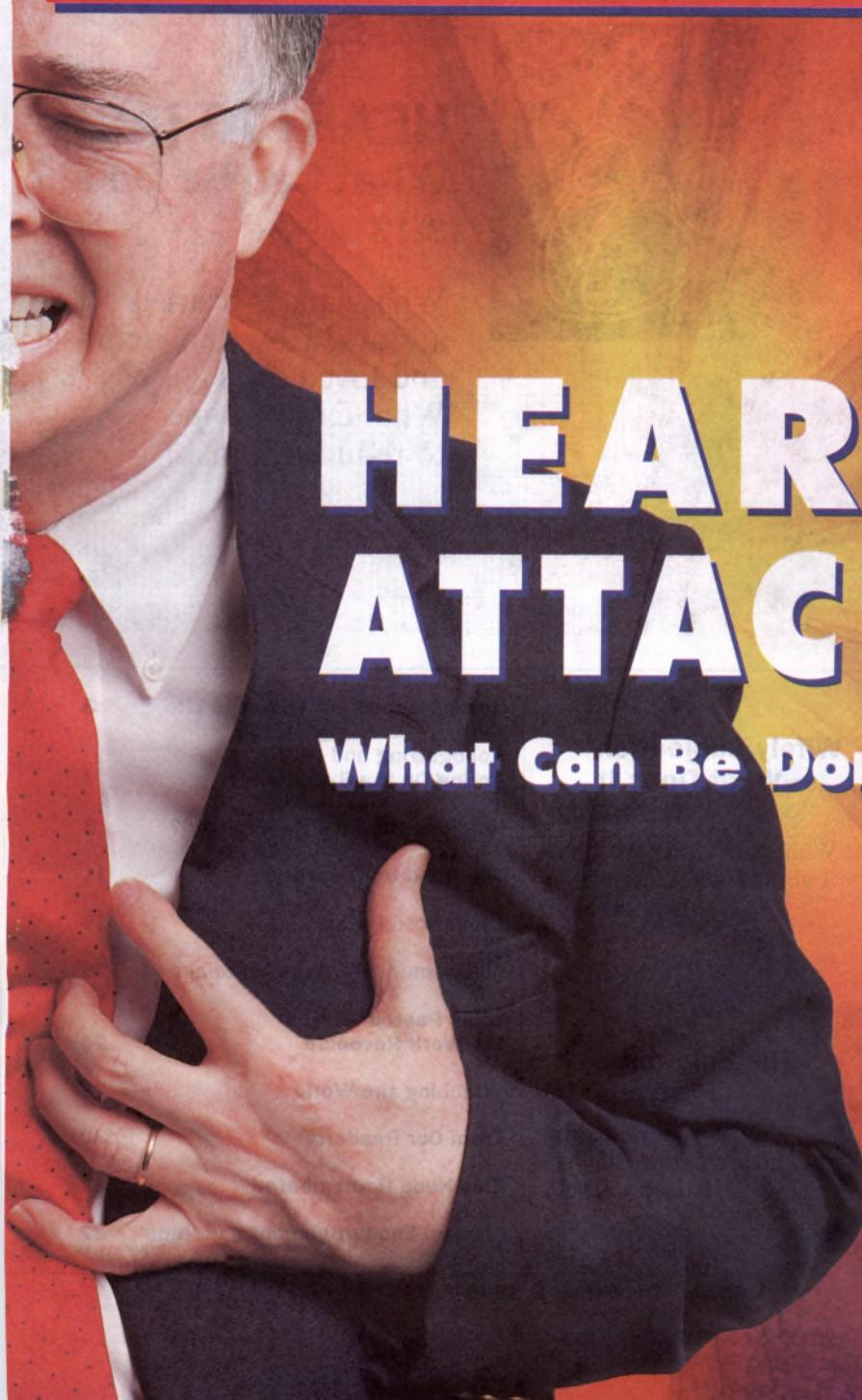


# **Awake!**

December 8, 1996

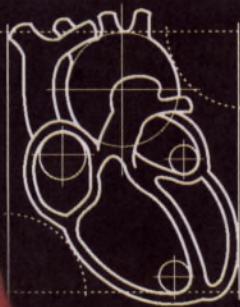
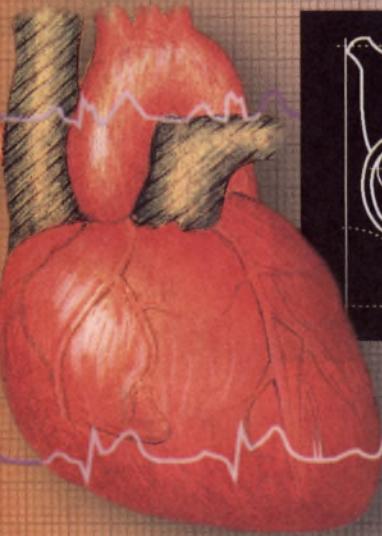
## **HEART ATTACK**

**What Can Be Done?**



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## **HEART ATTACK What Can Be Done?**

**3-13**

What causes heart attacks? How can victims and loved ones cope? What can be done to reduce the risk?



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What does God's Word say about a wife's subjection to her husband?



Courtesy of Healesville Sanctuary

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Just what is this shy little creature that has baffled science?

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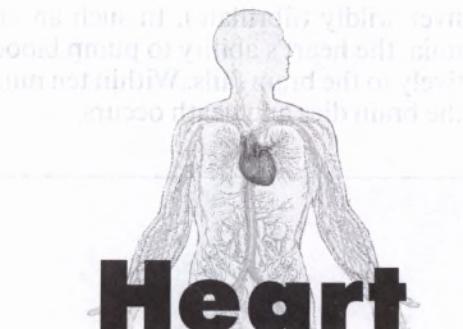


**E**ACH year millions of men and women worldwide have heart attacks. Many survive with few aftereffects. Others do not survive. For still others the heart is so damaged that "a return to useful activities is questionable," cardiologist Peter Cohn says, adding: "It is imperative, therefore, to nip heart attacks in the bud whenever possible."

The heart is a muscle that pumps blood throughout the body. In a heart attack (myocardial infarction), part of the heart muscle dies when deprived of blood. To stay healthy, the heart needs oxygen and other nutrients that are carried by the blood. It gets these by way of the coronary arteries, which wrap around the outside of the heart.

Diseases can affect any part of the heart.

...as deined a coronary artery, a group of blood vessels that supply the heart muscle with fuel. When a blood clot forms in one of these vessels, it may cut off the flow of oxygen to the heart muscle, causing a heart attack.



## Heart Disease A Threat to Life

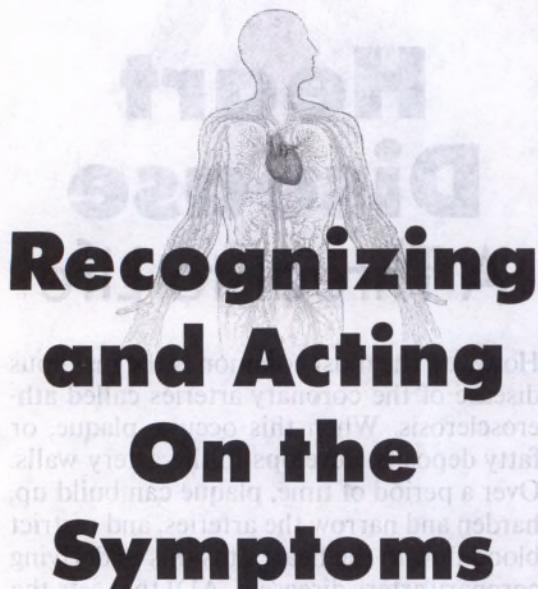
However, the most common is the insidious disease of the coronary arteries called atherosclerosis. When this occurs, plaque, or fatty deposits, develops in the artery walls. Over a period of time, plaque can build up, harden and narrow the arteries, and restrict blood flow to the heart. It is this underlying coronary artery disease (CAD) that sets the stage for most heart attacks.

Clogging in one or more arteries precipitates an attack when the heart's demand for oxygen exceeds the supply. Even in arteries less severely narrowed, a deposit of plaque can crack and lead to the formation of a blood clot (thrombus). Diseased arteries are also more susceptible to spasm. A blood clot can form at the site of a spasm, releasing a chemical that further constricts the artery wall, triggering an attack.

When heart muscle is deprived of oxygen long enough, nearby tissue may be damaged. Unlike some tissue, heart muscle does not regenerate. The longer the attack, the more damage to the heart and the greater the likelihood of death. If the heart's electrical system is damaged, the heart's normal rhythm can become chaotic and the heart can begin

to quiver wildly (fibrillate). In such an arrhythmia, the heart's ability to pump blood effectively to the brain fails. Within ten minutes the brain dies and death occurs.

Thus, early intervention by trained medical personnel is vital. It can rescue the heart from ongoing damage, prevent or treat the arrhythmia, and even save a person's life.



# Recognizing and Acting On the Symptoms

**W**HEN symptoms of heart attack occur, it is vital to seek medical help immediately, as the risk of death is greatest within the first hour after an attack. Quick treatment can save heart muscle from irreparable damage. The more heart muscle that is spared, the more effectively the heart will pump after the attack.

**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.

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## What Happened

John explains: "A year and a half before my heart attack, I was warned by a doc-

\* Names in these articles have been changed.

**Awake!**®

tor about my high cholesterol, a major risk factor in CAD. But I evaded the issue, as I felt that I was young—under 40—and in good health. I greatly regret that I did not take action then. I had other warning signals—shortness of breath with physical exertion, pains I thought were indigestion and, for several months before the attack, extreme fatigue. Most of these I blamed on too little sleep and too much job stress. Three days before my heart attack, I had what I thought was a muscle spasm in my chest. It was a minor attack prior to the big one three days later."

Chest pain or pressure, called angina, gives warning to about half of those who suffer a heart attack. Some experience shortness of breath or fatigue and weakness as symptoms, indicating that the heart is not getting enough oxygen because of a coronary blockage. These warning signals should send one to a doctor for a heart evaluation. Dr. Peter Cohn states: "Once angina is treated, there is no guarantee that a heart attack will be prevented, but at least the chances of an imminent attack are reduced."

### The Attack

John continues: "That day we were going to play softball. As I gobbled a hamburger and fried potatoes for lunch, I shrugged off some discomfort, nausea, and upper-body tightness. But when we got to the ballpark and began playing, I could tell something wasn't right. In the course of the afternoon, I felt progressively worse.

"Several times, I lay on the players' benches, face up, and tried to stretch my chest muscles, but they kept getting tighter and tighter. While playing, I said to myself, 'Maybe I've got the flu,' as I felt clammy and weak at times. When I ran, I was noticeably out of breath. I lay down on a bench again. When I sat up, there was no doubt that I was in serious trouble. I yelled to my son James: 'I need to go to the hospital NOW!' My chest felt as though it had caved in. The pain was so great that I couldn't get up. I thought, 'This can't be a heart attack, can it? I'm only 38!'"

John's son, who was 15 years old at the time, relates: "It took only minutes for my

### **Quick treatment after a heart attack may save a life and reduce heart damage**



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dad to lose his strength, so that he had to be carried to the car. My friend drove the car while asking Dad questions to keep up with his condition. Finally, Dad didn't answer. 'John!' my friend shouted. But my father still didn't respond. Then Dad jerked in his seat, going into convulsions and vomiting. I shouted over and over: 'Dad! I love you! Please don't die!' After his seizure, his whole body fell limp in the seat. I thought he had died."

### At the Hospital

"We ran into the hospital to get help. Two or three minutes had passed since I thought Dad had died, but I hoped he could be revived. To my surprise, about 20 fellow Witnesses of Jehovah who had been at the ballpark were in the waiting room. They made me feel comforted and loved, which was a great help at such a miserable time. About

15 minutes later, a doctor came and explained: 'We were able to revive your dad, but he has had a massive heart attack. We aren't sure he'll live.'

"He then allowed me to see Dad briefly. Dad's expressions of love for our family overwhelmed me. In great pain, he said: 'Son, I love you. Always remember that Jehovah is the most important person in our lives. Never stop serving him, and help your mother and brothers never to stop serving him. We have a solid hope in the resurrection, and if I die, I want to see all of you when I come back.' We were both crying tears of love, fear, and hope."

John's wife, Mary, arrived an hour later. "When I walked into the emergency room, the doctor said: 'Your husband has had a massive heart attack.' I was stunned. He explained that John's heart had been defibrillated eight times. This emergency measure involves the use of electrical voltage to stop the heart's chaotic beat and restore normal rhythm. Together with CPR, oxygen delivery, and intravenous drugs, defibrillation is an advanced lifesaving method.

"When I saw John, my heart ached. He was very pale, and there were many tubes and wires connecting his body to monitors. Silently, I prayed to Jehovah to give me the strength to endure this trial for the sake of our three sons, and I prayed for guidance to make wise decisions about what might lie ahead. As I approached John's bed, I thought, 'What do you say to your loved one at a time like this? Are we really prepared for such a life-threatening situation?'

"'Honey,' John said, 'you know I may not make it through this. But it's important that you and the boys remain faithful to Jehovah because soon this system will end and there will be no more sickness and death. I want to wake up in that new system and see you and our boys there.' Tears streamed down our faces."

### Symptoms of a Heart Attack

- An uncomfortable feeling of pressure, squeezing, or pain in the chest that lasts more than a few minutes. Could be mistaken for severe heartburn
- Pain that may spread to—or be present in only—the jaw, the neck, the shoulders, the arms, the elbows, or the left hand
- Prolonged pain in the upper abdomen
- Shortness of breath, dizziness, fainting, sweating, or feeling clammy to the touch
- Exhaustion—may be experienced weeks before the attack
- Nausea or vomiting
- Frequent angina attacks not caused by exertion

Symptoms may vary from mild to strong and do not all occur in every heart attack. But if any combination of these takes place, get help fast. However, in some cases there are no symptoms; these are referred to as silent heart attacks.

## Actions for Survival

### If you or someone you know shows symptoms of heart attack:

- Recognize the symptoms.
- Stop whatever you are doing and sit down or lie down.
- If symptoms last more than a few minutes, call a local emergency telephone number. Tell the dispatcher that you suspect heart attack, and give him the information needed to locate you.
- If you can get the victim to a hospital emergency room more quickly by driving there yourself, do so. If you think you are having a heart attack, ask someone to drive you there.

### If you wait for an emergency medical crew:

- Loosen tight clothing, including a belt or a necktie. Help the victim to get comfortable, propping him with pillows if necessary.
- Stay calm, whether you are the victim or the helper. Excitement may increase the likelihood of life-threatening arrhythmia. Prayer can be a strengthening aid in remaining calm.

### If the victim seems to stop breathing:

- In a loud voice ask, "Can you hear me?" If there is no response, if there is no pulse, and if the victim is not breathing, begin cardiopulmonary resuscitation (CPR).
- Remember the three basic steps of CPR:
  1. Lift the victim's chin up, in order to open the airway.
  2. With airway open, while pinching the victim's nostrils closed, blow slowly twice into the mouth until the chest rises.
  3. Press 10 to 15 times on the middle of the chest between the nipples to push blood out of the heart and the chest. Every 15 seconds, cycle two breaths followed by 15 compressions until pulse and breathing are regained or the emergency team arrives.

CPR should be performed by someone trained to do it. But when no one trained is available, "any CPR is better than none," says Dr. R. Cummins, a director of emergency cardiac care. Unless someone initiates these steps, chances of survival are very poor. CPR buys time until help arrives.

## The Doctor Explains

"The doctor later called me aside and explained that investigation showed that John's heart attack was due to a 100-percent blockage in the left anterior descending artery. He also had blockage in another artery. The doctor told me that I must make a decision regarding John's treatment. Two of the available options were drugs and angioplasty. He thought the latter would be better, so we opted for the angioplasty. But the doctors made no promises, as most do not survive this kind of a heart attack."

Angioplasty is a surgical technique in which a balloon-tipped catheter is inserted into a coronary artery and then inflated to open the blockage. The procedure has a

high rate of success in restoring blood flow. When several arteries are seriously blocked, bypass surgery is usually recommended.

## Grim Prognosis

After the angioplasty, John's life continued to hang in the balance for another 72 hours. Finally, his heart began to recover from the trauma. But John's heart was pumping at only half of its former capacity, and a large portion of it had become scar tissue, so the prospect of his being a cardiac cripple was almost inevitable.

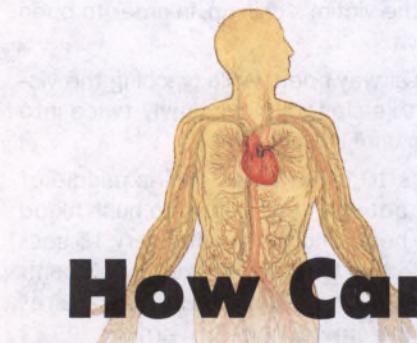
In retrospect, John admonishes: "We owe it to our Creator, our families, our spiritual brothers and sisters, and ourselves to heed the warnings and to take care of our health

—especially if we are at risk. To a considerable extent, we can be the cause of happiness or grief. It's up to us."

John's case was severe and required immediate attention. But not all with heartburn-type discomfort need to run to a doctor.

Still, his experience is a warning, and those who feel that they have symptoms should have a checkup.

What can be done to reduce the risk of heart attack? The next article will discuss this.



## How Can the Risk Be Reduced?

**C**ORONARY artery disease (CAD) is associated with a number of genetic, environmental, and life-style factors. CAD and a heart attack can result from years, if not decades, of risks associated with one or more of these factors.

### Age, Gender, and Heredity

With increased age comes an increased risk of heart attack. About 55 percent of heart attacks occur in people over 65. Some 80 percent of those who die of heart attacks are 65 or older.

Men under 50 are more at risk than women of the same age group. After menopause, a woman's risk increases because of the sharp decrease in the protective hormone estrogen. According to some estimates, estrogen replacement therapy may reduce the

risk of heart disease in women by 40 percent or more, although there may be an increased risk of some cancers.

Inheritance can play a key role. Those whose parents had an attack before the age of 50 have an increased risk of an attack. Even if parents had an attack after age 50, there is an increased risk. When there is a history of heart trouble in the family, the offspring are more likely to develop similar problems.

### The Cholesterol Factor

Cholesterol, a type of lipid, is essential for life. The liver produces it, and the blood carries it to the cells, in molecules called lipoproteins. Two types are low-density lipoproteins (LDL cholesterol) and high-density lipoproteins (HDL cholesterol). Cholesterol becomes a risk factor for CAD when too much LDL cholesterol is concentrated in the blood.

HDL is thought to play a protective role by removing cholesterol from tissues and carrying it back to the liver, where it is altered and eliminated from the body. If LDL tests high and HDL low, the risk of heart disease is high. Lowering the LDL level can result in a significant drop in risk. Dietary measures are a keystone in treatment, and exercise can be helpful. Various drugs can bring results, but some have unpleasant side effects.\*

\* *Awake!* does not endorse medical, exercise, or dietary treatments but presents well-researched information. Each person must decide what he himself will do.

A diet low in cholesterol and saturated fats is recommended. Replacing foods high in saturated fats, such as butter, with foods that are lower, such as canola oil or olive oil, can lower LDL and conserve HDL. On the other hand, the *American Journal of Public Health* notes that hydrogenated or partially hydrogenated vegetable oils found in most margarine and vegetable-shortening products can raise LDL and lower HDL. Cutting down on high-fat meats and substituting low-fat cuts of chicken or turkey is also recommended.

Studies have shown that vitamin E, beta-carotene, and vitamin C can slow down atherosclerosis in animals. A study concluded that these may also reduce the incidence of heart attack in humans. Daily consumption of vegetables and fruits rich in beta-carotene and other carotenoids and vitamin C, such as tomatoes, dark leafy greens, peppers, carrots, sweet potatoes, and melons, may provide some protection from CAD.

Also said to be useful are vitamin B<sub>6</sub> and magnesium. Whole grains like barley and oats as well as beans, lentils, and some seeds and nuts can be helpful. Additionally, it

is thought that eating fish such as salmon, mackerel, herring, or tuna at least twice a week may reduce the risk of CAD, as these are rich in omega-3 polyunsaturated fatty acids.

### Sedentary Life-Style

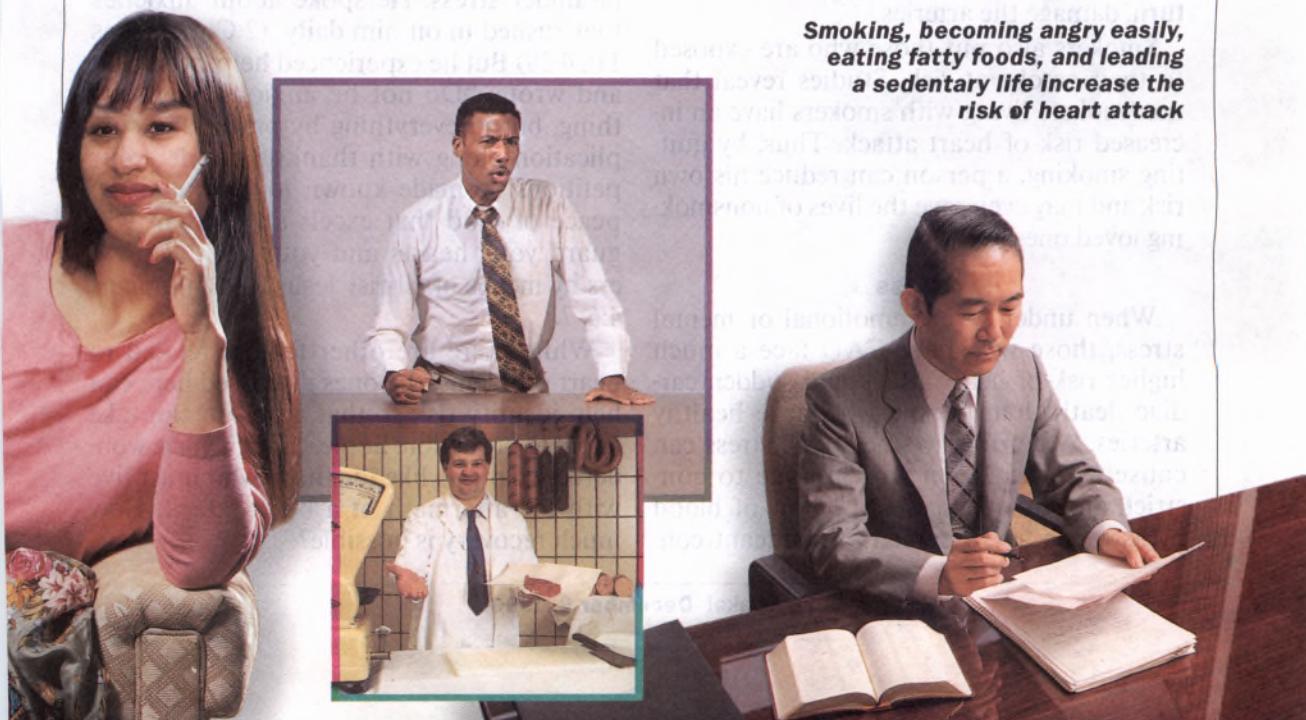
Sedentary people have a higher risk of heart attack. They spend most of the day physically inactive and do not exercise regularly. Heart attacks often occur in these people after strenuous activities, such as heavy gardening, jogging, picking up heavy weights, or shoveling snow. But the risk decreases among those who exercise regularly.

A brisk 20- to 30-minute walk three or four times a week may lower the risk of an attack. Regular exercise improves the heart's ability to pump, helps weight loss, and may decrease cholesterol levels and lower blood pressure.

### Hypertension, Excess Weight, and Diabetes

High blood pressure (hypertension) can injure artery walls and enable LDL cholesterol to enter the artery lining and promote the buildup of plaque. As plaque deposits

**Smoking, becoming angry easily, eating fatty foods, and leading a sedentary life increase the risk of heart attack**



increase, there is more resistance to blood flow and thus an elevation in blood pressure.

Blood pressure should be checked regularly, as there may not be any outward sign of a problem. For every one-point reduction in diastolic pressure (the bottom number), the risk of heart attack may be reduced by 2 to 3 percent. Medication to lower blood pressure may be effective. Dieting, and in some cases restricting salt intake, together with regular exercise for weight reduction can help control high blood pressure.

Excess weight promotes high blood pressure and lipid abnormalities. Avoiding or treating obesity is a primary way to prevent diabetes. Diabetes accelerates CAD and increases the risk of heart attack.

### **Smoking**

Cigarette smoking is a strong factor in the development of CAD. In the United States, it is directly responsible for about 20 percent of all heart-disease deaths and nearly 50 percent of the heart attacks in women under 55 years of age. Cigarette smoking increases blood pressure and introduces toxic chemicals, such as nicotine and carbon monoxide, into the blood stream. These chemicals, in turn, damage the arteries.

Smokers also put those who are exposed to their smoke at risk. Studies reveal that nonsmokers living with smokers have an increased risk of heart attack. Thus, by quitting smoking, a person can reduce his own risk and may even save the lives of nonsmoking loved ones.

### **Stress**

When under severe emotional or mental stress, those who have CAD face a much higher risk of heart attack and sudden cardiac death than people who have healthy arteries. According to one study, stress can cause arteries laden with plaque to constrict, and this decreases the flow of blood by as much as 27 percent. Significant con-

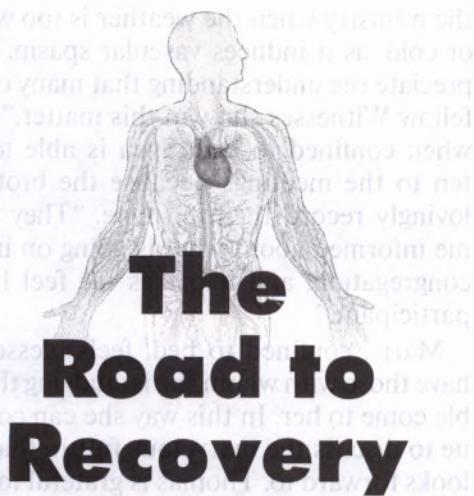
striction was seen even in mildly diseased arteries. Another study suggested that severe stress can create the environment for plaque in the artery walls to rupture, triggering a heart attack.

*Consumer Reports on Health* states: "Some people seem to go through life with a bad attitude. They're cynical, angry, and easily provoked. Whereas most people let minor aggravations slide, hostile people shift into emotional overdrive." Chronic anger and hostility raise blood pressure, increase the heart rate, and stimulate the liver to dump cholesterol into the bloodstream. This damages coronary arteries and contributes to CAD. Anger is thought to double heart-attack risk, and this remains an immediate danger for at least two hours. What can help?

According to *The New York Times*, Dr. Murray Mittleman said that people who tried to remain calm in emotional conflicts might be able to reduce their risk of heart attack. This sounds much like the words recorded in the Bible centuries ago: "A calm heart is the life of the fleshly organism."—Proverbs 14:30.

The apostle Paul knew what it was like to be under stress. He spoke about anxieties that rushed in on him daily. (2 Corinthians 11:24-28) But he experienced help from God and wrote: "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 God that excels all thought will guard your hearts and your mental powers by means of Christ Jesus."—Philippians 4:6, 7.

While there are other factors related to heart problems, the ones discussed here can help identify risk so that a person can take appropriate action. Some, though, have wondered what it is like for those who must live with the aftermath of a heart attack. How much recovery is possible?



# The Road to Recovery

**I**N THE wake of a heart attack, it is normal for a person to experience fear and concern. Will I have another attack? Will I be disabled or limited by pain and loss of strength and vitality?

John, mentioned in our second article, hoped that as time passed, the daily discomfort and chest pain would subside. But after a few months, he said: "So far they have not. That, along with tiring quickly and the fluttering of my heart, makes me constantly ask myself, 'Am I on the verge of another attack?'"

Jane, from the United States, a young widow at the time of her heart attack, admitted: "I thought that I was not going to live or that I'd have another attack and die. Panic set in, as I had three children to care for."

Hiroshi, of Japan, related: "It came as a shock to be told that my heart could no longer function as it had before; my pumping rate had dropped 50 percent. I was almost sure that I would have to curtail some of my activities as a minister of Jehovah's Witnesses, for I could do less than half of what I had been doing."

When one is faced with limited strength, bouts of depression and feelings of useless-

ness may set in. Marie, an 83-year-old Australian who devoted herself full-time to the preaching work of Jehovah's Witnesses, lamented: "My inability to be as active as before saddened me. Instead of helping others, now I needed help." In South Africa, Harold commented: "I was unable to work for three months. The most I could do then was just walk around the garden. That was frustrating!"

Bypass surgery was necessary after Thomas, of Australia, had his second heart attack. He said: "I do not tolerate pain well, and to have major surgery was almost too much to contemplate." Jorge, of Brazil, commented on the aftermath of heart surgery: "Because of my poor financial situation, I feared that I would leave my wife alone and without assistance. I felt that I would not last much longer."

## Recovery

What has helped many to recover and to get their emotions back on an even keel? Jane observed: "When I felt panicky, I would always go to Jehovah in prayer and throw my burdens upon him and leave them there." (Psalm 55:22) Prayer helps a person to gain the strength and the peace of mind that are essential when he is faced with anxieties.

—Philippians 4:6, 7.

John and Hiroshi took part in rehabilitation programs. Good diet and exercise strengthened their hearts, so that both resumed working. And they attributed their mental and emotional recovery to the sustaining power of God's spirit.

Through support from his Christian brothers, Thomas found the courage to face his surgery. He stated: "Before the operation, an overseer came to visit me and he prayed with me. In a very passionate plea, he asked Jehovah to strengthen me. That night I concentrated on his prayer and felt very

blessed to have elders like him whose empathy during emotional periods is in itself part of the healing process."

Anna, from Italy, coped with depression in this way: "When I'm discouraged, I think of all the blessings I have already received as one of God's servants and of the blessings to come under God's Kingdom. This helps me regain serenity."

Marie is grateful for Jehovah's help. Her family has been by her side, and she says: "My spiritual brothers and sisters, each with his own load to carry, made the time to visit me, call me on the telephone, or send cards. How could I stay sad with all this love being shown?"

### No Lonely Hearts

It has been said that the healing heart should not be a lonely heart. The support of family and friends plays a large, positive role in the recovery of those whose hearts must literally and figuratively mend.

Michael, of South Africa, commented: "It's hard to explain to others what it is like to be despondent. But when I walk into the Kingdom Hall, the concern that the brothers show is very heartwarming and uplifting to me." Henry, of Australia, was also strengthened by the deep love and understanding that his congregation expressed. He said: "I really needed those tender words of encouragement."

Jorge appreciated the depth of concern others showed by assisting his family financially until he was able to work. Olga, of Sweden, likewise appreciated the practical help given to her and her family by many spiritual brothers and sisters. Some did her shopping, while others cleaned her house.

Often, heart patients have to limit their participation in activities that they have held dear. Sven, of Sweden, related: "Sometimes I have to abstain from taking part in

the ministry when the weather is too windy or cold, as it induces vascular spasm. I appreciate the understanding that many of my fellow Witnesses show in this matter." And when confined to bed, Sven is able to listen to the meetings because the brothers lovingly record them on tape. "They keep me informed about what is going on in the congregation, and it makes me feel like a participant."

Marie, confined to bed, feels blessed to have those with whom she is studying the Bible come to her. In this way she can continue to discuss the marvelous future that she looks forward to. Thomas is grateful for the concern he is shown: "The elders have been very considerate and have reduced the number of assignments they give me."

### Families Need Support

The road may be as difficult for family members as it is for the victim. They are subject to much stress and fear. Concerning his wife's anxiety, Alfred, of South Africa, observed: "When I came home from the hospital, my wife used to wake me up many times during the night to see if I was still all right, and she would insist that I visit the doctor every three months for a checkup."

Proverbs 12:25 states that 'anxious care in the heart will cause it to bow down.' Carlo, of Italy, notes that since his heart attack, his loving and supportive wife "has fallen into depression." Lawrence, from Australia, said: "One of the things to watch out for is that your partner is being cared for. The strain on the partner can be very great." Thus, we should keep in mind the needs of all in the family, including the children. The situation can take an emotional and physical toll on them.

James, mentioned in our second article, withdrew into a shell after his father's heart attack. He said: "I felt that I couldn't have

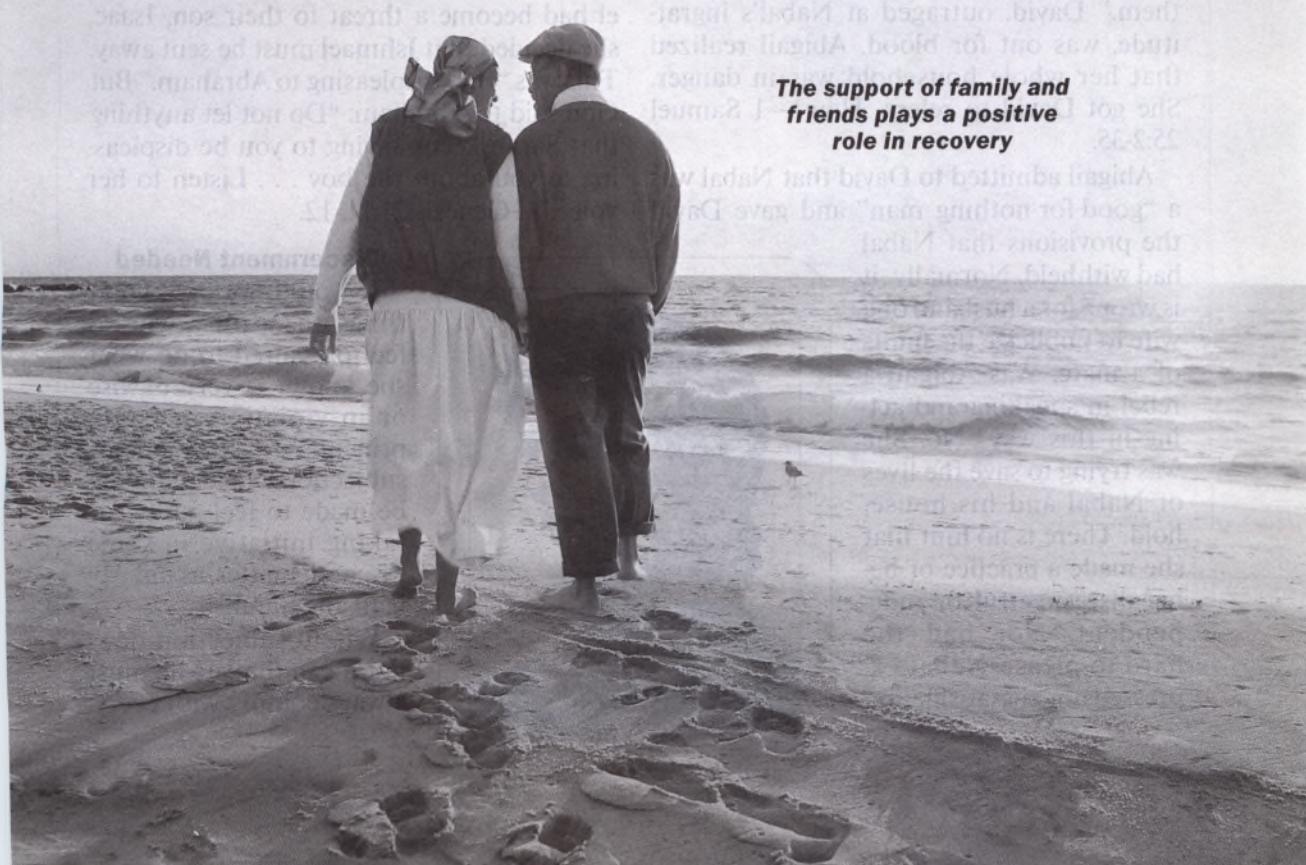
fun anymore because I thought that the minute I did, something bad would happen." Expressing his fear to his father and working at establishing good communication with others helped to relieve his worry. During that time James did something else that had a great effect on his life. He said: "I increased my personal study of the Bible and preparation for our Christian meetings." Three months later he dedicated his life to Jehovah and symbolized it by water baptism. "Since then," he says, "I have developed a very close relationship with Jehovah. I really have much to thank him for."

In the aftermath of a heart attack, one has time to reexamine life. For example, John's perspective changed. He said: "You see the vanity of worldly pursuits and realize how important love of family and friends is and how much we mean to Jehovah. My rela-

tionship with Jehovah, my family, and my spiritual brothers and sisters has an even higher priority now." Reflecting on the trauma of his experience, he added: "I can't imagine coping with this without our hope of a time when these things will be corrected. When things get me down, I think about the future, and what's happening right now seems less significant."

As they travel the ups and downs of the road to recovery, these heart-attack survivors have their hope firmly anchored in the Kingdom for which Jesus Christ taught us to pray. (Matthew 6:9, 10) The Kingdom of God will bring to humans everlasting life in perfection on a paradise earth. Then heart disease and all other disabilities will be eliminated forever. The new world is just ahead. Truly, the best of life is yet to come! —Job 33:25; Isaiah 35:5, 6; Revelation 21:3-5.

***The support of family and friends plays a positive role in recovery***



## Wifely Subjection What Does It Mean?

**G**OD'S WORD, the Bible, states at Ephesians 5:22: "Let wives be in subjection to their husbands as to the Lord." Exactly what does this mean? Must a wife submit to everything a husband wants, regardless? Can she never use her own initiative or have opinions differing from his?

Consider the Bible account of Abigail. She acted wisely but contrary to the wishes of her wealthy husband, Nabal. Despite kindness shown Nabal by the followers of David, who was God's choice to be king of Israel, Nabal had "screamed rebukes at them." David, outraged at Nabal's ingratitude, was out for blood. Abigail realized that her whole household was in danger. She got David to relent. How?—1 Samuel 25:2-35.

Abigail admitted to David that Nabal was a "good-for-nothing man" and gave David the provisions that Nabal had withheld. Normally, it is wrong for a husband or a wife to publicize the faults of a mate. Was Abigail a rebel in speaking and acting in this way? No. She was trying to save the lives of Nabal and his household. There is no hint that she made a practice of being disrespectful or independent. Nor had the hard-to-please Nabal expressed any dissatisfaction

with the way she helped manage his large estate. But in this crisis situation, wisdom dictated that she follow her own initiative. Moreover, the Bible speaks approvingly of what Abigail did.—1 Samuel 25:3, 25, 32, 33.

Long before Abigail's day, there were times when the wives of the patriarchs expressed viewpoints and took actions different from what their husbands wanted. Yet, these "holy women who were hoping in God" are held forth as models of subjection for a Christian wife. (1 Peter 3:1-6) For example, when Sarah sensed that Abraham's son Ishmael had become a threat to their son, Isaac, she decided that Ishmael must be sent away. This was "very displeasing to Abraham." But God said to Abraham: "Do not let anything that Sarah keeps saying to you be displeasing to you about the boy . . . Listen to her voice."—Genesis 21:11, 12.

### Discernment Needed

It would not be a good thing, then, for a wife to feel pressured to do what she knows is very unwise or in violation of godly principles, in the name of subjection. Nor should she be made to feel guilty for taking initiative in some essential matter, as did Abigail and Sarah.

Wifely subjection does not mean that a wife must always comply with every-



Leslie's

thing a husband wishes. What makes the difference? When right principles are at stake, she may have to disagree with her husband. Even so, she should still display the overall spirit of godly subjection.

Of course, a wife should be careful not to bypass her husband's wishes out of willfulness, spite, or other wrong motives. She must be discerning, "good in discretion," as was Abigail.—1 Samuel 25:3.

### **When the Husband Avoids Responsibility**

The primary goal and spirit of a wife's godly subjection is to please Jehovah by cooperating with her husband and supporting his decisions. This is fairly easy when a husband is spiritually mature. It can be a challenge if he is not.

In this case, how can she cope? She may appeal to him earnestly or suggest what decisions will benefit the family the most. If she lets him 'steer the ship,' he may become more skilled at it. Constantly nagging the husband violates the spirit of proper subjection. (Proverbs 21:19) Yet, if the family's welfare is clearly jeopardized by his policy, she may choose to recommend, as Sarah did, a corrected course.

If the husband is an unbeliever, the challenge to the wife is even greater. Still, she should be in subjection as long as he does not ask her to violate Bible laws. If he does that, the reaction of a Christian wife should be like that of the disciples when a court asked them to violate God's commands: "We must obey God as ruler rather than men."—Acts 5:29.

Because of lack of experience and limited wisdom, however, even well-meaning husbands and wives can overstep their roles. The husband may lack consideration; the wife may press too hard for her preferences. What will help? A modest view of self is important for both, since "we all stumble many times."—James 3:2.

Many men will come to appreciate a wife's honest initiative if she uses it judiciously. And cooperation is enhanced if both apologize when they make mistakes. As Jehovah forgives our everyday shortcomings, so we should forgive others. "If errors were what you watch, O Jah, O Jehovah, who could stand? For there is the true forgiveness with you."—Psalm 130:3, 4.

### **"Subjection to One Another"**

In our mutual best interests, then, the Scriptures advise: "Be in subjection to one another in fear of Christ." Accord each other loving mutual respect; neither hinder nor compete. The text continues: "Let wives be in subjection to their husbands as to the Lord, because a husband is head of his wife as the Christ also is head of the congregation."—Ephesians 5:21-23.

The Greek word used by Paul at Ephesians 5:21, 22 implies subjecting oneself, not being forced into subjection. And the subjection is for the Lord's sake, not just for the harmony of the marriage. Christ's anointed congregation subjects itself voluntarily, joyfully to Christ. When a wife does the same for her husband, then the marriage will very likely be happy and successful.

The Scriptures also state: "Let each [husband] so love his wife as he does himself," unstintingly. (Ephesians 5:33; 1 Peter 3:7) The husband should keep in mind that he too should be in subjection to his head, for the Bible states: "The head of every man is the Christ." Yes, the man should be subject to the teachings of Christ. Christ, in turn, is in subjection to his head: "The head of the Christ is God." Thus, everybody except Jehovah has a head. And even he binds himself to his own laws.—1 Corinthians 11:3; Titus 1:2; Hebrews 6:18.

Christian subjection is balanced and beneficial to both sexes. It brings to marriage the harmony and the contentment that only our loving Creator can provide.—Philippians 4:7.



# The Enigmatic PLATYPUS

BY AWAKE! CORRESPONDENT IN AUSTRALIA

**W**HEN scientists first saw the platypus, they did not know what to make of it. Here was a living paradox, a pound or two of contradictions that upended some of their scientific beliefs. We invite you to meet this unique little Australian—a charming, shy, and lovable creature. First, though, let us go back to the year 1799 and see the ruckus it caused when the very first platypus pelt fell under the gaze of British science.

"He literally could not believe [his eyes]," says an encyclopedia regarding Dr. Shaw, assistant keeper in the Natural History section of the British Museum. He suspected that "someone had grafted the bill of a duck on to the body of a [four-footed animal]. He tried to [take] off the bill, and today the marks of his scissors can still be seen on the original skin."

Even when the hide was found to be genuine, scientists were baffled. The platypus—whose name means "flat-footed"—has a reproductive system much like a bird's but also has mammary, or milk, glands. This seeming contradiction raised the question: Did this improbable creature lay eggs, or did it not?

After years of dispute, it was found that the platypus did indeed lay eggs. But each discovery, it seemed, just added to the puzzle. How do you classify a creature that (1) lays eggs but has mammary glands; (2) is furred yet has a duck's bill; and (3) has a skeleton with the features of a cold-blooded reptile yet is warm-blooded?

In time, scientists agreed that the platypus was a mammal of the order Monotremata. A monotreme, like a reptile, has one opening, or orifice, for the passage of eggs, sperm, feces, and urine. The only other living monotreme is the echidna. The scientific name given the platypus is *Ornithorhynchus anatinus*, which means "ducklike animal with a bird's snout."

Photo: Courtesy of Dr. Tom Grant

## Let's Visit a Platypus

We could go to a zoo, but there is nothing quite like spotting the secretive platypus in the wild—something even few Australians have ever done. Our search begins in eastern Australia, in the Blue Mountains west of Sydney, although many of the freshwater rivers, streams, and lakes on the eastern side of Australia would do.

We arrive before sunrise at an old wooden bridge over a glassy, eucalyptus-lined river. Patiently and silently, we watch the water for the appearance of a low-slung silhouette. Soon we are rewarded. About 50 yards upstream, a shape appears, headed our way. We must stand perfectly still.

The barrage of ripples radiating from its bill confirms that it is a platypus. Those tell-tale ripples form as the platypus grinds the food it has collected in its cheek pouches while foraging at the river's bottom. Though varying seasonally, its diet consists primarily of worms, insect larvae, and freshwater shrimps.

Does the small size of the platypus surprise you? It does most people. They imagine a platypus to be about the size of a beaver or an otter. But as you can see, it is smaller than even the average house cat. Males vary in length from 18 to 24 inches and weigh from two to five pounds. Females are a little smaller.

Propelled by alternate strokes of its webbed front feet, it quietly dives and remains submerged for one to two minutes as it works its way under the bridge. Its partially webbed hind feet are not used for propulsion but serve as rudders and work in concert with its tail when it swims. They also anchor its body firmly when it burrows.

If disturbed, the platypus dives with an audible slap, and that means good-bye! So we speak only when it is submerged. "How does such a little fellow keep warm," you

Courtesy of Healesville Sanctuary

**The platypus propels itself with its webbed feet**



Courtesy of Taronga Zoo

**Smaller than the average house cat, the platypus weighs two to five pounds**



Courtesy of Dr. Tom Grant

**Its highly sensitive bill finds prey underwater. (This platypus is in the Healesville Sanctuary)**



whisper, "especially in winter's icy waters?" The platypus manages well, thanks to two aids: metabolism that produces energy at a fast rate, thus warming it from the inside, and dense fur that keeps the heat in.

### That Amazing Bill

The soft, rubbery bill of the platypus is very sophisticated. It bristles with receptors for touch and electrical activity. At river's bottom the platypus gently swings its bill from side to side as it scans, detecting even the faint electrical fields created by the muscular contractions of its prey. While the platypus is submerged, its bill is its main contact with the world, for its eyes, ears, and nose are shut tight.

### Watch Those Spurs!

If our little friend is a male, his hind legs are armed with two ankle spurs joined by ducts to two venom glands in the thigh area. He vigorously thrusts both spurs into an attacker's flesh in a way somewhat akin to a horseman spurring his mount. Shortly after the initial shock, the victim suffers severe pain and local swelling.

In captivity, however, the platypus can be as tame as a puppy. The Healesville Sanctuary, in Victoria, has kept these animals for decades and reports that one early resident would "entertain visitors for hours, rolling over and over to have his tummy scratched . . . Thousands of visitors flocked to see this extraordinary little animal."

Our platypus makes his last dive for the day just as the morning sun peeks over the ranges to our east. Overnight he has eaten more than one fifth of his weight in food. As he climbs out of the water, the webs on his front feet retract, exposing strong nails. He now heads for one of his many burrows, which are wisely dug among tree roots for protection against erosion and collapse. Nesting burrows are normally about 25 feet

long, but other burrows may be between 3 feet and nearly 100 feet long and may have many side branches. Burrows also provide protection from temperature extremes, making them cozy dens for females to raise their young.

### Egg-Laying Time

In spring the female goes to a vegetation-lined chamber in one of her deeper burrows and lays from one to three (usually two) thumbnail-size eggs. She incubates her eggs by enwrapping them with her body and fatty tail. In about ten days, the babies break free from their parchmentlike shells and feed on the milk served by the mother's two mammary glands. The female platypus, by the way, raises her young alone; these mammals give no evidence of long-term pair bonding.

By about February, after a three-and-a-half-month spurt of growth, the young are ready for the water. Since a body of water can support only so many animals, the young may eventually search out less populous waters, even crossing hazardous land areas to do so.

In captivity platypuses have lived to over 20 years of age, but in the wild most do not live that long. Drought and flood take their toll as does predation by goannas (large monitor lizards), foxes, large birds of prey, and, in far north Queensland, even crocodiles. However, man poses the biggest threat to platypuses, not by deliberately killing them (platypuses are now strictly protected), but by relentlessly encroaching on their habitat.

If you ever visit Australia, you can observe for yourself our unique little duck-billed mélange in its natural habitat, as you will not see one in the wild anywhere else in the world. Courtesy of the platypus, you will experience yet another facet of the Creator's boundless imagination—and sense of humor as well.

## CROSSWORD PUZZLE

### Clues Across

1. Means by which God created the universe [2 words] (Genesis 1:2)
6. A son of Nahor (Genesis 22:21)
8. Of all the psalms, only the 6th and 12th mention this (superscription)
9. Basis for it provided by means of heavenly luminaries (See Genesis 1:14.)
12. What "the man of lawlessness" does regarding himself so that he appears "to be a god" (2 Thessalonians 2:3, 4)
15. The effect intended when Sennacherib's servants spoke loudly to the Jews (2 Chronicles 32:18)
19. Farming implement (Isaiah 7:25)
20. Seventh letter of Greek alphabet
22. The sacred embroidered pouch that the high priest wore over his heart when he entered the Holy (Exodus 28:29, 30)
23. The minimum number of witnesses required in order to establish a matter (Hebrews 10:28)
24. The family head of certain exiles returning from Babylon (Ezra 2:57)
25. He struck down Lahmi, Goliath's brother (1 Chronicles 20:5)
28. Moses, in his farewell blessing on Israel, said that Jehovah does this "upon heaven in help of you" (Deuteronomy 33:26)
32. High priest who had wicked Athaliah slain (2 Kings 11:15, 16)
35. What the Bible says a person can do to Jehovah's "face" (Exodus 32:11)
36. The name of this son of Jacob means "Good Fortune" (Genesis 30:11)
37. The rocky eminence upon which Solomon built Jehovah's temple [2 words] (2 Chronicles 3:1)

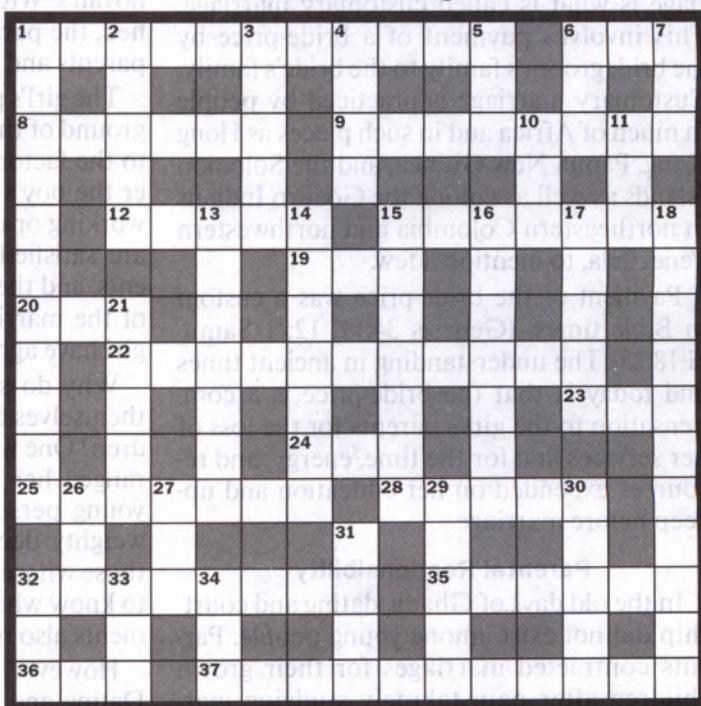
### Clues Down

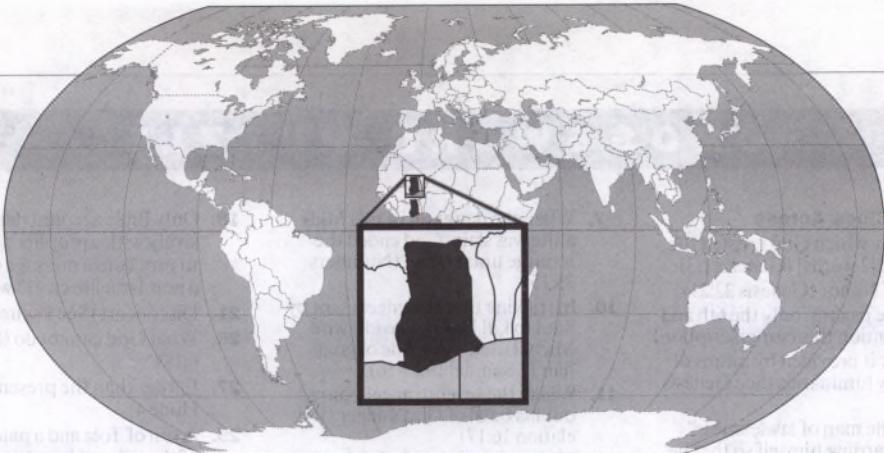
1. What Jesus' title "Christ" means [2 words] (Acts 4:26)
2. An entire quantity (Job 22:12)
3. What Jesus said one must do vigorously to be saved (Luke 13:24)
4. As soon as (John 8:28)
5. Name given to the last of God's earthly creative works (Genesis 3:20)
6. The assessment that God made of the hearts of mankind (Genesis 8:21)

7. When the daughter of this Midianite was slain, God ended the scourge upon Israel (Numbers 25:15)
10. In tricking the messengers sent by Saul to kill David, David's wife Michal used this made of goats' hair (1 Samuel 19:11-16)
11. Where the seventh angel poured out his bowl of God's anger (Revelation 16:17)
13. Bible term used to designate people not of Israelite extraction (Ezra 10:2)
14. Because this descendant of Judah had no sons, he gave his daughter to his servant Jarha in order to continue his line of descent (1 Chronicles 2:34, 35)
15. To lose all hope or confidence (Ecclesiastes 2:20)
16. Covered by means of scattering (Job 18:15)
17. When this seemed imminent, Uzzah grabbed hold of the ark of the covenant (1 Chronicles 13:9, 10)

18. Only Bible account dealing exclusively with a prophet's commission to proclaim a message of doom to a non-Israelite city [3 words]
21. Disconcert (See Psalm 83:17.)
26. What God cannot do (Hebrews 6:18)
27. Earlier than the present time (Jude 4)
29. A son of Tola and a paternal head of the tribe of Issachar (1 Chronicles 7:2)
30. A servant of Solomon whose offspring returned to Jerusalem (Ezra 2:55)
31. When Jehovah gives a blessing, he does not add this (Proverbs 10:22)
32. One of the items that David took from alongside Saul's head while Saul was sleeping (1 Samuel 26:12)
33. What Jesus did to avoid being stoned (John 8:59)
34. City in southern Judah (Joshua 15:29)

**Crossword Solutions Page 22**





BY AWAKE! CORRESPONDENT IN GHANA

## "Customary Marriage" in Ghana

**M**ARRIAGE—hundreds of thousands enter this relationship each year throughout the world. They usually do so according to the marriage custom that prevails where they live.

In Ghana the most common form of marriage is what is called customary marriage. This involves payment of a bride-price by the bridegroom's family to the bride's family. Customary marriage is practiced by people in much of Africa and in such places as Hong Kong, Papua New Guinea, and the Solomon Islands as well as among the Goajiro Indians in northeastern Colombia and northwestern Venezuela, to mention a few.

Payment of the bride-price was a custom in Bible times. (Genesis 34:11, 12; 1 Samuel 18:25) The understanding in ancient times and today is that the bride-price is a compensation to the girl's parents for the loss of her services and for the time, energy, and resources expended on her education and upkeep before marriage.

### **Parental Responsibility**

In the old days of Ghana, dating and courtship did not exist among young people. Parents contracted marriages for their grown children after painstakingly studying mar-

riageable young men and women in the community. Some parents in Ghana still do this.

The boy's parents consider such factors as the personality of the girl; her reputation and that of her family; hereditary disease that may run in the family; and in the case of Jehovah's Witnesses, her spirituality. If satisfied, the parents formally approach the girl's parents and make the marriage proposal.

The girl's parents now investigate the background of the boy and his family. In addition to the factors mentioned above, they consider the boy's ability to support a wife—is he working or unemployed? If the girl's parents are satisfied, they so inform the boy's parents, and the parents jointly work out details of the marriage, after both the boy and the girl have agreed to it.

Why do some parents still take it upon themselves to find mates for their grown children? One woman in India whose parents arranged her marriage stated: "How could a young person be qualified to make such a weighty decision? Far better to leave it to those whose age and experience qualify them to know what is the wisest choice." Her comments also reflect the view of many Africans.

However, times are changing in Ghana. Dating and courtship are growing in popu-

larity. At an appropriate point in courtship, the couple inform the parents of their intentions. After interaction between their parents and after the parents satisfy themselves that it is a good match, the families go ahead with the formal ceremony commonly known in various Ghanaian languages as knocking on the door, the marriage door.

### The Door-Knocking Ceremony

Parents of the couple apprise family members of the date and the purpose of the meeting. The term "family members" refers to the extended African family that includes the couple's uncles, aunts, cousins, grandparents. On the set day, representatives from both families gather for the ceremony. The bridegroom's presence is optional. The following is a very brief version of what transpired at one such door-knocking ceremony.

Girl's representative (GR): [Talking to the bridegroom's representatives] We know your reason for coming, but custom demands that we still ask, What brings you here?

Boy's representative (BR): Our son Kwasi was passing by your house and saw a pretty flower and wants your permission to pick it.

GR: [Feigning ignorance] There is no flower in this house. You can verify that for yourselves.

BR: Our son is not mistaken. We maintain that there is such a pretty flower in this house. The flower's name is Afi.

GR: It is a human flower then. Well, Afi does live here.

BR: We want to knock on the door and request Afi's hand in marriage to our son Kwasi.

The boy's family now presents some items, such as various drinks and some money. Depending on the tribe, there are variations in the quantities and items presented. This ceremony is a rough equivalent of Western-style engagement, and in some cases an engagement ring is stipulated.

The bride's representative now asks her before all onlookers whether the items brought should be accepted. By her affirmative answer, all present are eyewitnesses of her willingness to marry. A date convenient for both families is agreed upon for the celebration of the marriage. Refreshments conclude the ceremony.

### The Marriage Ceremony

The number of people that gather at the girl's house or at the house of a selected representative for the payment of the bride-price, which event constitutes the marriage, is usually larger than the number present for the door-knocking ceremony. This is because many friends are now present.

The atmosphere is joyful. Young unmarried men and women are anxious to see what has been brought for the bride. But the happy atmosphere tenses as the bride's family complains that the bride-price items are incomplete. Some in the audience hold their breath when the bride's family seems unyielding. The bridegroom's spokesman skillfully argues his way into the sympathetic consideration of the bride's family. The mood relaxes as the girl's family relents. The atmosphere again changes. Now it is festive, and light refreshments are served.

To start the marriage ceremony, the bride's spokesman calls the gathering to order and welcomes all. He asks the groom's

### IN OUR NEXT ISSUE

**How Can You Manage Your Finances?**

**Massacre at Port Arthur  
—Why Did It Happen?**

**Shrimp—A Delicacy From a Farm?**

representatives about their mission. The groom's spokesman states their reason for coming, reminding the gathering that the door has already been knocked on and that permission has been granted to enter.

Each family spokesman then introduces close members of the family to the gathering, including the one giving the girl's hand in marriage as well as the one backing the boy in the marriage. The ceremony proceeds.

**GR:** [Talking to the bridegroom's representatives] Please produce the marriage items we asked for.

The bride's spokesman enumerates the bride-price items so all can verify that they are there. If the bridegroom's representatives feel that the bride's family has inflated the demands, they privately resolve the issue before the marriage day. However, the groom's family comes to the ceremony prepared to bargain for the reduction of any extras if some of the bride's family prove difficult. Wherever one lives, the basic bride-price—whether high or low—must be paid in full.

Some families stipulate such things as drinks, clothes, necklaces, earrings, and other

#### CROSSWORD SOLUTIONS

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ladies' items. In northern Ghana, the bride-price may include salt, kola nuts, guinea fowl, sheep, and even cattle. There is invariably a cash component to the bride-price.

While negotiations proceed, the bride is not present but is close by, watching. The bridegroom's presence is optional. Thus, a person living far away can authorize his parents to contract the marriage on his behalf. On the occasion described here, however, the bridegroom is present. It is now his family's turn to make a demand.

**BR:** We have fulfilled all that is required of us, but we have not seen our daughter-in-law.

The marriage ceremony is not all serious business; it is also an occasion to have some fun. The girl's family now responds to the demand of the boy's family to see the bride.

**GR:** We wish the bride were here. Unfortunately, she has traveled abroad and we do not have passports or visas to make the trip to bring her back.

Everyone knows what that means. Instantly, the bridegroom's family offers an amount of money—any amount the bridegroom can afford—and presto! the imaginary passports and visas are ready. And the bride has returned from her trip!

To add to the fun, some tribes arrange for some friends of the bride to impersonate her. Each impersonator is roundly rejected by the crowd until, amid great applause, the true bride is presented. She is then invited by her spokesman to take a look at the various items of her bride-price. She is asked whether what the bridegroom has brought should be accepted. There is a hush as everyone waits anxiously for the answer. Some girls are timid and others bold, but the answer is invariably yes, followed by thunderous applause.

If the bridegroom is present, the bride's family demands to know him. The fun continues unabated if it has been arranged for

### **Rings being exchanged**

one of his friends to impersonate him. With an air of importance, his friend stands up, but he is instantly shouted down.

The bride's parents demand to see their son-in-law. The true bridegroom now stands up, radiating happy smiles. The bride's family permits her to join her husband, who puts a ring on her finger if a ring is stipulated as part of the bride-price. The ring is an innovation from the West. She, in turn, puts a ring on his finger. Congratulations and joy fill the air. For convenience and economy, some now combine the door-knocking ceremony with the marriage on the same day.

Experienced members of both families and others now offer the newlyweds counsel on how they can make their marriage work until death separates them. To round off the day, refreshments are served.

The marriage ceremony is over! In Ghana, from that day on, the couple are considered by the community to be legally married. If for some reason any of the principal members of the girl's family could not attend the ceremony, some of the drinks presented are sent to them to affirm the consummation of the marriage. If the bride and groom are Jehovah's Witnesses, in some cases the Witnesses then arrange for a Bible talk to be delivered, with light refreshments after that.

In Ghana some couples have a Western-style marriage ceremony, here called a civil marriage, or marriage by the ordinance. This can be contracted with or without parental consent as long as the couple are of legal age. In customary marriage parental consent is a must.

In civil marriage the couple take marriage vows. But vows are nonexistent in custom-



ary marriages. The State requires that all customary marriages be registered, and Jehovah's Witnesses comply. (Romans 13:1) A registration certificate is then issued.

From olden times until the Gold Coast, now Ghana, became a British colony, customary marriage was the only form of marriage in the country. The British then introduced Western-style marriage for their citizens living here. Natives of this land were also permitted to contract this type of marriage, and for many years now, Western-style marriage and customary marriage have existed together. In Ghana both are legally recognized, hence acceptable to Jehovah's Witnesses. It is up to the individuals to choose which form they desire.

In some African countries, customary marriages need to be registered before couples can be considered legally married. In Ghana, however, customary marriage as described above is legally valid without registration, the couples being considered legally married when the customary marriage is consummated. Later on, the customary marriage is registered for record purposes only.

Marriage is indeed God's loving gift to mankind, a unique gift that not even the angels were given. (Luke 20:34-36) It is a precious relationship worth preserving to the glory of its Originator, Jehovah God.



All photos pages 24-6: © Institut Pasteur

# Louis Pasteur

## *What His Work Revealed*

**C**AN life appear by spontaneous generation? In the 19th century, some scientists thought so. They felt that life could originate by itself from nonliving matter, without intervention by a creator.

But on a spring evening in April 1864, an audience present at a meeting hall at the Sorbonne University in Paris heard something different. In a masterful presentation before a commission of scientists, Louis Pasteur successfully refuted, point by point, the theory of spontaneous generation.

This lecture and later discoveries made him "one of the world's greatest scientists," as *The World Book Encyclopedia* puts it. But why did this man make such an impression on those of his time, and how did he become known worldwide? In what way do we now benefit from some of his discoveries?

### Early Research

Louis Pasteur was born in 1822 in the small town of Dôle, in the east of France. His father, a tanner, had ambitions for his son. In spite of having leanings toward art, as well as real artistic talent, Louis took up the sciences. He obtained a doctorate of sciences at the age of 25.

Early research of his had to do with tartaric acid, a compound present in the dregs left in wine barrels. The results of that research were used by other researchers a few years later to lay the basis for modern organic chemistry. Pasteur then moved on to the study of fermenting agents.

Prior to Pasteur's research, the presence of fermenting agents such as yeast was known. But it was thought that they were the result of fermentation. However, Pasteur

BY AWAKE! CORRESPONDENT IN FRANCE

proved that these fermenting agents were, not the result of fermentation, but rather the cause of it. He showed that each type of fermenting agent caused a different sort of fermentation. The report that he published on this in 1857 is today viewed as "the birth certificate of microbiology."

From that point on, his work and discoveries accelerated. Because of his reputation, the vinegar producers in Orléans called on him to solve their numerous technical problems. Pasteur proved that the agent responsible for the transformation of wine into vinegar was what is now called a microorganism, which was present on the surface of the liquid. At the end of his research, he presented before the town's vinegar producers and dignitaries his famous "Lesson on Wine Vinegar."

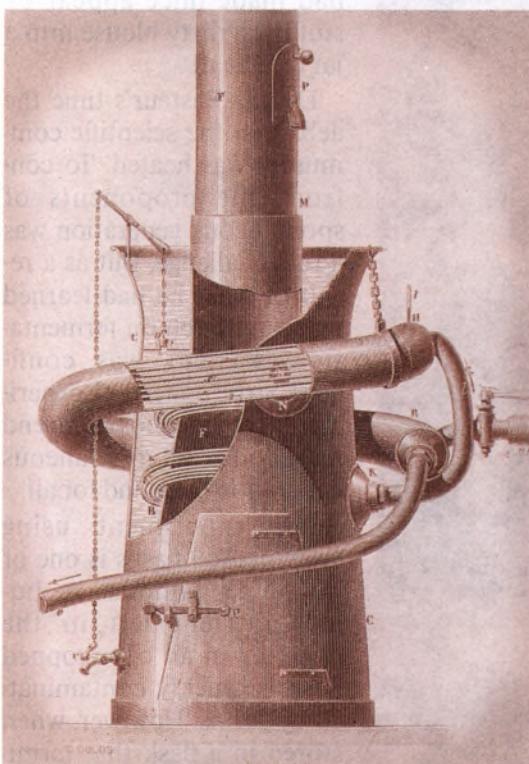
### Pasteurization

Pasteur's research into fermentation enabled him to conclude that the majority of problems of contamination in the food industry were caused by microbes. Microbes were present in the air or in improperly washed containers. Pasteur suggested that spoilage of food products by bacteria could be prevented by improving hygiene and that spoilage of a liquid could be prevented by maintaining a temperature of between 50 and 60 degrees Celsius for a few minutes. This method was first used on wine to prevent abnormal fermentation. The main microbes were killed without causing much change in the taste or bouquet.

This process, called pasteurization, which Pasteur patented, revolutionized the food industry. Nowadays this technique is no longer used for wine but is still adequate for numerous products like milk or fruit juice. However, other methods, such as sterilization at a much higher temperature, can also be used.

Another large industry to benefit from Pasteur's research was the brewing indus-

try. At the time, the French had many production problems and stiff German competition. Pasteur set to work and gave much advice to the brewers. He suggested that they pay attention to the purity of the brewer's wort as well as to the general cleanliness of the surrounding air. The success was immediate, and he obtained many patents thereafter.



*The apparatus above was used to pasteurize wine, killing unwanted microbes; it is highlighted in the drawing below*





## Life Comes From Life

From antiquity, the most fanciful ideas had been proposed to explain the appearance of insects, worms, or other creatures in decomposing matter. For instance, in the 17th century, a Belgian chemist boasted that he had made mice appear by stuffing a dirty blouse into a jar of wheat!

During Pasteur's time the debate in the scientific community was heated. To confront the proponents of spontaneous generation was a real challenge. But as a result of what he had learned in his research on fermentation, Pasteur was confident. So he undertook experiments intended to put an end to the idea of spontaneous generation once and for all.

His experiment using swan-necked flasks is one of his most famous. A liquid nutrient left in the open air in an open-topped flask is quickly contaminated by germs. However, when stored in a flask that terminates in a shape like a swan's neck, the same liquid nutrient remains uncontaminated. Why is this the case?

Pasteur's explanation was simple: On passing through the swan-neck, the bacteria in the air are deposited on the surface of the glass, so that the air is sterile by the time it reaches the liquid.

**Pasteur's experiments disproved the theory of spontaneous generation**

The germs that develop in an open flask are not produced spontaneously by the liquid nutrient but are transported in the air.

To show the importance of air as a transporter of microbes, Pasteur went to the Mer de Glace, a glacier in the French Alps. At an altitude of 6,000 feet, he opened his sealed flasks and exposed them to the air. Out of 20 flasks, only one became contaminated. He then went to the foot of the Jura Mountains and repeated the same experiment. Here, at the much lower altitude, eight flasks became contaminated. He thus proved that because of the purer air at higher altitudes, there was less risk of contamination.

Through such experiments Pasteur demonstrated convincingly that life comes only from previously existing life. It never comes into existence spontaneously, that is, by itself.

## Fight Against Infectious Disease

Since fermentation requires the presence of microbes, Pasteur reasoned that the same had to be true of contagious diseases. His investigations into silkworm disease, a serious economic problem for silk producers in the south of France, proved him right. Within a few years, he discovered the causes of two diseases and proposed strict methods for selecting healthy silkworms. This would prevent epidemics.

While studying fowl cholera, Pasteur noticed that a culture of the germ that was only a few months old did not make the chickens ill but instead protected them from the illness. In effect, he discovered that he could immunize them with an attenuated, or weakened, form of the germ.

Pasteur was not the first to use vaccination. Englishman Edward Jenner had used it before him. But Pasteur was original in using the actual disease agent in an attenuated form rather than using a related mi-

crobe. He was also successful with a vaccination against anthrax, an infectious disease of warm-blooded animals, such as cattle and sheep.

Following this, he went on to wage his last and most famous battle, against rabies. Although he did not realize it, in confronting rabies, Pasteur was dealing with a world very different from that of bacteria. He was now dealing with viruses, a world that he could not see with a microscope.

On July 6, 1885, a mother took her nine-year-old boy to Pasteur's laboratory. The child had just been bitten by a rabid dog. In spite of the mother's pleading, Pasteur was reluctant to help the boy. He was not a doctor and risked being accused of the illegal practice of medicine. What is more, he had not yet tried his methods on a human. Nevertheless, he asked his collaborator, Dr. Grancher, to vaccinate the young boy. He did so, with good results. Out of the 350 people treated in less than a year, only one—brought too late—did not survive.

In the meantime, Pasteur was giving thought to hospital hygiene. Puerperal fever was causing the deaths of large numbers of women each year at the maternity hospital of Paris. Pasteur suggested aseptic techniques and strict hygiene, especially of the hands. Later investigations by the English surgeon Joseph Lister and others proved the accuracy of Pasteur's conclusions.

### Valuable Work

Pasteur died in 1895. But his work was valuable, and we benefit from aspects of it even today. That is why he has been called a "benefactor of humanity." His name is still associated with the vaccines and procedures of which he is generally acknowledged to be the inventor.

L'Institut Pasteur, an institute founded in Paris during Pasteur's lifetime for the treatment of rabies, is today a highly reputed

center for the study of infectious diseases. It is particularly known for its work on vaccines and medicines—and even more so since 1983 when a team of its scientists, led by Professor Luc Montagnier, first isolated the AIDS virus.

The debate on the spontaneous generation of life, in which Pasteur was involved and in which he came off victorious, was not just a scientific quibble. It was more than an interesting point for a few scientists or intellectuals to discuss among themselves. It had much greater significance—it involved evidence that had to do with the existence of God.

François Dagognet, a French philosopher specializing in the sciences, observes that Pasteur's "adversaries, both materialists and atheists, believed that they could prove that a unicellular organism could result from decomposing molecules. This allowed them to take God out of creation. However, as far as Pasteur was concerned, there was no possible passage from death to life."

To this day all the evidence from experimentation, history, biology, archaeology, and anthropology continues to show what Pasteur demonstrated—that life can come only from preexisting life, not from inanimate matter. And the evidence also clearly shows that life reproduces "according to its kind," as the Bible's account in Genesis states. The offspring are always the same "kind," or type, as the parents.—Genesis 1: 11, 12, 20-25.

Thus, knowingly or not, through his work Louis Pasteur provided powerful evidence and testimony against the theory of evolution and for the absolute necessity of a creator for life to have appeared on earth. His work reflected what the humble psalmist acknowledged: "Know that Jehovah is God. It is he that has made us, and not we ourselves."—Psalm 100:3.

## WATCHING THE WORLD

### Lamenting the Loss of Manners

'Rudeness, loutish behavior, slovenly or aggressive dress, swearing, cheating, and the use of brute force have made life unpredictable, uneasy, and unpleasant,' reports *The Times* of London. High on the list of boorish behavior in some lands is the deliberate neglect of personal appearance. "Leather jackets, guerrilla headbands, pierced noses, studded leather boots and aggressive tattoos are declarations of war," says Athena Leoussi, of Reading University. Such clothing is a clear sign of contempt for other people, according to Leoussi. *The Times* says the 'decline in civility, restraint, and order threatens society perhaps even more than crime.' What, then, is the remedy? Manners must be "moulded within the family structure," says the paper. "They cannot simply be explained to children, but must be taught by example."

### Cellular Phone Hazard

A recent study in Japan has confirmed that radio waves emitted from cellular telephones can cause serious problems with hospital medical equipment. "In one test, a heart-lung machine stopped when a cellular phone was used 45 centimeters [18 inches] away," says the *Asahi Evening News*. Researchers also found that alarms went off on liquid transfusion pumps and pumps that supply anticancer drugs when a cellular phone was used

within two-and-a-half feet of the equipment. X-ray machines and tonometers were also affected. Based on these findings, the Posts and Telecommunications Ministry recommends that cellular phones not be taken into operating rooms and intensive care units. According to one survey, about 25 medical institutions in Tokyo already regulate the use of cellular phones, with 12 of them banning cellular phones altogether.

### Nuns Learn Karate

Faced with a growing threat of violence against women, a group of nuns at St. Anne's Province in Madhavaram, Tamil Nadu State, South India, have begun receiving karate training. Shihan Hussaini, president of the All India Isshinryu



Karate Association, says that the nuns have done much better than other women he has trained over his 24 years as a karate instructor. 'I suppose it has got something to do with the latent energy and discipline they have,' he says. One instrument the nuns are taught to use is called the *sein ko*. It is shaped like a crucifix, and by "using this instrument, it is even possi-

ble to kill an assaulter," claims Hussaini.

### Sunlight Cleans Water

"Canadian scientists have discovered that ordinary sunlight breaks down potentially harmful mercury compounds in water," reports *The Globe and Mail*, of Toronto. Researchers from the University of Manitoba and the Freshwater Institute of Winnipeg found that exposing lake water contaminated with methylmercury to sunlight for only a week resulted in a lowering of the level of methylmercury by 40 to 66 percent. "Until this experiment, scientists had believed that microbes alone broke down methylmercury in lake water," says the *Globe*. The report also notes that sunlight seems to "operate 350 times faster than the previously known microbial process."

### Stressed-Out Children

The number of children with ulcers and gastritis has doubled in ten years, reports the Brazilian newspaper *O Estado de S. Paulo*. These findings, based on a study by São Paulo University, point to emotional stress as one of the main factors. "Social pressures are reflected in the child's emotional makeup, ... to the point of causing disease," says gastroenterologist Dorina Barbieri. The newspaper went on to list a number of factors that contribute to childhood stress, including family conflicts, accidents or deaths in the family, perfectionism, an unbalanced diet, the spirit of

competition, and a lack of leisure time.

### Staying Smart Longer

Want to maintain your wits well into your senior years? "Don't neglect your education, stay physically active and protect your lungs," states *American Health* magazine. "There are things we can do to increase the likelihood of maintaining mental ability," claims Marilyn Albert, a Harvard Medical School neuropsychologist. Dr. Albert speculates that education somehow "alters brain structure" to protect mental skills from diminishing with age. In addition, it is thought that physical activity may improve blood circulation to the brain and supply it with more oxygen. Albert therefore suggests: "Take a daily walk, read at least one new book a month, and if you're a smoker, give your lungs (and brain) a break, by quitting."

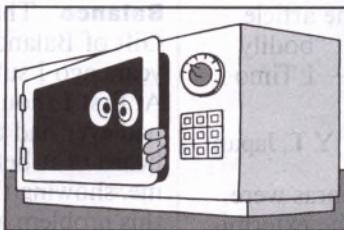
### Buffalo Pox Hits India

Buffalo pox, caused by a virus that belongs to the same group as the smallpox virus, has been detected in the Beed district of western India, reports *The Times of India*. Although the pox is less virulent than smallpox, scientists are nonetheless concerned about its spread. "The virus should be watched very carefully," says Dr. Kalyan Banerjee, director of the National Institute of Virology. "We cannot say how serious it is." Of major concern is the likelihood that the pox will spread in remote rural areas where medical facilities are few. Buffalo pox in humans causes high fever, swelling of the

lymph nodes, multiple pockmarks on the body, and general weakness.

### Another False Alarm

"The search for extraterrestrials scored a major breakthrough last year," reported *New Scientist* magazine. Researchers working for the SETI Institute, based in Mountain View, California, "picked up regular signals that provided indisputable proof of intelligent life." After further investigation, however, the team found that the radio signals "were not coming from ET [extraterrestrials] but from the



microwave oven downstairs." This is not the first time that the SETI Institute has been disappointed, notes *New Scientist*. Researchers scanning the sky in Australia found that "most of the false alarms were signals from satellites." A spokesman for the SETI Institute recently admitted to the American Astronomical Society that all the radio signals detected by SETI in 1995 were "coming from our own technology."

### New Waterway

A new waterway stretching over 2,150 miles southward from the Brazilian city of Cáceres to Argentina's River Plate is being proposed. It would

unite the Paraná and Paraguay rivers. The waterway, or *hidrovia*, will bypass thousands of kilometers of poor roads, making it easier to transport soybeans, cotton, grain, iron ore, lime, manganese, and other freight to foreign markets. The *hidrovia* is a joint project involving Argentina, Brazil, Paraguay, Uruguay, and landlocked Bolivia. According to *The Economist*, "developers see this as a South American Mississippi, ferrying goods to and from the heartland of a demi-continent that is ready to boom."

### The Value of Pi

Pi, as many learned in school, is the ratio of the circumference of a circle to its diameter. Most people can work satisfactorily with the approximate value of pi, 3.14159, but pi is not an exact number, so the decimal value of pi has no end. In the 18th century, a value accurate to 100 decimal places was obtained, and in 1973 two French mathematicians achieved a million decimal places. Now, Yasumasa Kanada, of Japan's Tokyo University, has calculated the value, by means of a computer, to more than six billion decimal places. The figure has no imaginable use, as "just 39 places of decimals are sufficient to calculate the circumference of a circle girding the known universe to within the radius of the hydrogen atom," notes *The Times* of London. Professor Kanada said he enjoys calculating pi "because it's there." But don't try to recite his result. "At one digit per second, without stopping, it would take about 200 years," says *The Times*.

## FROM OUR READERS

**Friendship** I am 16 years old, and I want to thank you for the article about Auntie Louie, entitled "My Dear Friend." (February 22, 1996) I was attracted by the photo and read the article immediately. I was a bit down because most of my friends had turned out to be no friends at all. The article truly encouraged me to seek friendships with people who are older than I am.

L. N., Italy

**School Sports** Thank you for the article "Young People Ask . . . Team Sports—Are They Good for Me?" (February 22, 1996) It seemed as though it was written just for me. It made me realize that maybe up until now I've been worshiping athletes. The article also helped me to appreciate that "bodily training is beneficial for a little."—1 Timothy 4:8.

Y. T., Japan

**Cobras** I used to think that cobras were very wicked reptiles that had to be exterminated. But after reading the article "Would You Like to Meet a Cobra?" (March 22, 1996), I now have a different view of them. Thanks for liberating people like me from misconceptions about these interesting creatures.

P. E., Nigeria

Although I was raised in a rural area where there are many snakes, I really did not know much about them. Reading about the cobra's cautiousness in avoiding confrontations helped me have a better understanding of Jesus' words at Matthew 10:16: "Prove yourselves cautious as serpents."

J. F. S., Brazil

**Counterfeiting** Thank you for the series "Counterfeiting—A Global Scourge." (March 22, 1996) I work in a banking institution and recently completed a seminar on

fraud prevention. The information you gave was the very latest. Thank you for all your reliable and informative articles.

B. P., United States

Since I work as a cashier at a bank, I appreciated the articles. In contrast with some journals that publish false information to create a sensation, you published a very balanced view. My bank gives the following advice to shopkeepers: 'Keep a mint copy of each bill. If in doubt, compare the suspect bill (paper, print, and watermark) against the genuine one.'

L. G., France

**Balance** Thank you for the article "God's Gift of Balance." (March 22, 1996) Three years ago I suffered vertigo for eight weeks. At first I thought I was the only one who had ever had this malady, since I had never heard of it before. Your article comforted me, showing that others have experienced this problem and have overcome it.

D. P., Jamaica

**Flies** Thank you for the most interesting article "Those Obnoxious Flies—More Useful Than You Think?" (March 22, 1996) Last summer I spent some time doing research on flies, but I did not find any satisfying information. I think they are bothersome and unhygienic, just as the article says. But now I know that they do something useful—otherwise our Creator would not have made them. I greatly appreciate the articles you publish.

T. G., Italy

I just finished reading the article on flies, and I had to write. Many times I have told people in jest that I would like to know what Jehovah had in mind when he created this troublesome creature. Now I know that the fly was not put on earth just to bother us!

P. P., United States

# This Kudu REMEMBERED

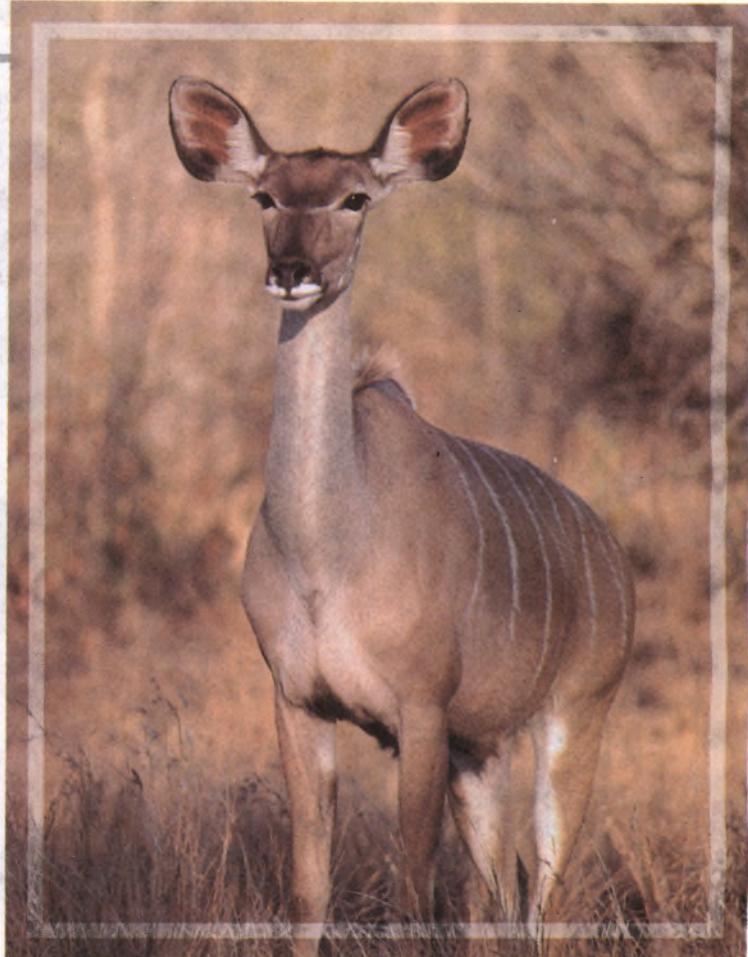
BY AWAKE! CORRESPONDENT  
IN SOUTH AFRICA

THE handsome male kudu, an antelope with impressive spiral horns and distinctive ears, is nearly five feet high at the shoulder when full grown. The female, though usually lacking horns, is also distinguished by its large ears. The kudu is a shy animal, always on the alert and ready to run for cover. Thus, what happened to Karen in Zimbabwe is remarkable.

As reported in *African Wildlife* magazine, a little female kudu calf, which was found entangled in a wire fence, was rescued and given to Karen, who bottle-fed it for a few weeks. It thrived and remained in the vicinity of the dairy where Karen and her family lived, often playing with the children and the dogs. However, it gradually drifted back to the wild until, when nearly full grown, it was seen near the farm no more.

Some two years later, while driving on the farm road, Karen was surprised that a pregnant kudu cow did not scamper away at the approach of her car. Nor did it flee when she started walking toward it. By this time she knew that this must be the same animal she had bottle-fed, so she talked softly as she quietly drew near to it. The cow had recognized her too, for it lowered its head and nuzzled her while allowing her to embrace it!

A couple of months later, the cow was again near the road—this time with a wee calf. Karen felt that the calf was being proudly introduced by its mother, who once more allowed herself



to be petted. A similar thing happened a few weeks later when it seemed as if the cow was actually waiting for Karen.

Another couple of months passed, and some farm laborers reported seeing this same kudu cow with a noose around her neck. They had tried to approach the cow to remove the noose, but the cow had run away. So Karen went looking for it in the bush, calling as she went. Before long, out it stepped in front of her. Karen had thoughtfully brought along some bread, which the cow had been fond of, and while this delicacy was being offered, Karen's husband cut off the offending noose.

The obvious bond that lasted so long between man and beast brought much delight to this family.



## "I Need Encouragement and Hope"

Do you ever feel that way? Many people today do. A woman from Fort Smith, Arkansas, wrote to the world headquarters of Jehovah's Witnesses in Brooklyn, New York, and explained: "Your book *Knowledge That Leads to Everlasting Life* is very informative and inspirational. I read it from cover to cover in just a couple of days. It gives me hope that soon the promised new world under the rule of Jesus Christ will be here. I long for that day."

"Until then, I am faced with surviving in this world, waiting for that to happen. I get very discouraged with this mundane, boring, uneventful

life. I need encouragement and hope. You stated that through your organization we can have a free home Bible study if we are interested. Could you please let me know what it takes to get this? I think this home Bible study would help encourage me."

What a wonderful response! We are happy to

share with you the details of our free home Bible study. Please contact us for more information.