Enigma of Britain's House Sparrows</b>	<b>31</b>
<b>"Engenders Confidence and Strengthens Faith"</b>	<b>32</b>



# This World's Hectic Pace

**DOES THE PACE OF LIFE TEND TO OVERWHELM YOU AT TIMES? DOES IT LEAVE YOU FRUSTRATED, TIRED, BARELY ABLE TO COPE? IF SO, YOU ARE NOT ALONE.**

**M**ILLIONS of people, especially in cities, find that life has become a dizzying, exhausting rush. This is particularly so in Western lands. At a recent religious meeting in the United States, a speaker asked his audience to raise their hands if they felt tired much of the time. Instantly, a sea of hands went up.

The book *Why Am I So Tired?* says: "Modern life is full of hitherto unheard of tensions—planes to be caught, deadlines to be met, children to be taken to and picked up from pre-school on time—the list is endless." It is hardly surprising that tiredness has been described as the bane of our times.\*

In years gone by, life was simpler, and the pace of life was slower. People tended to live more in harmony with the cycles of nature—day

time was for work, and nighttime was for one's family and for bed. Today, there are a number of reasons why people feel increasingly tired and fatigued.

## Suddenly, Longer Days

One factor may be that people sleep less. And one of the more significant developments that made inroads into sleep time was the arrival of the electric light. With the flick of a switch, humans could control the length of the "day," and people soon began staying up later. Indeed, many had little choice in the matter because factories began to operate around the clock and service industries extended their hours. One writer said: "The twenty-four-hour society was born."

Other technological advances, such as radio, TV, and the personal computer, have also played a role in depriving people of needed sleep. In many lands, TV programs run 24 hours a day. It is not unusual for

\* Chronic tiredness can also be due to or be exacerbated by a number of factors besides daily tensions. Causes may include physical health problems, poor diet, drugs, chemical pollution, mental and emotional problems, old age, or a combination of these factors.

movie lovers or sports fans to turn up at work sleepy and tired after a long night's viewing. Home computers, and the endless distractions that they offer, also entice millions to stay up late. Of course, these products in themselves are not at fault; nonetheless, they do provide some people an added incentive to brush aside the need for rest.

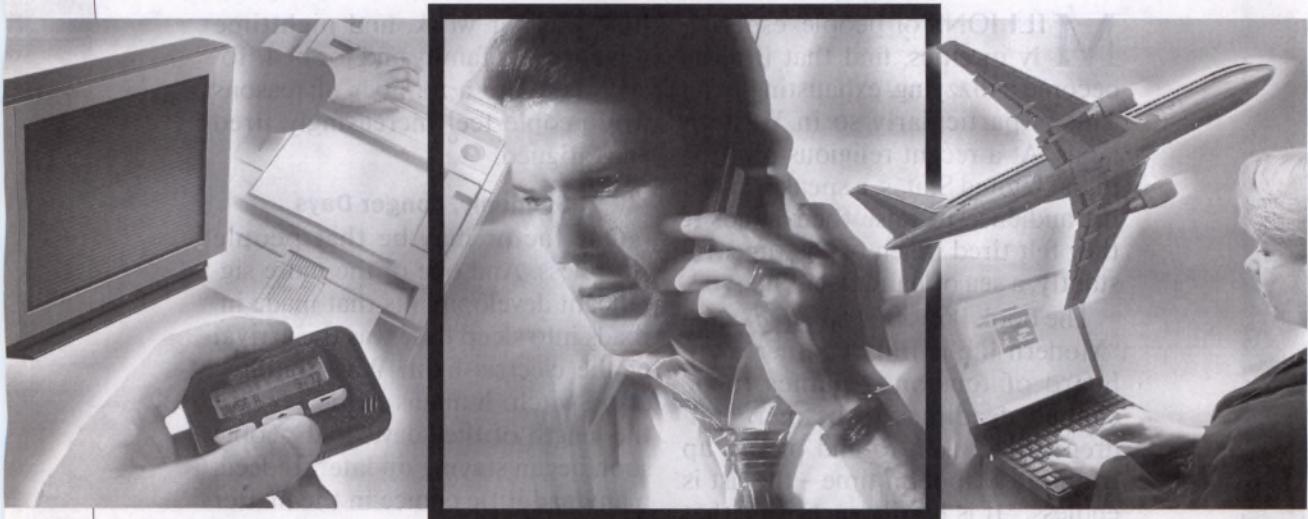
### Life Speeds Up

Not only have our days become longer but life itself seems to move faster—once again facilitated by technology. The horse-drawn carriage of less than a century ago is a far cry from today's fast cars, bullet trains, and jet airplanes. In fact, a modern-day businessman, whose grandfather probably either walked to work or rode a horse or a

bicycle, may fly across the Atlantic Ocean between meals!

The office has also hosted a quiet revolution in the interests of speed and productivity. Typewriters and conventional mail have given way to computers, fax machines, and E-mail. Notebook computers, cellular phones, and pagers have even blurred the distinction between home and office.

Of course, none of us can slow the world's accelerating pace. However, on a personal basis, we can make adjustments that enable us to live a more calm, balanced life. But before we consider this matter, let's examine some of the effects that today's frantic pace can have on us personally and on society as a whole.



**Awake!**

**Why Awake! Is Published** *Awake!* is 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.

Unless otherwise indicated, *New World Translation of the Holy Scriptures—With References* is used.

*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**.

Vol. 82, No. 3 Printed in U.S.A. © 2001 Watch Tower Bible and Tract Society of Pennsylvania. All rights reserved. Semimonthly ENGLISH

# The Cost of Trying to Do Too Much

**TODAY'S WESTERN WORLD IS INFATUATED WITH SPEED AND CONVENIENCE.**

DISHWASHERS save time in the kitchen. Washing machines do likewise in the laundry. Millions of people do not even have to leave home to do their shopping and banking anymore—they simply turn on their computer and use the Internet.

Yes, the world, at least in part, is bursting with all kinds of time- and labor-saving devices. Hence, you would think that people would have an abundance of time to spend with their families and for relaxation. Yet, all too often, many say that they are more tired and stressed than ever before. The causes are many and complex.

Economic pressures are high on the list. The Australian Centre for Industrial Relations Research and Training analyzed the number of hours people spent at work in that country and found that “a hefty proportion are regularly working more than 49 hours a week” and that “these increases in working hours were likely to have an

important adverse impact on family and community life.” Many workers choose to live in the greener, quieter outskirts of cities. That can mean spending hours each week—or even each day—commuting on crowded trains and buses or on congested roads. In effect, this adds to the length of the workday and to its tensions.

## Do You Suffer From Sleep Debt?

Sleep problems have become so common in recent years that sleep clinics have opened up in many parts of the world. Researchers have found that when people regularly do not get sufficient sleep, they accumulate a sleep debt. Naturally, their body wants to pay this debt and encourages such by making them feel tired. But because of today's sleep-deprived life-style, many people remain chronically tired.

In one Western land, sleep time has declined 20 percent over the past century,

**Would you welcome more information? Write Watch Tower at the appropriate address.  
Publication of Awake! is part of a worldwide Bible educational work supported by voluntary donations.**

### Semimonthly Languages Available by Mail:

Afrikaans, Arabic, Cebuano, Chinese, Chinese (Simplified), Croatian, Czech,<sup>\*</sup> Danish,<sup>\*</sup> Dutch, English,<sup>\*</sup> Estonian, Finnish,<sup>\*</sup> French, German,<sup>\*</sup> Greek, Hungarian, Iloko, Indonesian, Italian,<sup>\*</sup> Japanese, Korean, Latvian, Lithuanian, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Slovak, Slovenian, Spanish,<sup>\*</sup> Swahili, Swedish,<sup>\*</sup> Tagalog, Ukrainian, Zulu

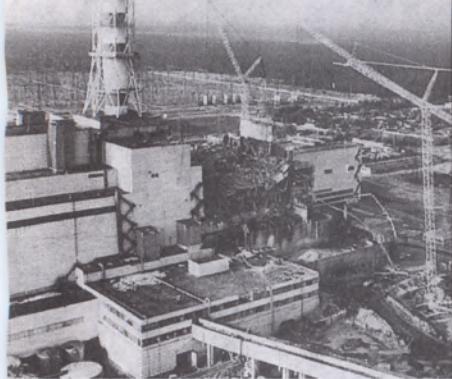
### Monthly Languages Available by Mail:

Albanian, Amharic, Bulgarian, Chichewa, Cibemba, Ewe, Georgian, Hebrew, Hiligaynon, Igbo, Macedonian, Malagasy, Malayalam, Maltese, Nepali, New Guinea Pidgin, Papamento, Sepedi, Sesotho, Shona, Sinhala, Tamil, Thai, Tsonga, Tswana, Turkish, Twi, Urdu, Xhosa, Yoruba

\* Audiocassettes also available.

### Offices of the Watch Tower Society in selected countries

America, United States of, Wallkill, NY 12589	New Zealand, P.O. Box 75-142, Manurewa
Australia, Box 280, Ingleburn, NSW 1890	Nigeria, P.M.B. 1090, Benin City, Edo State
Britain, The Ridgeway, London NW7 1RN	South Africa, Private Bag X2067, Krugersdorp, 1740
Canada, Box 4100, Halton Hills (Georgetown), Ontario L7G 4Y4	Zambia, Box 33459, Lusaka 10101
Ghana, P.O. Box GP 760, Accra	Zimbabwe, P. Bag A-6113, Avondale
Jamaica, P.O. Box 103, Old Harbour, St. Catherine	



**Fatigue may have contributed to the nuclear disaster at Chernobyl, the explosion of the "Challenger" space shuttle, and the "Exxon Valdez" oil spill**

from an average of nine hours per night to seven. Researchers have amassed evidence that sleep debt causes learning and memory problems, motor-skill impairment, and a weakened immune system. Most of us have discovered for ourselves that a tired mind is also prone to make errors. Sadly, these errors can be both serious and costly.

#### The High Cost of Fatigue

Fatigue resulting from long hours and staff cuts is said to have contributed to some of the worst disasters of the late 20th century. Among these are the nuclear disaster at Chernobyl, Ukraine; the explosion of the *Challenger* space shuttle; and the oil spill caused when the tanker *Exxon Valdez* struck a reef in Prince William Sound, Alaska.

The explosion at Chernobyl occurred during a special test at the power station. In his book *The 24-Hour Society*, Martin Moore-Ede says that the test "was being conducted under the supervision of an exhausted team of electrical engineers who had been at the plant for at least thirteen hours, and probably longer because of a ten-hour delay in obtaining permission to start." Whatever the case, according to a recent study, one long-term effect of the radiation spill is a

tenfold rise in thyroid cancers among Ukrainian children since 1986.

After a thorough investigation into the explosion of the *Challenger* space shuttle, a presidential commission report stated that the 20-hour overtime limit was exceeded 480 times by one group of contract workers and 2,512 times by another. The report added that fatigue on the managerial level, the result of "several days of irregular working hours and insufficient sleep," was also a significant factor in the shuttle getting the ill-advised OK to launch. The report observed that "when overtime becomes excessive, worker efficiency decreases and the potential for human error rises."

According to union officials, crew reductions, allegedly to reduce operating costs, meant that mariners on the *Exxon Valdez* had to work longer hours and perform extra duties. A report on the disaster explains that the third mate, who was in charge of the vessel when it ran aground just after midnight, had been up since early that morning. Nearly 11 million gallons of oil—the largest oil spill in U.S. history—caused horrific damage to beaches and wildlife and cost more than \$2 billion to clean up.

### The More Subtle Costs of Fatigue

According to one estimate, tiredness and fatigue cost the world at least \$377 billion *each year!* But no amount of money can equal the cost in human life and health, which all too often are also affected. Take road accidents, for instance. According to a sleep-disorder clinic in Sydney, Australia, between 20 and 30 percent of road accidents in that country are due to drivers falling asleep at the wheel. It is estimated that in the United States, drowsiness contributes to at least 100,000 traffic accidents annually.

Yet, the consequences of fatigue may not end there. An accident victim who is rushed to a hospital for surgery hopes that his doctor is bright and alert. But because of a busy schedule and long hours, the doctor may be anything but bright and alert! A report by the Australian Institute of Health and Welfare revealed that some 10 percent of doctors were working in excess of 65 hours a week, 17 percent of all specialists exceeded those hours, and 5 percent of "junior doctors" worked more than 80 hours a week!

"Machines are protected by operation manuals, warning labels, and training courses," says Martin Moore-Ede. "Humans arrive in this world with no such protection. . . . The shocking truth is that we know far less about the design spec[ification]s of the

human being than we know about the hardware and software he or she operates."

Our body does not have flashing red lights and alarms that tell us to stop or to slow down. Nevertheless, it does give us warning signals. These include chronic tiredness, mood changes, depression, and a tendency to become easily infected by prevalent viruses. If you have these symptoms—assuming, of course, that you have no underlying physical or other health problem—it may be time to reexamine your life-style.

### The Social Costs of Being Too Busy

The stressed, sleep-deprived life-style also takes a toll on human relationships. Consider the case of a newly married couple, John and Maria.\* They wanted what most newlyweds desire—a comfortable home and financial security. So both went to work full-time. But because of irregular shifts, they had little time together. Their relationship soon began to suffer. They ignored the symptoms, however, and persisted with their demanding schedules until their marriage, which had hardly begun, fell apart.

"Studies show that the divorce rate in shift working families is 60 percent higher than for day workers in regular jobs," says the book *The 24-Hour Society*. Yet, whether

\* The names have been changed.

**Life's hectic pace can lead to strained marriages**





**In their efforts  
to cope, some  
abuse alcohol**

they work shifts or not, many couples try to cram so much into their lives that, in effect, they squeeze the life out of their marriage. For others, stress and fatigue may contribute to a cycle of drug and alcohol abuse and poor eating habits—factors that not only exacerbate fatigue but may lead to many other problems, even child abuse.

To aid parents in coping with demanding schedules, child-care centers are increasing in number, with some even offering 24-hour

service. For many children, though, TV is a de facto baby-sitter. Of course, if children are going to grow up to be responsible, emotionally well-adjusted adults, they need generous amounts of quality time with their parents. Hence, parents who are too tired for their children because of trying to maintain an unreasonably high standard of living are wise to count the cost—to their children and to themselves.

In today's fast-moving technological society, the elderly are often victims as well. The speed of change and the constant flood of new gadgets onto the market make many feel confused, insecure, afraid, or even obsolete. So what does the future hold for them?

Are all of us—young and old—totally at the mercy of a world that seems bent on going ever faster? Or are there things we can do to help us cope and improve the quality of our life? Happily, there are, as we will see in the following article.

## **Coping Joyfully in a Hectic World**

**MOST PEOPLE COPE WITH THE PRESSURES OF LIFE, BUT FEW COPE JOYFULLY.  
THAT TAKES A SPECIAL KIND OF WISDOM.**

ACKNOWLEDGING this, the book *The 24-Hour Society* says: "We need to develop the wisdom to protect human needs and nature in the technological world we have created."

Happily, practical wisdom is readily avail-

able in the most widely distributed book in the world—God's Word, the Bible. Inspired by the One who understands human needs and nature perfectly, the Bible contains tried-and-tested principles. Applying these principles can help you to gain more



control over your life, giving you at least a measure of joy as you cope in today's hectic world.—Isaiah 48:18; 2 Timothy 3:16.

These principles address three main areas. First, they point out where you can do some judicious pruning. Second, they can help you set sound priorities. Third, they provide a spiritual perspective on life that is far superior to a purely secular viewpoint. Let us now consider these three areas.

#### **Keep Life Simple and Uncluttered**

Imagine that you are going camping for a few days. You want to be comfortable, so you take along a large tent with every conceivable accessory. You also take a trailer

loaded with furniture, cooking equipment, a freezer, a portable generator, lights, a TV, and many other items, including food. However, setting up all these things takes you many hours! Then, at the end of your short vacation, you take as much time packing up again—not to mention stowing everything away at home. Looking back, you realize that you did not have enough time to enjoy camping! You wonder whether it was worth all the effort.

For millions of people today, life itself is a little like that camping trip. They spend an inordinate amount of time obtaining and maintaining the endless number of material things this world would have us believe we need in order to be happy. In contrast, Jesus Christ said: "Even when a person has an abundance his life does not result from the things he possesses." (Luke 12:15) Yes, quality of life is not measured in terms of material wealth. In fact, riches often add to

#### **Can you simplify and unclutter your life?**

life's stresses and anxieties. "The plenty belonging to the rich one is not permitting him to sleep," says Ecclesiastes 5:12.

So take a good look at each of your possessions, and ask yourself, 'Is this thing really needed, or is it clutter? Does it add to the quality of my life, or does it steal valuable time?' The introduction to the book *Why Am I So Tired?*, by Leonie McMahon, observes:

A color photograph of a woman with shoulder-length brown hair, wearing a red short-sleeved shirt, sitting on a light-colored sofa. She is holding an open book titled "My First Bible Stories" and reading it to a young child who is sitting on her lap. The child has blonde hair and is wearing a dark green and yellow long-sleeved shirt. The background is slightly blurred, showing a domestic interior.

## **Do you give priority to things or to people?**

"The invention of various appliances, intended to take the drudgery out of housework, has resulted in the housewife having to take up an outside job, in order to buy them and pay for their maintenance."

When you simplify your life, you make more time for family, friends, and yourself. Such time is vital to your happiness. Do not be like those who discover too late in life that friends and family are far more important—and interesting—than money and things. Only people can love you. Bank accounts, stock portfolios, computers, television sets, and other gadgets, though they may have their place, are the husk of life, not its kernel. Those who give such things their priority cheapen their lives and eventually become dissatisfied or even bitter.—1 Timothy 6:6-10.

### **Manage Time and Set Priorities**

In some respects managing time is like balancing a financial budget. If you try to squeeze too many things into the limited hours you have available, you are not living within your means timewise. Such a life-style inevitably leads to frustration, stress, and weariness. So learn to set priorities.

First, determine what the more important things are, and assign

sufficient time to these. For Christians, spiritual pursuits always have top priority. (Matthew 6:31-34) If important matters are rushed or handled superficially, serious problems often follow. Hence, you may need to cull out anything that consumes time but yields poor returns.

In setting priorities, take into account your need for a little solitude—time for constructive meditation and for recharging your own batteries. “Meaningful alone-time,” says the journal *Psychology Today*, is “a necessary tonic in today’s rapid-fire world. . . . Alonetime is fuel for life.” People who are too busy to meditate can become superficial in their attitude toward life.

#### **Modesty and Spirituality**

Modesty and spirituality are two of the best assets you could possibly have when it comes to living a happy, balanced life. Modesty is important because it helps you to avoid taking on unrealistic work loads and responsibilities. If you are modest, you will know when to say no to overtime work or other activities that would encroach on something more important. Modest people are not envious of what others have and do; hence, they tend to be more content. Genuine modesty, in turn, is a facet of spirituality, another vital key to gaining more control over our lives.—Micah 6:8; 1 John 2:15-17.

Spirituality based on accurate knowledge of the Bible makes you a more discerning and perceptive person—someone who is not fooled by cheap, secular definitions of success. You take to heart the sage advice of 1 Corinthians 7:31: “[Let] those making use of the world [be] as those not using it to the full; for the scene of this world is changing.” Christians are “making use of the world” when providing materially for themselves and their families, but they do not let this world swallow them up. They know that it offers no real security, that soon it

will be completely done away with, and that real success—security and everlasting life on a paradise earth—depends on a person’s standing with God. (Psalm 1:1-3; 37:11, 29) So heed Jesus’ admonition, and invest wisely by storing up “treasures in heaven, where neither moth nor rust consumes, and where thieves do not break in and steal.”—Matthew 6:20.

#### **Avoid Anxiety and Find True Peace**

As this present system comes to its close, stress and demands on your time will no doubt increase. How important, therefore, that you strive to apply the Bible’s counsel: “Do not be anxious over anything, but in everything by prayer and supplication along with thanksgiving let your petitions be made known to God; and the peace of

#### **Set priorities, including filling your need for solitude and spirituality**

God that excels all thought will guard your hearts and your mental powers by means of Christ Jesus.” Such peace is beyond the reach of anyone of a purely secular bent who sees no value in prayer.—Philippians 4:6, 7.

Yet, Jehovah will do even more than give you peace of mind. He will help you carry your load of responsibility every day if you “throw all your anxiety upon him.” (1 Peter 5:7; Psalm 68:19) It is therefore wise to listen to God each day by reading a portion of his Word. Who could possibly give you better advice than your Creator? (Psalm 119: 99, 100, 105) Yes, experience has shown that those who put God in the center of their life are greatly helped to cope joyfully in today’s hectic world.—Proverbs 1:33; 3:5, 6.

## CROSSWORD PUZZLE

### Clues Across

1. In the wilderness this expression applied both to Moses' dwelling and to the sacred tabernacle [3 words] (Exodus 33:7; 39:40)
9. Wider (Job 11:9)
11. The location near which Ahaziah, king of Judah, was struck down at Jehu's orders (2 Kings 9:27)
12. The location of the temple of Artemis, considered to be one of the seven wonders of the ancient world (Acts 19:26, 27)
14. A Babylonian official lower than a satrap (Daniel 2:48)
15. One of several constellations mentioned in the Bible (Job 9:9)
16. Covered with a fatty liquid (Habakkuk 1:16)
18. Under Mosaic Law, the tenth part that was to be given to the Levites (Deuteronomy 26:12\*)
20. Precious stone that was the eighth foundation of the wall of New Jerusalem (Revelation 21:20)
21. Former prostitute who became an ancestress of Jesus (Matthew 1:5)
24. Established by law (Luke 1:6)
26. Son of Abdiel, a family head of the tribe of Gad (1 Chronicles 5:15)
27. The city in which Paul became acquainted with Aquila and Priscilla (Acts 18:1-3)
29. Adornment (1 Peter 3:3, 4)
31. It comes after the good news of the Kingdom is preached earth wide (Matthew 24:14)
32. The name Caesar became a regal title equivalent to this
34. This prominent part of a Christian's spiritual armor enables him to "quench all the wicked one's burning missiles" [3 words] (Ephesians 6:16)

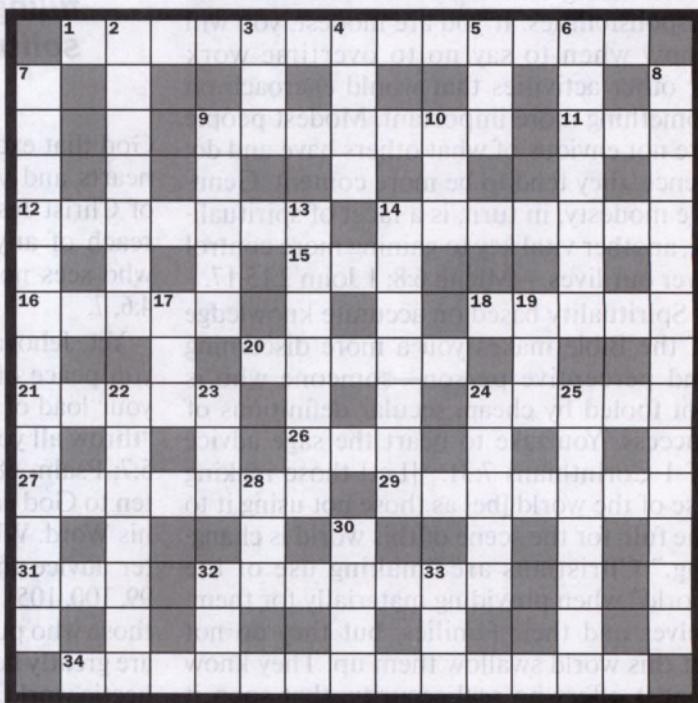
### Clues Down

2. This son of Ur was one of the mighty men in David's military forces (1 Chronicles 11:35)
3. Used to power and steer a ship (Ezekiel 27:29)
4. This was not part of man's diet before the Flood (Numbers 11:4)
5. Waterproofing material used for the ark (Genesis 6:14)
6. Disregard (Nehemiah 10:39)

7. Jesus called this "deceptive," able to choke the word of the Kingdom and leave one "unfruitful" [3 words] (Matthew 13:22)
8. We are taught by God to show this [2 words] (1 Thessalonians 4:9)
9. Founded (Song of Solomon 5:15)
10. To make a mistake (1 Kings 8:47\*)
13. A city at the eastern limit of Bashan that was taken from Og by the Israelites under Moses and became inhabited by Gadites (Deuteronomy 3:10)
14. "Forbidden by the holy spirit to speak the word in the district of Asia" while on his second missionary tour, Paul journeyed through this region and "the country of Galatia" (Acts 16:6)
17. Seventh letter of the Greek alphabet
19. In Ezekiel's vision the expanse over the heads of the four living creatures resembled this (Ezekiel 1:22)
22. A site where the Israelites camped after leaving Mount Shepher while on their way to the land of Canaan (Numbers 33:24)
23. This prefix, occurring often in Hebrew names, means "son" (Genesis 35:18\*)
24. What King Uzziah became as a result of his presumptuous act of offering incense in the temple (2 Chronicles 26:19-21)
25. Elijah's was made of animal hair (2 Kings 1:8)
28. Abbreviation for the name Timothy
30. The Caesar who ruled when Paul was taken to Rome and who evidently had Paul executed
32. The first person reported to have used God's name (Genesis 4:1)
33. The opposite of on (Hebrews 12:1)

\* The scripture cited contains a form of the word needed.

### Crossword Solutions Page 19



# Sentinels That Protect Your Health

"MY DEAR MADAM," said the doctor as he examined the results of blood tests, "your immunologic defenses are quite low." Veronica had not been feeling well for some time. Repeated bouts of bronchitis had debilitated her, and recently she had also had an ear infection and an irritating sinus condition.

What are the immunologic defenses, and why are they so important? How do they work?

## Protected From Attack

The immune system involves an intricate network of molecules and specialized cells that work in close cooperation to fight infection. We rely upon our immune system to defend us from attack by foreign invaders, such as bacteria or viruses.

To illustrate, we could compare the body to an ancient city. A typical city may have been located on high ground so that any hostile armies could be seen far away. And the city was protected by an array of walls and gates, manned by guards and sentinels. With such defenses, the city remained a safe place of dwelling. If we compare our body to such a city, we can better understand what is required to defend it from attack.

For our bodies, the first line of defense against invasion by germs is made up of the skin and the mucous membranes (for example, those that line the nose and the throat). Our skin acts as an important physical barrier. Many of the billions of germs that we have on our skin surfaces are eliminated when they are shed with the outer layers of skin.

The mucous membranes are not as tough as skin and are more vulnerable. However, they contain many natural substances that fight germs. One such substance, called lysozyme, is found in tears, saliva, and sweat.

## LINES OF DEFENSE:

- SKIN AND MUCOUS MEMBRANES
- LEUKOCYTES, OR WHITE BLOOD CELLS

**Monocytes** penetrate stricken tissue and devour invading bacteria

**Neutrophils** help swallow bacteria and are expelled from the body as pus

**Lymphocytes** have immunologic memory; if the same type of germ reappears, antibodies will destroy it immediately

• **B cells** release antibodies like well-aimed arrows; these "seek" germs and attack them

• **T cells** help produce antibodies, which engage in "hand-to-hand" combat with germs

—**Helper T cells** help B cells secrete large quantities of antibodies

—**Natural killer cells** kill infected cells directly without producing antibodies

While the mere acidity of sweat is sufficient to impede the growth of many germs, lysozyme kills them by destroying their cell walls. For that reason, an animal can help heal its wounds simply by licking them.

### **Primary Sentinels—White Blood Cells**

Let us imagine that bacteria capable of causing disease manage to penetrate our "city" through a wound or by contagion. An army of cells immediately goes into action, with but one purpose—elimination of the invading germ and consequent recovery from illness. The cells that fight to defend the body are called leukocytes, or white blood cells. Three important types of white blood cells in this stage of the struggle are monocytes, neutrophils, and lymphocytes.

When monocytes "hear" chemical signals indicating inflammation in a certain zone, they leave the bloodstream and penetrate the stricken tissue, where they become macrophages, that is, "big eaters." There they devour all that is foreign to the organism. In addition, they secrete important substances called cytokines, which prepare the body to fight the infection. Among their functions, the cytokines provoke fever. Fever is a useful phenomenon in that it is a sign that defensive mechanisms have gone into action. It can accelerate the healing process and also function as a useful diagnostic indicator.

Next, neutrophils "hear" the chemical sig-

nal from the inflamed zone and dash to help the macrophages. They too engulf, or swallow, bacteria. When these neutrophils die, they are expelled from the body as pus. Thus, the formation of pus is another type of defense. In this case, the Latin expression used by doctors for centuries would apply: *pus bonum et laudabile*. This means "good and praiseworthy pus." Its formation helps to stem infection. After digesting the germs, our friends the macrophages "present," or display, fragments of the germ to the lymphocytes to warn them of the invader.

The lymphocytes make up a superspecialized elite in the fight against infection. They produce substances called antibodies, which bind specifically to a particular germ fragment. There are two principal teams of lymphocytes with differing abilities. First are the B cells, which release the antibodies that they produce into the bloodstream. The B cells have been called the armed corps of the immune response, and they shoot their arrows, the antibodies, with extreme precision. These antibodies will "seek" the germ they recognize and will strike a vital site on the germ. The other principal team of lymphocytes, the T cells, keep the antibodies that they recognize anchored to their surface. They use them to strike the enemy—engaging in hand-to-hand combat, so to speak.

The story becomes even more complex. A subgroup of T cells, called helper T cells, help their companions, the B cells, to secrete large quantities of antibodies. Before the attack, the helper T cells communicate with one another. Recent research has shown that by means of chemical signals, these cells "talk" excitedly among themselves, exchanging information on the foreign agent, in what has been called vibrant conversation.

Help is lent by another important group, the natural killer cells. These do not produce antibodies, but they are ready to kill cells that

#### **IN OUR NEXT ISSUE**

**Insurance—Do You Really Need It?**

**The War Did Not Stop  
Our Preaching**

**What's So Bad About  
Sneaking Out?**

have become "foreign" because of being infected. So natural killer cells too contribute to guarding the integrity of the body.

Finally, by virtue of their immunologic memory, lymphocytes are capable of remembering the characteristics of a germ, as though they had a record of it on file. So if ever that type of germ should reappear, these lymphocytes already have specific antibodies to destroy it immediately.

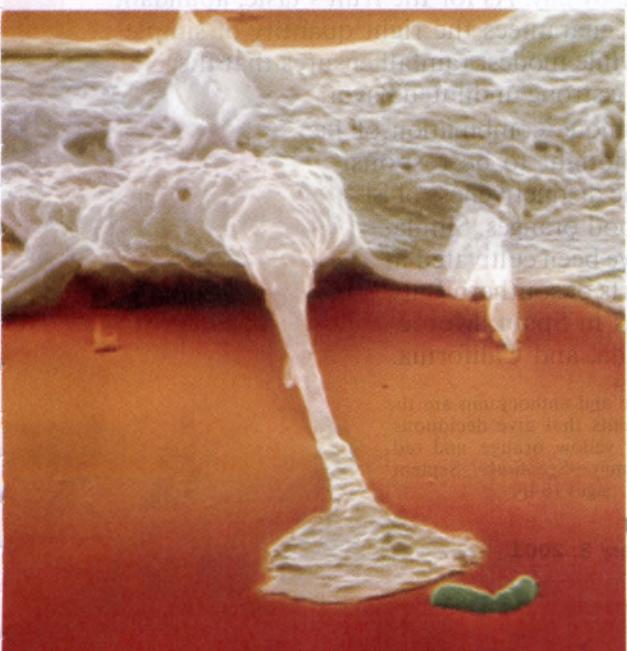
The macrophages, cells that activate the immune response, also help complete the job by staying around to assist in quenching inflammation. They free the affected area of all the dead cells, cell fragments, or debris left on the "battlefield" after the fight, restoring quiet and order to the "city."

### When Defenses Are Low

The foregoing is but a basic outline of how the immunologic defenses are thought to work. But defenses can be low for several reasons: There can be primary defects innate to the immune system and secondary defects acquired in the course of one's life because of contracting diseases.

One of the most serious of these diseases is

### White blood cells attack bacteria



AIDS, the fearsome pandemic that exploded during the 1980's. It is caused by the human immunodeficiency virus (HIV), which can strike at the heart of the immune system, progressively destroying a particular class of lymphocytes. An extremely important part of the individual's defenses is thus incapacitated. After that, infections recur and are never completely eradicated. In fact, they get worse, and the body is left without the means for defending itself. It is like a city in ruins, without walls, that can be conquered by anyone.

Fortunately, not all immunologic deficits are of such a serious nature. Veronica, mentioned at the outset, had a minor defect in the production of one kind of antibody that is usually present in the mucous membranes, particularly along the airways. That explained the repeated and persistent infections she had been suffering.

Veronica got better. After listening to her doctor's explanation, she decided that she would scrupulously follow the therapy he prescribed. When she got over her sinusitis, she agreed to a course of injections that would stimulate the production of antibodies.\* She also stopped smoking and managed to get more rest. Shortly thereafter, her health improved considerably.

Yes, we have been designed to enjoy life in good health. When we reflect on the amazing complexity of the immune system and other intricate mechanisms of the human body, we are moved to admiration and gratitude for the wisdom of our Creator. (Psalm 139:14; Revelation 15:3) And while at this time because of human imperfection we do not always enjoy good health, God's inspired Word assures us that in the new world soon to come, humans will be restored to perfection of mind and body, so that "no resident will say: 'I am sick.'"—Isaiah 33:24.

\* *Awake!* does not endorse any particular form of treatment, recognizing that this is a matter for personal decision.

# When Oranges Are Not Orange

BY AWAKE! WRITER IN ITALY

**W**HEN are oranges not orange? In English, that might sound like a play on words, but it need not be. On the Italian island of Sicily, the obvious answer is, "When they are red!"

We are talking about Sicilian blood oranges, so called because of the dramatic color of their flesh, which can range from orange veined with ruby to vermillion to vivid crimson to almost black. Their rind is orange tinged with a red or purple blush, and their aroma is mouth-wateringly fresh. Their flavor is intense and tart-sweet, and some say it has "a hint of raspberry."

Citrus fruits have been cultivated in Italy from ancient times. Oranges likely reached Sicily from Asia by the fourth century C.E., but these were blond (nonred) sour oranges. The sweet orange was brought to Europe by the Portuguese in the 14th and 15th centuries and from there was introduced into the Americas along with other varieties of citrus. Not until the beginning of the 20th century, however, were blood oranges first formally identified in Sicily.

## Why Red?

All oranges contain carotene, the same yellow-orange pigment that

gives egg yolks and carrots their color. What is unusual about Sicilian blood oranges of the Moro, Tarocco, and Sanguinello varieties is that they develop a red pigment called anthocyanin, which confers a characteristic red hue on ripe fruits.\* But move a blood orange tree from here—a limited area within the provinces of Catania, Syracuse, and Enna—and plant it elsewhere, and the fruit it produces may not necessarily be red at all. Why? What is special about this part of eastern Sicily?

Not all the factors involved in anthocyanin formation in Sicilian blood oranges are clear. It still has to be determined what influence, if any, soil exerts on fruit pigmentation. Other variables either favor or inhibit synthesis of the red pigment as the fruit ripens. It has been observed, for example, that reddening begins when temperatures are frigid by night and light is intense by day. As for the fruit's taste, abundant sunshine guarantees the right quantity of simple sugars, while modest rainfall ensures that the fruit has a strong undiluted flavor.

This unique combination of factors is thought to be responsible for the distinctiveness of Sicilian blood oranges. Similar fruits have been cultivated in other parts of southern Italy as well as in Spain, Morocco, Florida, and California,

\* Carotene and anthocyanin are the same pigments that give deciduous leaves their yellow, orange, and red tints in autumn.—See *Awake!*, September 22, 1987, pages 16-18.



but, it is said, no one has succeeded in replicating all the qualities of the Sicilian blood orange.

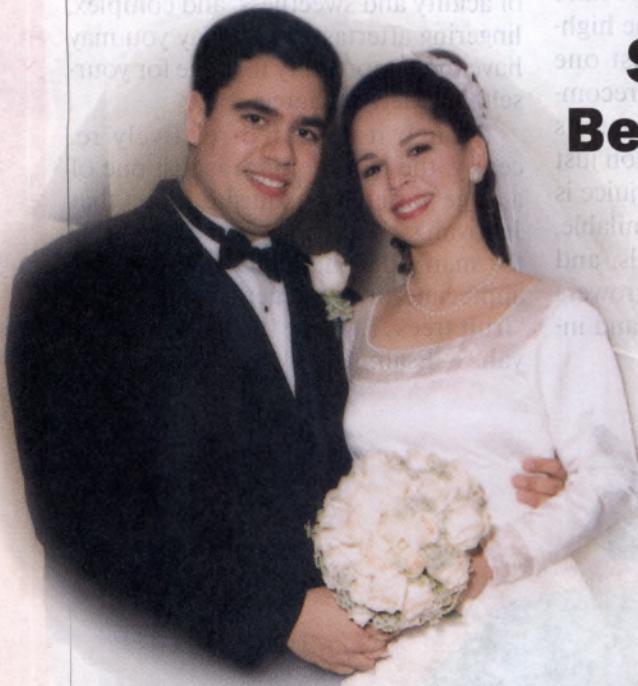
### A Fruit to Be Appreciated

Besides their exceptional color, these fruits also have high nutritional value. Tarocco oranges have the highest vitamin-C content of all citrus fruits. Just one medium-size orange is enough to supply the recommended daily allowance of this vitamin. Numerous benefits are claimed for blood oranges. To mention just some of them, a glass of thick, freshly squeezed juice is a delicious and healthy source of readily assimilable, energy-yielding simple carbohydrates, minerals, and fiber. Not without reason then, Sicilian citrus growers are striving to protect their distinctive product and increase appreciation for it.

Connoisseurs are convinced that these Sicilian fruits are "among the world's finest dessert oranges because of their intense flavor, ideal balance of acidity and sweetness, and complex, lingering aftertaste." One day you may have the opportunity to judge for yourself whether you agree.

Though it appeared relatively recently, the blood orange is just one of a huge variety of exquisite foods that Jehovah's creative acts made possible for man's delight. Thus, for any who appreciate divine generosity, even the "fruit trees . . . praise the name of Jehovah."—Psalm 148:9, 13; Genesis 1:29.





## Should Marriage Be a Lifelong Union?

agreement, . . . without self-control." That prophecy is striking in its accuracy. Those attitudes have scarred and weakened marital relations worldwide, which high divorce rates prove.

Clearly, many people have lost respect for marriage. In view of this, we might ask: Should marriage be taken so seriously? Is there such a thing as the sanctity of marriage? How should Christians view wedlock? What help does the Bible offer to married couples today?

### Has God's View Changed?

In the beginning, God did not speak of the marriage bonds as temporary. His joining of the first man and woman is related at Genesis 2:21-24, and there no mention is made of an option to divorce or separate. Instead, verse 24 says: "A man will leave his father and his mother and he must stick to his wife and they must become one flesh." What does that scripture mean?

Consider the human body, how its different tissues are woven together seamlessly and how bones meet in strong, frictionless joints. What unity! What durability! But what agony when this matchless organism is seriously injured! Hence, at Genesis 2:24, the term "one flesh" emphasizes the intimacy and permanence of the marital union. It also gives implicit warning of great pain if that bond is dissolved.

**W**HY even ask that question? Isn't marriage, to quote Western wedding vows, "for better or for worse" and "until death do us part"? Yes, marriage vows usually state that the bride and the groom are entering a lifelong commitment. But many no longer consider themselves bound by those solemn promises. Married couples in alarming numbers are breaking up—some after a few months, and others after decades. Why is esteem for marriage diminishing? The Bible gives the answer.

Please examine 2 Timothy 3:1-3, and compare it with what you observe in the world today. In part, those verses state: "In the last days critical times hard to deal with will be here. For men will be lovers of themselves, lovers of money, . . . unthankful, disloyal, having no natural affection, not open to any

Although the winds of change over the past millenniums have shaped and reshaped human views, God still views marriage as a lifelong commitment. About 2,400 years ago, some Jewish men had taken to abandoning their first wives and marrying younger women. God condemned this practice, declaring through his prophet Malachi: “‘You people must guard yourselves respecting your spirit, and with the wife of your youth may no one deal treacherously. For he has hated a divorcing,’ Jehovah the God of Israel has said.”—Malachi 2:15, 16.

Over four centuries later, Jesus reaffirmed God’s original view of marriage when he quoted Genesis 2:24 and then directed: “What God has yoked together let no man put apart.” (Matthew 19:5, 6) Years later the apostle Paul instructed that “a wife should not depart from her husband” and that “a husband should not leave his wife.” (1 Corinthians 7:10, 11) These scriptures accurately state God’s view of marriage.

Does the Bible ever allow for the termination of a marriage? Yes, a marriage ends when either mate dies. (1 Corinthians 7:39) Adultery can also dissolve a marriage if the innocent mate so decides. (Matthew 19:9) Otherwise, the Bible encourages couples to remain together.

### How to Make Marriage Long-Lasting

God wants marriage to last, not as a struggle for survival, but as a happy journey. He desires that a husband and wife solve their problems and deeply enjoy each other’s company. His Word furnishes guidance for a happy, long-lasting marriage. Please note the following texts.

**Ephesians 4:26:** “Let the sun not set with you in a provoked state.”\* One happily married man believes that this scripture

helps him and his wife to resolve disagreements promptly. “If you can’t sleep after a disagreement, something is not right. You cannot allow the problem to continue,” he says. Sometimes he and his wife have talked through problems well into the night. But it works. He adds: “Applying Bible principles has wonderful results.” By doing so, this man and his wife have enjoyed a happy marriage for 42 years.

**Colossians 3:13:** “Continue putting up with one another and forgiving one another freely.” A husband explains how he and his wife have put this into practice: “Marriage mates can irritate each other without necessarily doing anything wrong, since everyone has foibles and habits that bother other people. We put up with each other by not allowing these things to come between us.” Doubtless that sentiment has helped this couple during the 54 years that they have been married!

The application of such Scriptural principles reinforces the tie that binds husbands and wives. Thus their marriage can be joyful, satisfying, and lifelong.

### CROSSWORD SOLUTIONS

T	E	N	T	O	F	M	E	E	T	I	N	G
P	L	A	V	A	E	A	E	E	B	A	E	B
W	P	A	T	R	L	O	O	R	D	E	R	O
O	I	I	B	R	O	A	D	E	R	G	U	R
P	L	A	E	A	E	B	E	H	E	S	U	S
E	P	H	E	S	U	S	P	R	E	F	E	C
R	A	E	A	S	H	C	T	R	E	C	T	
F	T	B	E	R	Y	L	C	C	R			
O	I	L	E	D	L	R	T	I	T	H	E	
R	A	E	A	S	H	C	H	C	H			
R	A	H	A	B	C	G	L	E	G	A	L	
I	A	E	A	H	I	E	A	A	Y			
C	O	R	I	N	T	H	A	P	P	A	R	E
H	A	A	I	N	N	E	M	O	O			
E	N	D	E	M	P	E	R	O	R	E	V	
S	A	V	R	F	F	N	N	E				
S	H	I	E	L	D	O	F	A	I	T	H	

\* According to first-century Middle Eastern timekeeping, the day ends at sunset. Paul was thus encouraging readers to be at peace with others before each day ends.



JAMES COOK



JOSEPH BANKS

# BOUND FOR BOTANY BAY

BY AWAKE! WRITER IN AUSTRALIA



● BOTANY BAY

**I** FOUND the book lying on the path," pleaded young Job. This freckle-faced 19-year-old was arrested while crossing a London street, accused of stealing the book. Its value? Eighty cents! Unimpressed by the young man's defense, the judge sentenced him to seven years in a penal colony.

On the other side of the globe, in an area now known as Quebec, Canada, a gentleman by the name of François-Maurice Lepailleur was captured. Because of taking part in a failed armed uprising against the British government, he was condemned to death. However, the court decided upon an alternative form of punishment for him.

These two young men had more in common than finding themselves on the wrong side of British law. Both found themselves on boat rides to a place called Australia and a fledgling penal colony known as Botany Bay.

What was it like to be a convict in Australia? How many were sent there? And why did these two young men end up so far from home?

## Why Australia?

In 1718 the British government decided to lessen their burgeoning prison population by

exporting their criminals. By 1770 they were shipping prisoners out at the rate of a thousand a year, mostly to their colonies in Maryland and Virginia. By 1783 the British had lost these colonies as a destination for their felons because of the Revolutionary War in North America. By this time, though, they had already sent more than 50,000 convicts there.

The alternative destination was an arid land at the far side of the globe. Its east coast had been mapped and claimed for Britain 13 years earlier by a naval officer named James Cook. Joseph Banks was a fellow explorer on that voyage, and he suggested that this land would be an ideal destination for undesirable subjects of the British Empire. Thus, in May 1787 the first fleet of 11 little ships started their 16,000-mile voyage toward Botany Bay. Over the next 80 years, until 1868, a total of 158,829 convicts were sent to Australia.

## An Epic Ocean Voyage

In 1833 young Job and his 300 shipmates arrived at Sydney Cove, in Port Jackson. Although the colony was known as Botany Bay,

Cook: Painting by John Weber/Dictionary of American Portraits/Dover;

Banks: Dickinson, W. Portrait of Sir Joseph Banks when Mr. Banks. Rex Nan Kivell Collection; NK10667. By permission of the National Library of Australia; bay scene: Fittler, James. Sydney, New South Wales, with entrance into Port Jackson. By permission of the National Library of Australia

the landmark that bears that name is actually a few miles south of where the settlement was finally established.

For some the journey itself was a severe punishment. An excerpt from François Lepailleur's diary gives a glimpse of life on board ship: "In 1840 we were passing by the Cape of Good Hope [South Africa] in the hold of the *Buffalo*, which was the most horrible, because of the constant darkness, the strict rules that had to be obeyed, and the vermin which continually devoured us and the heat, and to crown our misery, hunger."

Ironically, the convict ships ended up with one of the best health and safety records for sea travel at the time. Because of incentives put in place by the British government, their total mortality rate from 1788 to 1868 was less than 1.8 percent. In contrast, from 1712 to 1777, between 3 percent and 36 percent of the hapless passengers of slave ships perished en route. Why, even the ships carrying free emigrants from Europe to America had a worse mortality rate than the convict ships!

### A Mixed Bag

One of the key reasons for this high survival rate was the youthfulness of the convict population. François was in his mid-30's, relatively old for a convict. The majority were between 16 and 25 years of age, with some as young as 11. By a ratio of more than 6 to 1, convict men outnumbered convict women.

The majority of the people transported were from the United Kingdom. More than half were English, a third were from Ireland, and Scotland contributed a few thousand felons. Some, like François, came from such far reaches of the British Empire as the places now known as Canada, India, Malaysia, Sri Lanka, and even the tiny island of Malta.

These involuntary immigrants brought with them an impressive array of talents and skills. Among them were butchers, boilermakers, brass founders, carpenters, cooks, hatters, tailors, and weavers. A thousand separate occupa-

tions are identified in official records, reflecting a cross section of the British work force.

It seems that the convicts were often better educated than the working class left at home. Three quarters of those who arrived in New South Wales could read and write. In comparison, only a little more than half the population back in Britain had the ability to sign the marriage register.

Kidnapping, murder, and sedition could earn one a ticket to Botany Bay, but the qualifications for transportation were far more liberal than that. Opening a place of amusement on Sunday, stealing a handkerchief, or simply holding a debate on Holy Scripture could result in a trip to the Southern Hemisphere.

### Life in the New Land

Harsh beatings, constant cruelty, and a sub-human existence are the most popular images of early convict life in Australia. For some this was reality, but many ended up better off than they were in the land they had left behind.

A system evolved in which convicts could be assigned to work for free settlers and officers or even for themselves. Thus, in place of being chained to a road gang for their entire sentence, they could work at their trade or learn a new one. For example, Job was assigned to work for a wealthy but kind landowner and learned to be a stockman on one of the landowner's properties on the outskirts of Sydney.

The convicts were assigned to work for five and a half days, or 56 hours, each week. Remarkably, this was less than what most factory workers in Britain had to endure at the time, laboring from sunrise to sunset each day. Convicts could charge for any work they did beyond this prescribed length of time, and they often ran small after-hours businesses, such as selling cut grass for livestock fodder.

While the whip was used liberally, one study shows that 66 percent of convicts in New South Wales received no beatings or only one during their sentence. This meant that their

floggings were no more frequent than those given men serving in the British Army or Navy.

These facts, combined with the prospect that convicts could receive their own land at the end of their sentence, made transportation desirable to some. In 1835, W. Cope, governor of the infamous Newgate Prison in London, reported concerning inmates threatened with transportation: "Nineteen out of twenty are glad to go." And the overseer of another prison said of his prisoners: "Ninety-nine out of a hundred are very desirous of going."

### The Darker Side

For those who continued to flout the law, life could be very miserable. One report said: "Transportation is not a simple punishment, but rather a series of punishments, embracing every degree of human suffering." The treadmill was one such punishment. François described one this way: "It is a mill which grinds grain and is moved by the convicts. 18 men continually go up a wheel and their weight makes the wheel and the mill go. Often these men have only one pair of irons on their feet, often they have up to three or four pairs on their feet, and they are forced to do their work like the others or, if not, they are flogged without mercy."

Convict women who behaved badly were made to wear a collar iron. This device was an iron collar for the neck with two projections, each at least a foot long, extending from it. These heavy monstrosities were considered the only means of keeping the women in order.

Penal institutions such as Port Arthur, east of Hobart in Tasmania, were designed as a place of severe punishment for reconvicted criminals. The harshness of these places can be gauged by an official report that indicated: "Some convicts . . . preferred death to continued imprisonment, and committed crimes so as to be executed."

For some banished prisoners, the worst was the separation from their families. François wrote: "My dear family whom I love so tenderly, is it to be that exile will keep me away

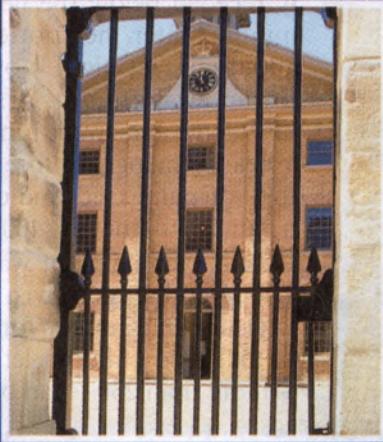
from you, from all I love, for a long time to come? Oh, the separation is sad and wrenching! To separate from a tender wife and young children who haven't known the tenderness of a loving father! Dear family, I often raise my spirit and my heart to Heaven so that God may break the chains that bind me to this place and put an end to my exile and so allow me to return to my dear family, to all that my heart desires."

### The Convicts' Contribution

In 1837, Governor Bourke said: "In New South Wales, by the aid of convict labour, the industrious and skillful settlers have, within a period of fifty years, converted a wilderness into a fine and flourishing colony." By this time more than two thirds of the male work force was convict or ex-convict, helping the remaining population of free immigrants to accomplish this extraordinary task. Through choice or circumstance, more than 90 percent of all convicts made Australia their home.

Young Job also became one of these permanent residents, for when he gained his freedom, he married, settled down, and eventually became the forefather of hundreds of inhabitants of Australia and New Zealand. François, on the other hand, was one of the few who on their release were able to return to their homeland and their beloved families.

The pace of change continued to accelerate from those early days, and within just three overlapping generations, the "fine and flourishing colony" grew into a multicultural nation. Each year now, thousands from Asia, Canada, and Europe, including Britain, voluntarily visit Australia or apply to stay here. When they arrive, they find towering concrete buildings covering the ground that the convicts cleared and great paved highways following the tracks that the convicts carved. Yet, even among the bustle of Australia's modern streets, old stone buildings still bear witness to the labors of those reluctant pioneers who found themselves bound for Botany Bay.



**(Top)** Sydney's Central Business District has grown on the site of what was once known as the Botany Bay penal colony

**Old Sydney Hospital, now the State Mint Museum, was built by convict labor**

Image Library, State Library of New South Wales

**Hyde Park Barracks, a prison designed and built by convicts**

Hyde Park Barracks Museum (1817).  
Historic Houses Trust of New South Wales, Sydney, Australia

**The Great North Road. Convicts carved this 164-mile highway through sandstone hills by hand. It connected Sydney and the Hunter Valley, near Newcastle. It was one of the most important civil engineering feats of the colony**

Managed by the National Parks and Wildlife Service, N.S.W.

# KILLER WAVES

## Myths and Realities

THE sun had set just a few minutes earlier. On this tranquil Friday, July 17, 1998, the men, women, and children of several small villages on the northern coast of Papua New Guinea were suddenly shaken by a magnitude-7.1 earthquake. "The main shock," says *Scientific American*, "rocked 30 kilometers (nearly 19 miles) of coastline . . . and suddenly deformed the offshore ocean bottom. The normally flat sea surface lurched upward in response, giving birth to a fearsome tsunami."

An observer says that he heard what sounded like distant thunder, which gradually faded as the sea slowly receded below the normal low-water mark. A few minutes later, he spotted the first wave, which was about ten feet high. It overtook him as he was trying to run away from it. A second, larger wave flattened his village and swept him along for nearly a mile, into a nearby mangrove forest. "Debris hanging from the tops of palm trees indicated that the waves reached heights of 14 meters [46 feet]," reports *Science News*.

That evening giant waves took the lives of at least 2,500 people. As a twist of irony, a lumber company later donated timber for new schools, but there were virtually no children left to go to school. Almost all—more than 230—had been killed by the tsunami.

### What Are Tsunamis?

Tsunami is a Japanese word that means "harbor wave." This is "a fitting term," says the book *Tsunami!*, "as these giant waves have frequently brought death and destruction to Japanese harbors and coastal villages." What gives these freak waves their awesome power and size?



U.S. Department of the Interior

Tsunamis are sometimes called tidal waves. Strictly speaking, however, tidal waves are simply the surging and waning swells that we call tides and are caused by the gravitational pull of the sun and the moon. Even the massive waves—sometimes over 90 feet high—that are whipped up by gale-force winds cannot be compared with tsunamis. If you were to dive beneath these tidal waves, you would find that their influence weakens the deeper you go. At a certain depth, the water is hardly disturbed. But not so with tsunamis. Their influence reaches from the surface right to the ocean floor, even though the water may be miles deep!

A tsunami runs deep because it is generally caused by violent geologic activity on the seafloor. For this reason, scientists sometimes refer to tsunamis as seismic waves. The seafloor may rise, lifting the column of water above it and creating a gentle swell, which may cover 10,000 square miles. Or the ocean floor may sink, briefly creating a hollow on the ocean surface.

Either way, gravity causes the affected water to oscillate up and down—a motion that spawns a series of concentric waves, like those formed when a stone hits a pond. This phenomenon shatters the popular myth that tsunamis are just single rogue waves. Instead, they usually fan out in what is called a tsunami wave train. Tsunamis may also be triggered by volcanic eruptions or undersea landslides.

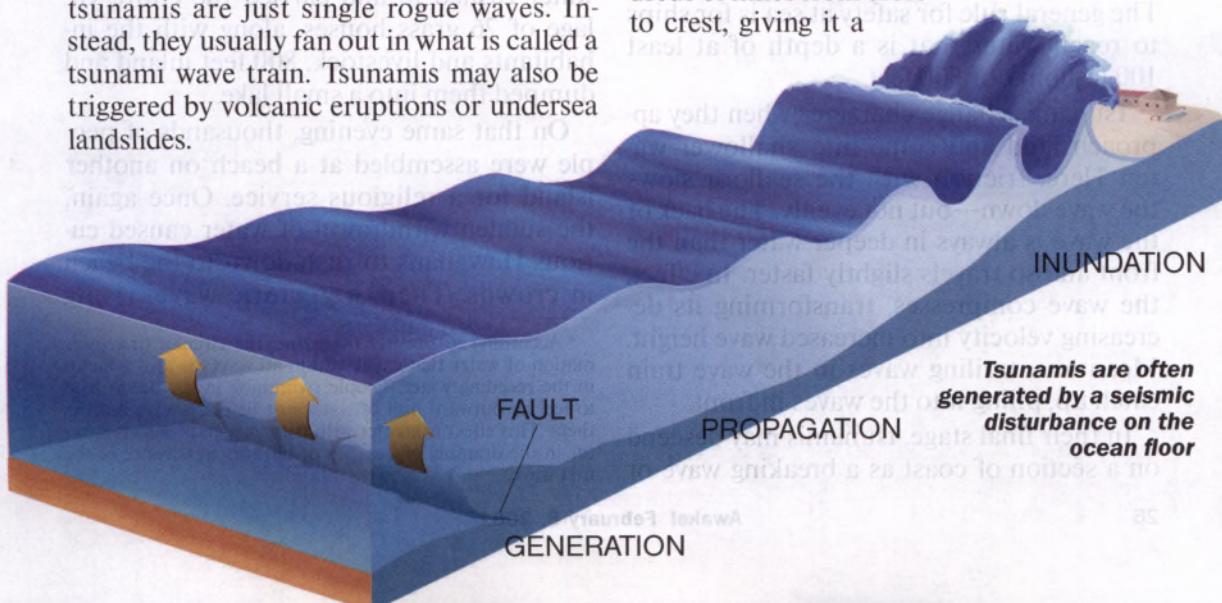
A tsunami drove a board through this truck tire

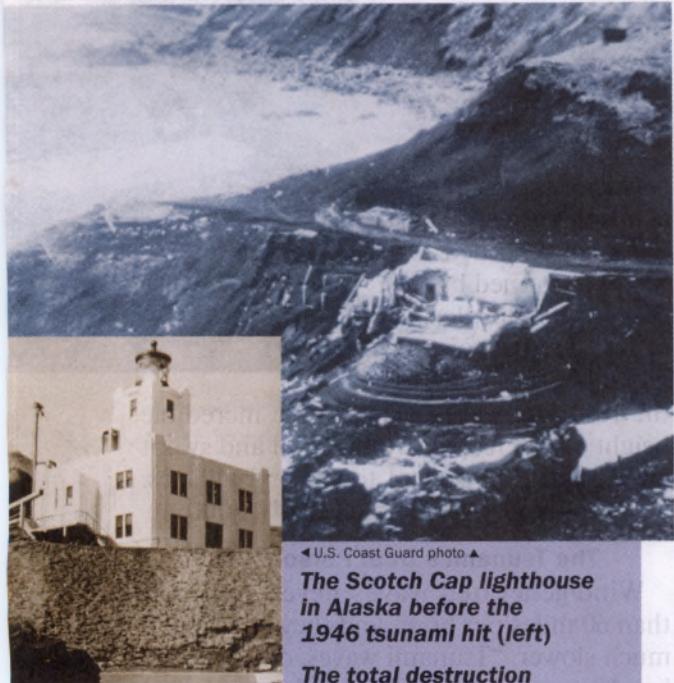
One of the most devastating series of tsunamis in recorded history was formed by the August 1883 explosion of Krakatau, a volcano in Indonesia. Some of the resulting waves reached the incredible height of 135 feet above sea level and swept away some 300 coastal towns and villages. The death toll probably exceeded 40,000.

### The Tsunami's Dual Personality

Wind-generated waves never go faster than 60 miles per hour, and they are usually much slower. "Tsunami waves, on the other hand," says the book *Tsunami!*, "may travel as fast as a jetliner, an astonishing 500 miles per hour or more in the deep waters of an ocean basin." Yet, despite their speed, they are not dangerous in deep water. Why?

First, because on the open sea, a single wave is usually less than ten feet high; and second, because the wave can be hundreds of miles from crest to crest, giving it a





◀ U.S. Coast Guard photo ▲  
**The Scotch Cap lighthouse  
in Alaska before the  
1946 tsunami hit (left)**

**The total destruction  
afterward (top)**

gentle slope. Hence, tsunamis can pass under ships without even being noticed. The master of a ship lying off the coast of one of the Hawaiian Islands was not even aware that a tsunami had passed by until he saw huge waves pounding the distant shore. The general rule for safety at sea is for ships to reach water that is a depth of at least 100 fathoms, or 600 feet.

Tsunamis change character when they approach land and come into shallower water. Here, friction with the seafloor slows the wave down—but not evenly. The back of the wave is always in deeper water than the front and so travels slightly faster. In effect, the wave compresses, transforming its decreasing velocity into increased wave height. Meantime, trailing waves in the wave train catch up, piling into the waves in front.

In their final stage, tsunamis may descend on a section of coast as a breaking wave or

as a wall of water called a bore, but more commonly, they appear as a fast-rising tide-like flood that surges well above the normal high-water mark. Water has been known to surge more than 170 feet above the normal sea level and carry debris, fish, and even chunks of coral thousands of feet inland, obliterating everything within its path.

Deceptively, the first sign of an approaching tsunami is not always the appearance of a growing swell racing toward shore. It may be quite the opposite—an abnormal outgoing tide that drains beaches, bays, and harbors dry and leaves fish flapping on the sand or mud. What determines the initial conditions is which part of the wave train reaches shore first—the rise or the trough.\*

#### **When the Beach Runs Dry**

It was a calm evening on November 7, 1837, on the Hawaiian island of Maui. About seven o'clock that evening, explains the book *Tsunami!*, the water began to recede from the beach, leaving the reef exposed and fish stranded. Many excited islanders ran out to pick up the fish, but a few individuals, who were more alert, ran for high ground, possibly knowing from past experience what was about to happen. Soon, a terrifying surge of water rushed in and carried the entire village of 26 grass houses, along with the inhabitants and livestock, 800 feet inland and dumped them into a small lake.

On that same evening, thousands of people were assembled at a beach on another island for a religious service. Once again, the sudden withdrawal of water caused curious Hawaiians to rush down to the beach in crowds. Then, a gigantic wave, rising

\* According to *Discover* magazine, the circular or elliptic motion of water that exists within all waves is also a factor in the receding water. People swimming in the ocean tend to feel an outward pull of water just before a wave reaches them. This effect is greater with tsunamis and hence is a factor in the draining of beaches or harbors in advance of the first wave.

20 feet above the normal high-water mark, appeared as if out of nowhere and rushed ashore "with the rapidity of a racehorse," according to one observer. Retreating water washed even strong swimmers out to sea, where some drowned because of exhaustion.

### How Often Do They Strike?

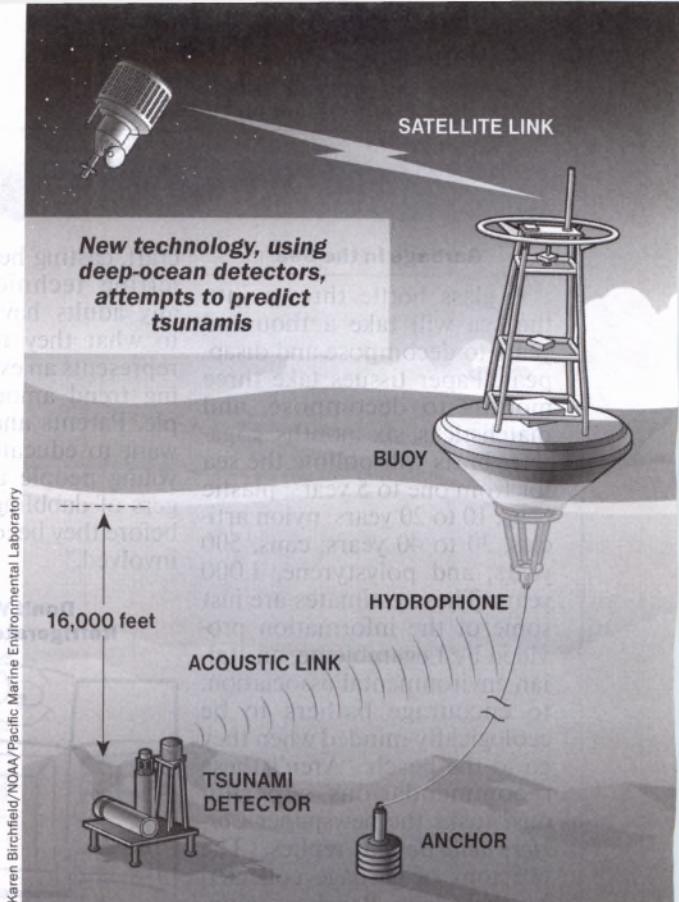
"Since 1990," says *Scientific American*, "10 tsunamis have taken more than 4,000 lives. In all, 82 were reported worldwide—a rate much higher than the historical average of 57 a decade." However, this reported increase, the magazine adds, is largely attributed to improved communications, while the high death tolls are due in part to increases in coastal populations.

The Pacific Ocean is especially noted for tsunamis because its basin is seismically the most active. In fact, "hardly a year goes by without at least one destructive tsunami striking somewhere in the Pacific," says one reference, which also states that "over the past fifty years, 62 percent of all earthquake-related deaths in the United States have been caused by tsunamis."

### Can They Be Predicted?

Between 1948 and 1998, about 75 percent of tsunami warnings given in Hawaii were false alarms. Understandably, such a record invites complacency. However, a much better system of detection, incorporating modern technology, is now being deployed. At the heart of the improved detection system is a bottom pressure recorder (BPR), which, as its name suggests, is placed thousands of feet down, at the bottom of the ocean.

This highly sensitive instrument is able to register the difference in water pressure as a tsunami travels overhead—even one no higher than a single centimeter. Using sound waves, the BPR transmits data to a special buoy, which then forwards it to a satellite. In turn, the satellite relays the signal to the



tsunami-warning center. Scientists are confident that this more precise early-warning system will curb the number of false alarms.

Perhaps the most important factors in promoting safety are public awareness and education. Even the best warning system is useless if people ignore it. So if you live in a tsunami-prone, low-lying coastal region and local authorities announce a tsunami warning or you sense an earthquake or you see an unusual out-going tide, be sure to seek high ground immediately. Remember, in the open sea, tsunamis can travel at the speed of a jet plane and may barrel in at highway speed near shore. So once you see the wave, chances are you will not be able to outrun it. However, if you meet up with a tsunami when you are out at sea enjoying a cruise or fishing, you can relax—your cup of coffee or glass of wine resting on the table will likely remain undisturbed.

## WATCHING THE WORLD

### Garbage in the Sea

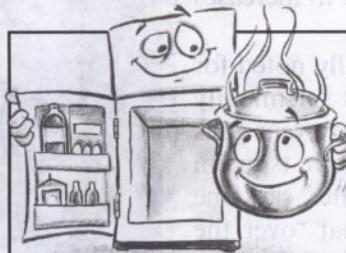
A glass bottle thrown into the sea will take a thousand years to decompose and disappear. Paper tissues take three months to decompose, and matchsticks, six months. Cigarette butts will pollute the sea for from one to 5 years; plastic bags, 10 to 20 years; nylon articles, 30 to 40 years; cans, 500 years; and polystyrene, 1,000 years. These estimates are just some of the information provided by Legambiente, an Italian environmental association, to encourage bathers to be ecologically-minded when they go to the beach. "Aren't these recommendations superfluous?" asks the newspaper *Corriere della Sera*. It replies: "The 605 tons of garbage collected by the Clean Beaches volunteers along Italian coasts from 1990 until today say no."

### Children and the Occult

"Children are at risk from Satanic and occult material posted on the internet," states a teacher's union, according to *The Independent* newspaper of London. A British survey for the Association of Teachers and Lecturers (ATL) revealed that over half the children between 11 and 16 years of age "were interested in the occult and the supernatural," nearly one quarter were "very interested," and 1 in 6 claimed to have been "spooked" when looking into the occult. Peter Smith, general secretary of the ATL, warns: "Youngsters can easily visit a choice of hundreds of websites on witch-

craft, casting hexes and bloodletting techniques, without any adults having control as to what they read. . . . This represents an extremely worrying trend among young people. Parents and teachers will want to educate children and young people about the dangers of dabbling in the occult before they become too deeply involved."

### Don't Wait to Refrigerate Hot Food



It's a mistake to leave hot foods out on the counter to cool before refrigerating them, says Bessie Berry, manager of the U.S. Department of Agriculture Meat and Poultry Hotline. "Even foods right out of the oven or off the range" should be refrigerated immediately if they will not be eaten. As explained in *Tufts University Health & Nutrition Letter*, "the sooner you get cooked foods into the cold fridge, the sooner any harmful bacteria they may harbor will stop multiplying." But won't this harm the refrigerator or overtax the motor? Ms. Berry says no. Modern refrigerators are designed to handle hot foods. The idea that they can't may be a carry-over from the days of iceboxes, when heat would cause the

ice to melt. However, two precautions need to be taken: If you are refrigerating a large item—such as a whole chicken, a pot of soup, or a deep-dish casserole—it should be divided into shallower containers first, or it won't cool down quickly enough inside to stop the growth of bacteria. And space should be allowed between hot foods and other foods in the refrigerator so that the air can circulate and cool the item quickly.

### Emotional Computer Voices

In an effort to make computer voices sound friendlier, scientists have been seeking ways to add emotions to the voices. According to the German newspaper *Gießener Allgemeine*, a research team at the Technical University of Berlin analyzed how voices change with different emotions. Playactors read sentences of neutral content in different moods—angry, sad, bored, joyful, fearful, or disgusted. The sentences were then analyzed—syllable by syllable—for pitch, speed, basic frequency, volume, and clarity of articulation. The results showed that a joyful mood or an angry mood increased the pace and volume. Syllables were stressed, and articulation remained good. With boredom, fear, or sadness, speech was slower and slurred and the pitch changed. Fear caused the voice to increase by about one octave. With grief, the vocal cords vibrated softly and the voice became hoarse and lower in pitch. The charac-

teristics were applied to artificial voices so that they could be checked to see if listeners could "recognize the correct emotional state." Interest in the venture has particularly been shown by those who deal with speech synthesis and automatic speech recognition.

#### 500 Years of Devastation

Brazil has lost 37 percent of three of its principal ecosystems since colonization began approximately 500 years ago. So reveals a recent World Wide Fund for Nature (WWF) survey. To date, "93 percent of the Atlantic forest, 50 percent of the savanna and 15 percent of the Amazon region have been destroyed," notes the newspaper *O Estado de S. Paulo*. Says Garo Batmianian, executive director of WWF Brazil: "When the Portuguese arrived here, they found lush forest and more water than they had ever seen before. That gave rise to the myth that everything planted here flourishes and that there is no need to adapt European technology to the local reality." This, he said, sparked the devastation of Brazil's Atlantic forest.

#### Clean Transport for the Future

"Fuel-cell technology that promises to revolutionise the global car business is now coming to market," reports the newspaper *The Australian*. Fuel-cell technology is particularly suitable for city buses because it offers much lower noise levels and has no polluting emissions. The buses will have a range of 200 miles, a top speed of 50 miles per

hour, and the capacity to carry 70 passengers. The buses will be offered to transport companies throughout Europe at a starting price of over \$1 million each, and they are expected to be in service by the end of 2002. Fuel cells may also be the way of the future for cars, but at present they have not reached the production stage. "We have to reduce the cost, volume and weight of the fuel-cell systems in order to become competitive with internal combustion engines," says Professor Ferdinand Panik.

#### "Vanity Stamps"



"Vanity stamps, the latest product for an ego-centered age, made their debut in Canada," reports *The New York Times*. Individuals can now personalize their postage "with a photo of the new baby, the new graduate, the happy couple or the loyal dog." Applicants mail in a form along with a photo and payment. In return they receive a sheet of 25 self-sticking, printed gilt frames marked with the word "Canada" and the postage and a second sheet with reproductions of the photo, which can be placed within the gilt frames. The cost, however, is more than double the cost of regular stamps. In addition, greeting stickers are being offered that "will allow customers

to customize their correspondence according to mood or message," said Micheline Montrœuil, director of stamp products for Canada Post. Not to be outdone, Australia, Britain, Singapore, and Switzerland have also come up with their version of vanity stamps. The endless variations can pose a challenge for stamp collectors.

#### Diseases Versus Disasters

Although disasters, such as floods and earthquakes, get the greatest publicity, infectious diseases claim far more lives, says a Red Cross report. Commenting on it, *The New York Times* states: "The death toll last year from infectious diseases like AIDS, tuberculosis and malaria is 160 times greater than the number of people killed in last year's earthquakes in Turkey, cyclones in India and floods in Venezuela . . . An estimated 150 million people have died from those three diseases alone since 1945 compared with 23 million in wars during the same period." According to Peter Walker, author of the report, poor public health is at the root of the problem. "In almost every country, there is a facade of a health system, but away from the city centers, there is nothing," he said. The 13 million deaths last year from infectious diseases could have been prevented by an outlay of just five dollars per person in health care. The article concludes: "Money spent on changing people's behavior saves more lives than money for expensive facilities like hospitals and high-tech equipment."

## FROM OUR READERS

**Chronic Illness** We have three children—one suffers from Down's syndrome and another from sickle-cell anemia. Recently, the child with sickle cell had a severe crisis and had to be hospitalized, which was very hard on all of us. I felt that Jehovah answered my prayers when I received a copy of the May 22, 2000, *Awake!* with the series "Chronic Illness—Coping as a Family." These articles gave my wife and me the courage to keep going. They also strengthened our hope that soon no one will say: "I am sick."—Isaiah 33:24.

E.J.M., Brazil

We have a 19-year-old son who suffers from schizophrenia. We have seen many books that deal with illness but have never read anything that dealt with illness from the family's standpoint, as did these articles. They well described my own inner struggle and suffering, as if my heartfelt cries had been put in writing.

H. T., Japan

For the past ten years, I have suffered from a progressive chronic illness, and the way you described what a person feels really touched me. At times it is very easy to lose one's mental and spiritual balance, but the brothers in my congregation have shown that they want to understand what I am suffering. With discreet words, they give me the strength to continue living.

M. M., Italy

We read the articles as a family. My daughter developed renal failure and has been on kidney dialysis for five years. This has been extremely difficult for us to cope with. She has had so many near-death crises that we continually live on a knife-edge, wondering when the next problem will occur. But your advice was very good. Each day has to be appreciated. Prayer is also essential. Know-

ing that Jehovah understands my feelings helps me.

S. J., United States

My heart swelled as I realized that someone understands the pain of being chronically ill! One by one, I have watched all three of my girls begin to suffer from epilepsy, as I do. Articles like this help us to gain understanding and to display the mind of Christ.

G. L., United States

**Anacondas** I live in a region where there are anacondas. People often tell stories about these snakes, but it is hard to know whether to believe them or not. Your article "Anacondas—Are They Shedding Some Secrets?" (May 22, 2000) helped me to separate fact from fiction, and it answered all my questions about this marvel of creation.

J.S.P., Brazil

**Runaway Dads** I have been reading *Awake!* for 25 years, and I believe this subject has never been dealt with. ("Young People Ask . . . Runaway Dads—Can They Really Run Away?" May 22, 2000) Single mothers, yes, but not the responsibility of the young man. I could not understand why if two people commit fornication, only the mother and child pay the consequences. I got pregnant when I was 19. The boy didn't want to have anything to do with me. Please continue telling young ones to "flee from fornication."—1 Corinthians 6:18.

C. C., Spain

**Greek Theater** I can't tell you how much I appreciated the article "The Theater of Epidaurus—Intact Throughout the Centuries." (June 8, 2000) I anticipated that the article would be thought provoking, which it truly was. However, I did not expect it to contain so many spiritual tidbits!

K. S., United States

# The Enigma of Britain's House Sparrows

BY AWAKE! WRITER IN BRITAIN

THE ubiquitous house sparrow, with its familiar chirpings and twitterings, has long been part of the British scene. But it is now disappearing—often suddenly—from urban areas, and nobody knows why. The *Independent* newspaper of London has offered a £5,000 (\$7,200) prize for the first scientific paper from anyone who can solve the mystery. The Royal Society for the Protection of Birds and the British Trust for Ornithology will act as judges. The project is expected to take at least two years to complete.

Surveys reveal that towns and cities across the country have suffered a catastrophic fall in the number of house sparrows. In some areas they have disappeared completely. Yet, sparrows are still plentiful in other European cities, such as Paris and Madrid. Dr. Denis Summers-Smith, world expert on the house sparrow, says: 'It's one of the most remarkable wildlife mysteries of the last 50 years.'

The 65-percent drop in sparrow populations in rural areas is understood to be largely on account of intensive farming. Other bird species have suffered similar serious declines in the rurals. But this does not explain the 92-percent loss of the sparrow in urban areas. Environmentalist Michael McCarthy concludes that the house sparrow's dramatic disappearance "is a sure indication that something has gone seriously wrong in the sparrow's ecosystem—and maybe in ours too." It remains to be seen just what has gone wrong and how serious it is.





# "Engenders Confidence and Strengthens Faith"

AN INTERNATIONAL BIBLE STUDY PROGRAM sponsored by Jehovah's Witnesses recently included a several-month-long study of ancient history and prophecy as recorded in the Bible book of Daniel. Note the appreciation expressed in the following letter from Poland.

"For a long time, we desired to acquire accurate understanding of the Bible prophecy of Daniel. Now, that desire has been satisfied. The Bible study aid used, *Pay Attention to Daniel's Prophecy!*, is characterized by simple argumentation, clarity of language, and striking illustrations. All of these speak to the mind and the heart. This has added to our confidence that God's purpose will be fulfilled in his due time. This excellent study aid engenders confidence and strengthens faith."



Pay Attention to  
**DANIEL'S**  
PROPHECY!



Persian frieze: From the book *The Coloured Ornament of All Historical Styles*; Alexander the Great: Roma, Musei Capitolini; cylinder: Photograph taken by courtesy of the British Museum