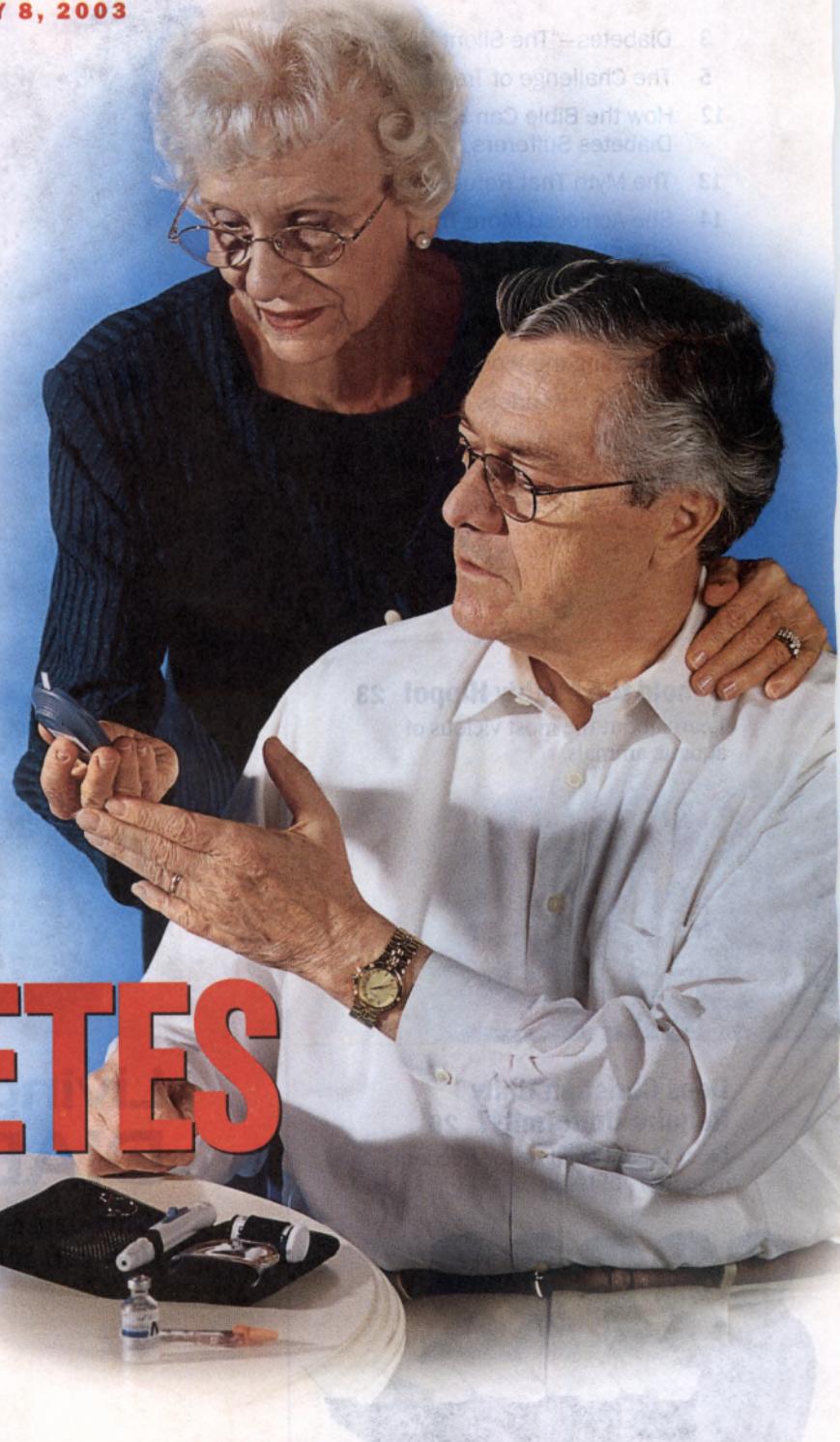


Awake!

MAY 8, 2003

Awake! Magazine
Volume 11 Number 10
MAY 8, 2003
\$3.99

Living With **DIABETES**



Awake!

AVERAGE PRINTING 22,755,000
PUBLISHED IN 86 LANGUAGES

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What causes diabetes?
How can sufferers cope?

Author's note: I'd like to thank Dr. Robin S. Goland, codirector of the Diabetes Treatment Center at the University of Southern California, for her help in writing this article. She is a leading authority on diabetes and has conducted extensive research on the disease.

Diabetes “The Silent Killer”

WHEN he was 21 years old, Ken developed a puzzling, unquenchable thirst. He also had to urinate frequently—even- tually about every 20 minutes. Soon Ken's limbs began to feel heavy. He was chronically tired, and his vision became blurry.

The turning point came when Ken caught a virus. A visit to the doctor confirmed that Ken had more than the flu—he also had Type 1 diabetes mellitus—diabetes, for short. This chemical disorder disrupts the body's ability to utilize certain nutrients, primarily a blood sugar called glucose. Ken spent six weeks in the hospital before his blood-sugar level stabilized.

That was more than 50 years ago, and treatment has improved considerably during the past half century. Nevertheless, Ken still suffers from diabetes, and he is not alone. It is estimated that worldwide, more than 140 million people have the disorder, and according to the World Health Organization, that number could double by the year 2025. Understandably, experts are concerned about the prevalence of diabetes. “With the numbers we're starting to see,” says Dr. Robin S. Goland, codirector of a treatment center in the United States, “this could be the beginning of an epidemic.”

Consider these brief reports from around the world.

AUSTRALIA: According to Australia's International Diabetes Institute, "diabetes presents one of the most challenging health problems for the 21st century."

INDIA: At least 30 million people have diabetes. "We hardly had any patients under 40 about 15 years ago," says one doctor. "Today every other person is from this age group."

SINGAPORE: Nearly a third of the population between 30 and 69 years of age have diabetes. Many children—some as young as ten—have been diagnosed.

UNITED STATES: Approximately 16 million people are afflicted, and each year some 800,000 new cases are diagnosed. Millions have the disease but do not yet know it.

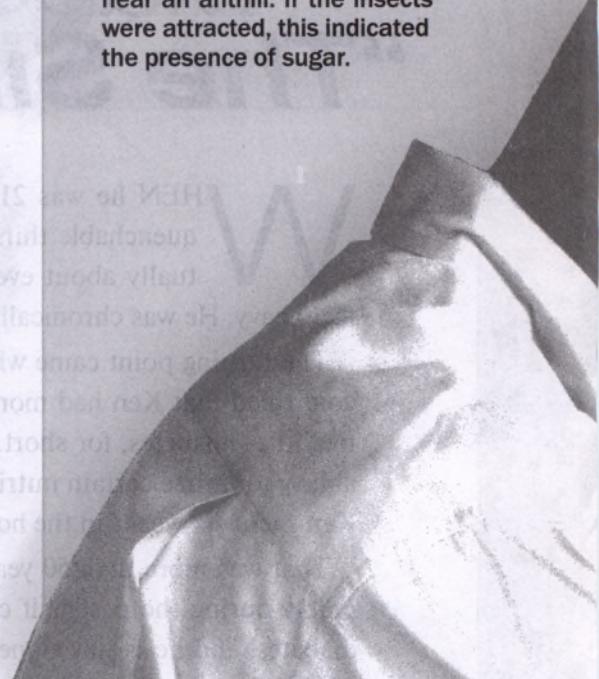
Treatment for diabetes is made more difficult because a person can have the disease a long time before it is diagnosed. "Because the early symptoms are relatively mild," notes *Asiaweek* magazine, "diabetes often goes unrecognized." Hence, diabetes has been dubbed the silent killer.

In view of the prevalence and the severity of this disorder, the following articles will address the questions:

- What causes diabetes?
- How can those who have the disorder cope with it?

Behind the Name

The term "diabetes mellitus" comes from a Greek word meaning "to siphon" and a Latin word meaning "sweet like honey." These words aptly describe the disorder, for water passes through the person who has diabetes as if it were being siphoned from the mouth through the urinary tract and right out of the body. Furthermore, the urine is sweet with sugar. In fact, prior to the discovery of more efficient techniques, one test for diabetes was to pour a patient's urine near an anthill. If the insects were attracted, this indicated the presence of sugar.



Awake!®

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

Awake! (ISSN 0005-237X) is published semimonthly by

Watchtower Bible and Tract Society of New York, Inc.; M. H. Larson, President; G. F. Simonis, Secretary-Treasurer; 25 Columbia Heights, Brooklyn, NY 11201-2483. Periodicals Postage Paid at Brooklyn, N.Y., and at additional mailing offices.

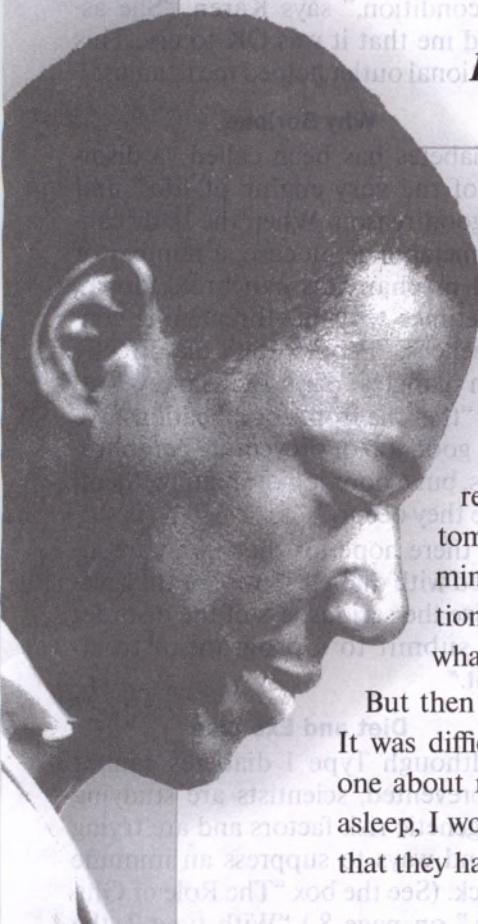
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POSTMASTER: Send address changes to *Awake!*, c/o Watchtower, Wallkill, NY 12589. © 2003 Watch Tower Bible and Tract Society of Pennsylvania. All rights reserved. Printed in U.S.A.

Vol. 84, No. 9 Semimonthly ENGLISH

The Challenge of Treatment

**"There's no diabetes that's not bad.
It's all serious."**—Anne Daly,
American Diabetes Association.



YOUR blood tests came back with significant abnormalities. You need immediate medical attention." The doctor's words hit Deborah like a sledgehammer. "That night, I kept thinking there must have been a lab error," she says. "I told myself I just couldn't be sick."

Like many people, Deborah thought that she was reasonably healthy, so she ignored the nagging symptoms. She blamed her persistent thirst on the antihistamines she was taking. She attributed the frequent urination to an excess intake of water. And the tiredness—well, what working mother does not get exhausted?

But then a blood test confirmed that diabetes was the culprit. It was difficult for Deborah to accept the diagnosis. "I told no one about my illness," she says. "At night, when the family was asleep, I would stare out at the darkness and cry." Upon learning that they have diabetes, some, like Deborah, experience a flood of

Semimonthly Languages: Afrikaans, Albanian, Arabic, Cebuano, Croatian, Czech,[#] Danish,[#] Dutch, English,[#] Estonian, Finnish,[#] French,[#] German,[#] Greek, Hungarian, Iloko, Indonesian, Italian,[#] Japanese,[#] Korean,[#] Latvian, Lithuanian, Norwegian, Polish, Portuguese,[#] Romanian, Russian, Serbian, Slovak, Slovenian, Spanish,[#] Swahili, Swedish,[#] Tagalog, Ukrainian
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Publication of *Awake!* is part of a worldwide Bible educational work supported by voluntary donations. Unless otherwise indicated, *New World Translation of the Holy Scriptures—With References* is used.

Would you welcome more information? Write Jehovah's Witnesses at the appropriate address: **America, United States of:** Wallkill, NY 12589. **Australia:** Box 280, Ingleburn, NSW 1890. **Britain:** The Ridgeway, London NW7 1RN. **Canada:** Box 4100, Halton Hills (Georgetown), Ontario L7G 4Y4. **Ghana:** P. O. Box GP 760, Accra. **Jamaica:** P. O. Box 103, Old Harbour, St. Catherine. **New Zealand:** P.O. Box 75-142, Manurewa. **Nigeria:** P.M.B. 1090, Benin City 300001, Edo State. **South Africa:** Private Bag X2067, Krugersdorp, 1740. **Zambia:** Box 33459, Lusaka 10101. **Zimbabwe:** Private Bag WG-5001, Westgate.

A Disease of the Young?

Diabetes is "becoming a disease of the young," says Dr. Arthur Rubenstein, a leading endocrinologist and dean at New York's Mount Sinai School of Medicine. The average age for the onset of diabetes is indeed dropping. "Ten years ago, we were teaching medical students that you didn't see this disease in people under 40," says diabetes expert Dr. Robin S. Goland, speaking of Type 2 diabetes. "Now we're seeing it in people under 10."

Why the increase in diabetes among youths? Sometimes a genetic predisposition is involved. But weight and environment may also play a role. The number of obese children has doubled in the past two decades. What accounts for this? "There have been a number of changes in food habits and activity patterns over the last 20 years," says Dr. William Dietz of the U.S. Centers for Disease Control and Prevention. "These include increased reliance on foods consumed outside the home; increased rates of skipping breakfast; increased consumption of soft drinks and fast foods; reduction of [physical education] in schools; and elimination of recess at school."

Diabetes cannot be reversed. Therefore, it is wise to follow the advice of one teenage sufferer, who simply states: "Stay away from junk food and stay fit."



emotions, including depression and even anger. "I went through a tearful period of denial," says Karen.

These are natural responses to what seems an unfair blow. With support, however, those with diabetes can adapt. "My nurse helped me to accept my condition," says Karen. "She assured me that it was OK to cry. This emotional outlet helped me to adjust."

Why Serious

Diabetes has been called "a disorder of the very engine of life," and for good reason. When the body cannot metabolize glucose, a number of vital mechanisms can break down, sometimes with life-threatening consequences. "People don't die directly from diabetes," says Dr. Harvey Katzeff, "they die from complications. We do a good job of preventing complications, but a poor job of treating [them] once they occur."^{*}

Is there hope for those who are afflicted with diabetes? Yes—if they recognize the seriousness of the disorder and submit to a program of treatment.[#]

Diet and Exercise

Although Type 1 diabetes cannot be prevented, scientists are studying the genetic risk factors and are trying to find ways to suppress an immune attack. (See the box "The Role of Glucose," on page 8.) "With type 2, the picture is much brighter," says the book *Diabetes—Caring for Your Emo-*

* Complications include heart disease, stroke, poor kidney function, peripheral arterial disease, and nerve damage. Poor blood supply to the feet can lead to ulcers, which in severe cases require amputation of the affected limb. Diabetes is also the most frequent cause of blindness among adults.

[#] *Awake!* does not endorse any particular therapy. Those who suspect that they have diabetes should consult a physician who has experience in prevention and management of the disease.

tions as Well as Your Health. "Many of those who might be genetically susceptible avoid showing any sign of this disease simply by eating a balanced diet and exercising regularly, thereby staying physically fit and keeping their weight within normal limits."^{*}

Underscoring the value of exercise, the *Journal of the American Medical Association* reported on a large study involving women. The study found that "a single bout of physical activity increases insulin-mediated glucose uptake [by the body's cells] for more than 24 hours." Hence, the report concludes that "both walking and vigorous activity are associated with substantial reductions in risk of type 2 diabetes in women." The researchers recommend at least 30 minutes of moderate physical activity on most if not all days of the week. This can include something as simple as walking, which, says the *American Diabetes Association Complete Guide to Diabetes*, "is probably the best, safest, and least expensive form of exercise."

However, exercise by people with diabetes should be professionally supervised. One reason is that diabetes can damage the vascular system and nerves, thus affecting blood circulation and feeling. Hence, a simple scratch on the foot may go unnoticed, get infected, and turn into an ulcer—a serious condition that may lead to amputation if not treated immediately.^{*}

Still, an exercise regimen can help one to manage diabetes. "The more researchers study the benefits of regu-

* Excess fat in the midriff (the apple-shaped body) seems to pose more danger than fat on the hips (the pear-shaped body).

[†] Smokers put themselves at an even greater risk, for their habit damages the heart and circulatory system, and it narrows blood vessels. One reference states that 95 percent of diabetes-related amputations involve smokers.

Proper diet is essential for diabetes sufferers



lar exercise," says the *ADA Complete Guide*, "the better the news gets."

Insulin Therapy

Many with diabetes must supplement their diet and exercise program with daily testing of glucose levels along with multiple insulin injections. As a result of improved health through diet and a good routine of exercise, some with Type 2 diabetes have been able, at least for a time, to discontinue insulin therapy.* Karen, who has Type 1 diabetes, found that exercise increases the efficiency of the insulin she injects. As a result, she

* Some of these people were helped by oral medication. This includes drugs that stimulate the pancreas to release more insulin, others that slow the increase of blood sugar, and still others that lower insulin resistance. (Oral medication is not usually prescribed for Type 1 diabetes.) At present, insulin cannot be taken orally, for digestion breaks this protein down before it reaches the bloodstream. Neither insulin therapy nor oral medication eliminates the need for exercise and a good diet.

(Continued on page 10)

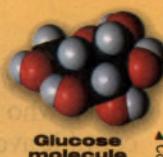
The Role of Glucose

Glucose fuels the body's trillions of cells. To enter the cells, however, it needs a "key"—insulin, a chemical released by the pancreas. With Type 1 diabetes, insulin is simply not available. With Type 2, the body makes insulin but usually not enough.* Moreover, the cells are reluctant to let insulin in—a condition called insulin resistance.

* About 90 percent of those with diabetes have Type 2. Previously, this was referred to as "non-insulin dependent" or "adult onset" diabetes. However, these terms are imprecise, for up to 40 percent of those with Type 2 diabetes require insulin. Furthermore, an alarming number of young people—some not even in their teens—are being diagnosed with Type 2 diabetes.

With both forms of diabetes, the result is the same: hungry cells and dangerous levels of sugar in the blood.

In Type 1 diabetes, a person's immune system attacks the insulin-producing beta cells in the pancreas. Hence, Type 1 diabetes is an autoimmune disease and is sometimes called immune-mediated diabetes. Factors that can trigger an immune reaction include viruses, toxic chemicals, and certain drugs. Genetic makeup may also be implicated, for Type 1 diabetes often runs in families, and it is most common among Caucasians.

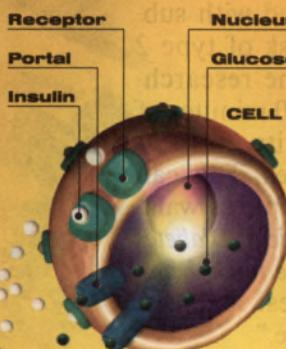


Courtesy: Pacific Northwest Nutrigenomics Laboratory

Diabetes Simplified

Healthy Person

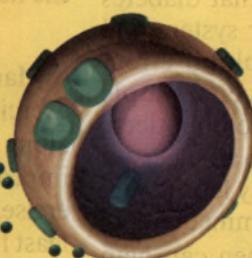
After a meal, the pancreas responds to increases in the glucose content of the blood, releasing the proper amount of insulin



Insulin molecules become attached to receptors on muscle cells and other cells. This, in turn, activates portals that allow glucose molecules to enter

Type 1 Diabetes

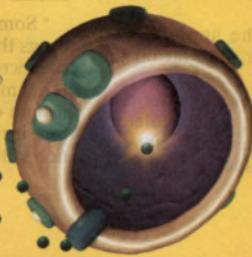
The insulin-producing beta cells in the pancreas are attacked by the immune system. As a result, insulin is not produced



Without the assistance of insulin, the glucose molecules cannot enter into the cells

Type 2 Diabetes

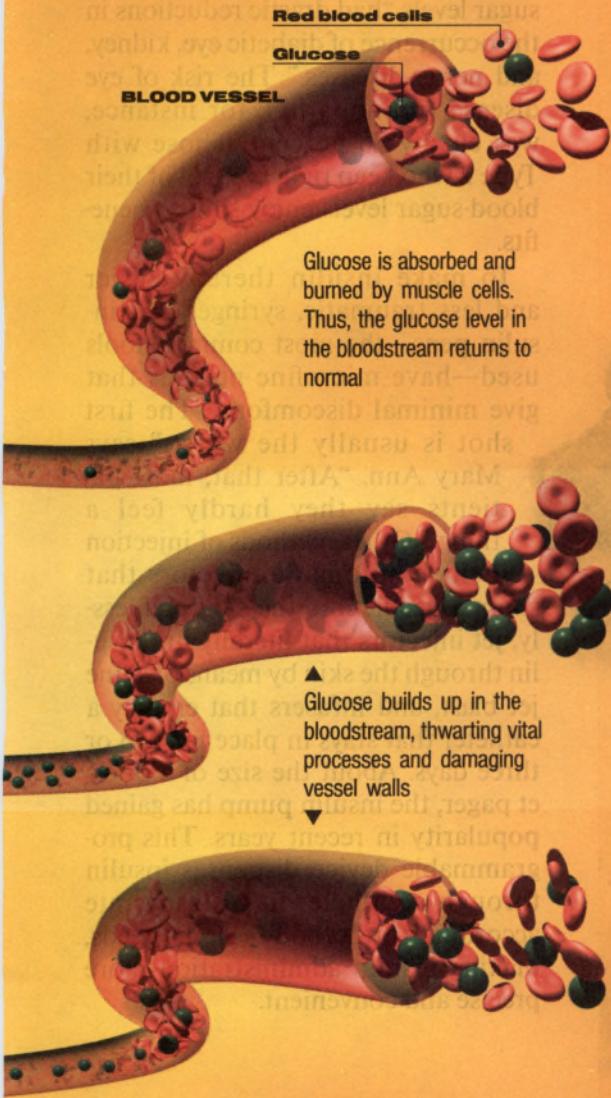
In most cases the pancreas produces a limited amount of insulin



If receptors are less responsive to insulin, portals that are needed to absorb glucose from the blood are not activated

With Type 2 diabetes, the genetic factor is even stronger but with a greater occurrence among non-Caucasians. Australian Aborigines and Native Americans are among the most affected, the latter having the highest rate of Type 2 diabetes in the world. Researchers are studying the relationship between genetics and obesity, as well as the way excess fat seems to promote insulin resistance in genetically susceptible people.* Unlike Type 1, Type 2 diabetes occurs mainly in those who are over 40 years of age.

* A person is generally considered to be obese when 20 percent or more above his or her ideal body weight.



The Role of the Pancreas

About the size of a banana, the pancreas lies just behind the stomach. According to the book *The Unofficial Guide to Living With Diabetes*, "the healthy pancreas performs a continuous and exquisite balancing act, managing to sustain smooth, stable blood-sugar levels by releasing just the right amount of insulin as glucose levels wax and wane throughout the day." Beta cells within the pancreas are the source of the hormone insulin.

When beta cells fail to produce enough insulin, glucose builds up in the blood, causing hyperglycemia. The opposite—low blood sugar—is called hypoglycemia. In concert with the pancreas, the liver helps manage blood-sugar levels by storing excess glucose in a form called glycogen. When commanded by the pancreas, the liver converts glycogen back into glucose for use by the body.

The Role of Sugar

It is a common misconception that eating a lot of sugar causes diabetes. Medical evidence shows that getting fat—regardless of sugar intake—increases the risk among genetically susceptible individuals. Still, eating too much sugar is unhealthy, since it provides poor nutrition and contributes to obesity.



Another misconception is that people with diabetes have an abnormal craving for sugar. In reality, though, they have the same desire for sweets as most others. When it is not controlled, diabetes can lead to hunger—but not necessarily for sugar. People with diabetes can eat sweets, but they must factor their sugar intake into their overall diet plan.

Recent studies have shown that a diet high in fructose—sugar derived from fruits and vegetables—can contribute to insulin resistance and even diabetes in animals, regardless of their weight.

(Continued from page 7)

has been able to cut her daily insulin requirements by 20 percent.

If insulin is needed, however, there is no reason for the sufferer to feel discouraged. "Going on insulin does not imply failure on your part," says Mary Ann, a registered nurse who cares for a number of diabetes patients. "Whatever form of diabetes you have, if you carefully control your blood sugar, you will minimize other health problems later." In fact, a recent study revealed that people with Type 1 who kept strict control of their blood-sugar levels "had drastic reductions in the occurrence of diabetic eye, kidney, and nerve diseases." The risk of eye disease (retinopathy), for instance, was cut by 76 percent! Those with Type 2 who keep tight control of their blood-sugar levels enjoy similar benefits.

To make insulin therapy easier and less traumatic, syringes and insulin pens—the most common tools used—have microfine needles that give minimal discomfort. "The first shot is usually the worst," says Mary Ann. "After that, most patients say they hardly feel a thing." Other methods of injection

include automatic injectors that shoot a needle into the skin painlessly, jet injectors that literally fire insulin through the skin by means of a fine jet blast, and infusers that employ a catheter that stays in place for two or three days. About the size of a pocket pager, the insulin pump has gained popularity in recent years. This programmable device dispenses insulin through a catheter at a steady rate according to the body's daily needs, making insulin administration more precise and convenient.

**Diabetes sufferers
can enjoy
normal activities**

Keep Learning

All told, there is no blanket therapy for diabetes. When considering treatment, each individual must take into account a number of factors in order to make a personal decision. "Even though you may be under the care of a medical team," says Mary Ann, "you are in the driver's seat." In fact, the journal *Diabetes Care* states: "Medical treatment of diabetes without systematic self-management education can be regarded as substandard and unethical care."

The more those with diabetes learn about their disease, the better equipped they will be to manage their health and increase their prospects of living a longer, healthier life. Effective education, however, calls for patience. The book *Diabetes—Caring for Your Emotions as Well as Your Health* explains: "If you try to learn everything at once, you are likely to get confused and not use the information effectively. Besides, much of the most useful information you will need to learn isn't found in books or pamphlets. It has to do with . . . how your blood sugar varies with changes in routine. This can be learned only over time, through trial and error."

For example, by careful monitoring you learn how your body reacts to stress, which can cause your blood-sugar level to shoot up. "I've lived with this diabetic body for 50 years," says Ken, "and I know what it is telling me!" "Listening" to his body has paid off, for Ken is still able to work full-time—even though he is over 70 years of age!

The Importance of Family Support

Not to be overlooked in treatment of diabetes is support from the family. In fact, one reference notes that "the quality of a family's life together is perhaps the largest single factor" in managing diabetes in children and young adults.

It is beneficial when family members learn about diabetes, even taking turns attending medical appointments with the sufferer. Knowledge will help them to be of sup-

port, recognize important symptoms, and know how to respond. Ted, whose wife has had Type 1 diabetes since the age of four, says: "I can tell when Barbara's sugar level goes down too low. She will get quiet in the middle of a conversation. She perspires profusely and gets angry for no reason. And her reactions slow down."

Similarly, when Catherine, Ken's wife, observes Ken becoming pale and clammy and when she sees a change in his disposition, she presents him with a simple math problem. Ken's confused response tells Catherine that it is time to take any decision-making out of his hands and act quickly to remedy the situation. Both Ken and Barbara deeply appreciate having informed marriage mates whom they love and fully trust.*

Loving family members should strive to be supportive, kind, and patient—qualities that can help an ill person face life's challenges and can even influence for the better the course of their disease. Karen's husband reassured her of his love, which made a big difference. Karen relates: "Nigel said to me, 'People need to take in food and water to survive, just the same as you need food and water—and a little dose of insulin.' These warm yet practical words were just what I needed."

Family and friends also need to understand that as blood-sugar levels fluctuate, diabetes can affect one's moods. "When I experience sugar-related lows," says one woman, "I get very quiet, moody, easily upset, and frustrated. Then I feel awful about being so childish. But it helps when I know that others understand the reason for these feelings—which I try to control."

Diabetes can be managed successfully, especially if the sufferer has cooperation from friends and family members. Bible principles can also help. How?

* Medical authorities recommend that people with diabetes always carry an identification card and wear identification jewelry. In a crisis these items can save a life. A low-sugar reaction, for example, can be misinterpreted as a different medical condition or even as an alcohol problem.

How the Bible Can Help Diabetes Sufferers

SELF-CONTROL and a positive outlook are especially vital to the health and well-being of people with diabetes. But to cultivate such qualities, the sufferers need ongoing support. So family members and friends would not want to tempt the person with diabetes to eat unwholesome food, perhaps saying, ‘Just this once won’t hurt.’ “I receive fine support from my wife,” says Harry, who has heart disease and Type 2 diabetes. “She doesn’t keep foods around that I should not eat. But some others do not understand, and they do not know how hard that makes it at times.”

If you regularly associate with a person who has diabetes, keep in mind the following two beautiful precepts found in the Bible: “Let each one keep seeking, not his own advantage, but that of the other person,” and “Love . . . does not look for its own interests.”—1 Corinthians 10:24; 13:4, 5.

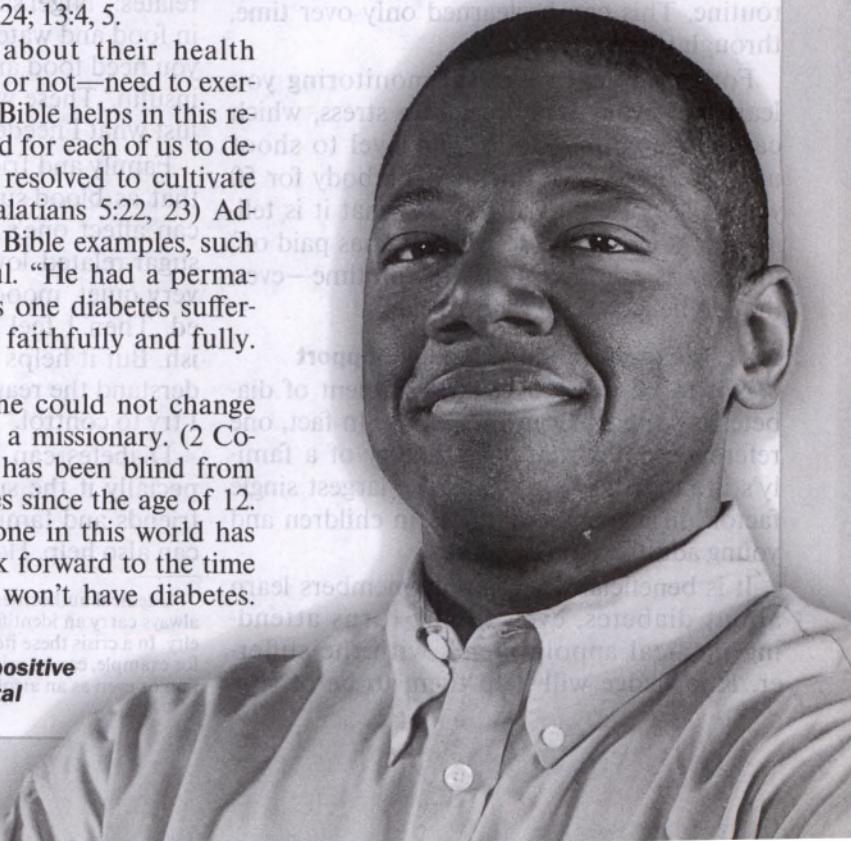
All who are concerned about their health—whether they have diabetes or not—need to exercise restraint with food. The Bible helps in this regard, for it points out the need for each of us to develop self-control. Have you resolved to cultivate this quality in your life? (Galatians 5:22, 23) Additional help can come from Bible examples, such as the Christian apostle Paul. “He had a permanent thorn in his flesh,” says one diabetes sufferer, “yet he still served God faithfully and fully. So can I!”

Yes, Paul accepted what he could not change and enjoyed great success as a missionary. (2 Corinthians 12:7-9) Dustin, 18, has been blind from birth, and he has had diabetes since the age of 12. He writes: “I know that no one in this world has everything just perfect. I look forward to the time in God’s new world when I won’t have diabetes.

To me, it is just a temporary thing. It may last longer than a cold or the flu, but eventually it will end.”

In making that statement, Dustin had in mind the Bible-based hope of perfect health in a paradise earth under God’s Kingdom. (Revelation 21:3, 4) God’s Word promises that under such divine rule, “no resident will say: ‘I am sick.’” (Isaiah 33:24; Matthew 6:9, 10) Would you like to learn more about this Bible-based promise? Contact Jehovah’s Witnesses locally, or write to the publishers of this magazine at the appropriate address listed on page 5.

Self-control and a positive outlook are vital



THE MYTH THAT REFUSES TO DIE

BY AWAKE! WRITER IN FRANCE

CHILDREN the world over adore him. In one recent year, the French postal services received nearly 800,000 letters for him—mainly from children between three and eight years of age. With his bushy white beard and red robe edged in white fur, the affable figure of Father Christmas (Santa Claus) seems one of the most popular aspects of the holiday festivities. Can you imagine, then, burning an effigy of him? That is precisely what took place just over 50 years ago in Dijon, France. On December 23, 1951, Father Christmas was “executed” in front of some 250 children.

What was his crime? The newspaper *France-Soir* reported that this execution was “decided upon with the agreement of the clergy, who had condemned Father Christmas as a usurper and heretic” and had accused him of “paganizing Christmas.” This was “a symbolic gesture,” a communiqué declared. “Falsehood cannot awaken the religious feelings of children and is in no way a method of education.”

Some clergymen felt that customs surrounding Father Christmas were turning people away from “the strictly Christian meaning” of the Nativity. Indeed, in the March 1952 issue of *Les Temps Modernes* (Modern Times), ethnologist Claude Lévi-Strauss called belief in Father Christmas

On a brûlé le Père Noël

(See page 8.)



DR/© Cliché Bibliothèque nationale de France, Paris

“one of the most active hotbeds of paganism among modern man” and stated that the church was justified in denouncing this belief. Lévi-Strauss also noted that the origins of Father Christmas can be traced back to the king of the Saturnalia. The Saturnalia festival was celebrated in ancient Rome from December 17 to 24. During that week, buildings were decorated with greenery and gifts were exchanged. Like Christmas, the Saturnalia was characterized by merrymaking.

Now, more than 50 years after Father Christmas was burned in effigy, how do Catholics in France view Father Christmas? This distant heir of Rome’s Saturnalia is as much a part of Christmas as is the representation of Jesus in a manger. Occasionally, a priest will denounce Santa Claus as representing a form of commercialism that takes Christ out of Christmas. For the most part, however, any scruples over the pagan roots of Father Christmas have foundered on the rocks of public acceptance.

She Achieved More Than She Expected

IKNEW my history teacher did not like Jehovah's Witnesses, although I had no idea why," says 17-year-old Rebekka from Germany. Thus, when the teacher asked for volunteers to give a talk in front of the class, Rebekka hesitated. Nevertheless, she summoned the courage to ask him for permission to give a talk about the persecution of Jehovah's Witnesses under the Nazi regime during World War II. The teacher was pleased with the suggestion.

The class enjoyed Rebekka's presentation, and they accepted a total of 44 magazines and booklets on the subject. Afterward, Rebekka presented her research material to the teacher, including a number of books and videos written or produced by non-Witnesses. One video reported on the persecution of Jehovah's Witnesses in East Germany during the Cold War. This particularly interested the teacher, as he was unfamiliar with the topic.

Rebekka then discovered why her teacher did not like Jehovah's Witnesses. He explained that he had attended school with one of Jehovah's Witnesses. The young man had said little about his faith or about life as a

Witness. Hence, the teacher concluded that Witnesses are strange people and decided that he wanted nothing to do with them. But Rebekka's presentation changed things. "I now get along with the teacher much better," she says. "I also learned that we as youths ought to talk more freely to others about our faith."

But that was not the end of the story. The teacher told his colleagues about Rebekka's excellent talk. Some days later the ethics teacher asked Rebekka to give another talk, not just in front of a class but on a very special occasion—the school's annual remembrance of the liberation of the concentration camp at Auschwitz at the end of World War II. About 360 pupils were in attendance, along with about ten teachers. At the end of the talk, those present accepted 50 booklets, and the school asked for 150 additional copies for later distribution.

Much more was achieved than Rebekka expected. A good witness about her faith was given not only to her class but also to the whole school. And her teacher overcame his earlier doubts about the Witnesses.



Heinrich Fundis was beheaded by the Nazis. Hundreds of other Witnesses were executed as well.

Many of Jehovah's Witnesses were offered freedom if they would sign this document renouncing their faith.

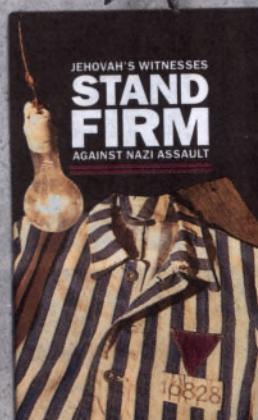
Courtesy of United States Holocaust Memorial Museum





Children such as Berthold Mewes were taken from their parents

This video chronicles the courageous account of Jehovah's Witnesses in Nazi Germany



A purple triangle was sewn on prison uniforms to identify Jehovah's Witnesses

Sand in your eyes causes pain, but how soothing it is under your toes! Vast amounts of it are suspended in seawater, but it also abounds in bone-dry deserts. Hordes of creatures flee its encroachment, but for others, it is home. It is often considered a nuisance, but without it, modern living would be nearly impossible.

From the above description, sand seems to be somewhat of a paradox. Just what is sand, and where does it come from?

A Rough Beginning

Sand is composed of particles of minerals, rock, or soil, with quartz being the most common constituent. Peaks that



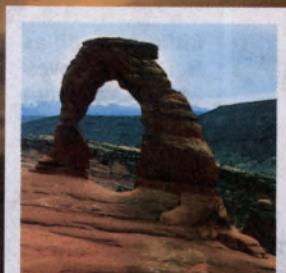
once stood rock solid have eroded into sand. How does such erosion occur?

Sand is often the product of ocean violence. Waves smash against coastal cliffs, and these collisions loosen and rip away slabs of rock. Very large pieces surrender before the unremitting assault, being sloughed off in chunks into the surf. The churning sea grinds off sharp edges, producing boulders. Constant motion gradually wears them into pebbles, and these are crushed into still smaller particles, which we know as sand. Sometimes the sea carries the sand off, but in many places, waves heave the sand back ashore, leaving pristine beaches.

The Splendor

The Namib Desert, Namibia

Forces that make sand by crushing rock include crashing waves, surging surf, and wind



When cold weather combines with ocean violence, frozen water becomes trapped in rock, producing icy wedges that split the stones. The fracturing goes on, reducing large rock masses to smaller and smaller pieces, which eventually become sand.

The wind too plays a role, lifting grains of sand and driving them against rock masses. The abrasion creates more sand. Layers of rock hundreds of feet thick give way before this natural form of sandblasting. Meanwhile, the wind scatters the resulting sand, stretching it out like a carpet on the desert floor.

Over millennia, these harsh processes have yielded countless tons of sand.



Many people would be delighted if it were used only to provide contoured cushions at the beach. But sand's value reaches far beyond the shore, as we shall see.

Tiny Grains, Huge Benefits

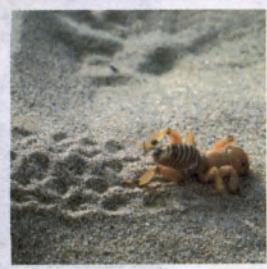
To a large degree, our eating and drinking is dependent on sand. How is that? In one way or another, all our food comes from the vegetation of the earth. Sand and its finely ground cousins silt and clay supply minerals that plants need. Also, sand in the soil allows air and water to circulate. Thus, plant roots can easily absorb nutrients. But how is sand involved in quenching our thirst?

If you fill a one-quart jar with dry sand, you can add a third of a quart of water to that same jar without making

of Sand

Sand is home to insects, flowers, foxes, and camels

Foxes: Hai-Bar, Yotvata, Israel





Sand is an essential ingredient in glass and concrete



Sand dunes can be hundreds of feet high



it overflow. This is so because sand is porous—that is, between its grains there is a lot of space. In fact, there are sand “water jars” large enough to supply large cities with the life-giving fluid. What are they?

Geological formations called aquifers lie below much of the earth’s surface. Composed of vast layers of sand and other porous minerals, these contain water that has been filtering downward for possibly thousands of years. Scientists calculate that these unseen “water jars” hold 40 times more fresh water than all the lakes and rivers on earth. Wells tap aquifers for their precious liquid, which sustains the lives of millions.

Sand Before Your Eyes

You may be walking on sand every day without ever going to the beach. Are streets or sidewalks in your hometown paved with concrete? In some cases, sand makes up one quarter of this common building material. Hundreds of millions of tons of sand are consumed annually as construction material, so much so that some places have experienced shortages of sand.

While sand generally lies underfoot, in another form it may be right before your eyes. The screen on your computer is likely made from sand, as are the lenses of mountaintop telescopes and desktop microscopes. The same is true of crystal vases and your bathroom mirror. Those items are all made of glass, and sand constitutes over half the raw material that is used in glassmaking. How is sand used to make glass?

Sand and other ingredients are mixed and then melted at temperatures exceeding 2,600 degrees Fahrenheit. The resulting viscous liquid can be rolled, blown, bent, drawn, and spun into almost any form. Glass fibers are even woven into cloth. But whether it promotes beauty or industry, whether it refracts or reflects, smooth, clear glass comes from the opaque grit of sand.

Sand on the Move

Imagine a hill 250 feet high that moves. This happens when piles of sand called dunes migrate, pushed by the wind. In some parts of the Sahara, dunes seem to string out their undulating ridges endlessly.

When humans establish themselves nearby, dunes may pay them an unpleasant visit. Indeed, sand on the move has been known to block highways, swallow houses, and bury entire towns.

Abounding With Life

As lifeless as sand may appear, many creatures call it home. Foxes, snakes, and scorpions burrow in desert sand during the day. Sleeping through the heat, they come out at night to hunt for food. Along Namibia’s Skeleton Coast, in southwest Africa, elephants roam the vast dunes. They seem to have fun on the steep, sandy inclines, sliding down dragging their back legs. The “ship of the desert,” also known as the camel, cruises the sand seas of Asia and Africa.

Some animals come up out of the ocean to make use of sand. When their biological clocks sound the alarm, horseshoe crabs, sea turtles, and small fish called grunions ride the surf to the shore. There they lay their eggs to incubate in the softness of the sand.

For certain flowers, a dune is as comfortable as a window box. Sea rockets, beach peas, and beach morning glories flourish in sand and push their heads back up even when a dune buries them. Their long roots pull up water and nutrients to feed dainty blossoms—dabs of color on the monotone canvas of sand.

Granted, sand can be irritating when it collects in your shoes as you stroll near the shore. Do not get annoyed though. The fact is, we depend on those humble grains of sand! Sand is yet another testament to the wisdom of the Creator, Jehovah God.—Psalm 104:24.

Sandy Fascination

Sand comes in a variety of colors. In different lands, you can find sands that are pitch-black, snow-white, purple, gray, red, orange, yellow, and many hues in between. Some include a mixture of crushed seashells. The array of color and texture in sand fascinates some people to the point that they have taken up collecting sand. Many find themselves trading sand, traveling to find it, and stooping to gather samples of it in small glass bottles, new additions to their collections. They call themselves arenophiles, meaning “lovers of sand.”

◀ Courtesy Serge tkint

The Fascinating World of

QUEEN CLEOPATRA of Egypt declared them sacred. Aristotle called them the intestines of the earth. Charles Darwin felt that they played an important part in the history of the world. What animal earned the admiration of such famous people? The humble earthworm.

As you will see, worms deserve to be admired. True, they are slimy and they wriggle. But even these qualities, which we might consider unattractive, can inspire a sense of awe once you get to know the worm a little better. All you need to do is bend down and upturn a clod of soil or disturb a layer of leaf litter, and you have entered the fascinating world of worms.

Simple Brain, Astounding Talents

Take a closer look at an earthworm, and you will notice that its body is constructed of ringed segments that look like a row of miniature doughnuts bunched tightly together. Each segment is powered by two groups of muscles. One group, just below the skin, forms a ring around the worm. Beneath this layer, the second group stretches along the worm. The worm moves by expanding and contracting these opposing muscle groups, flexing segment after segment in a rhythmic pulse that ripples down its body.

If you place an earthworm in your hand, no doubt it will writhe and wriggle. The worm



Worms "paddle" through the soil with their setae

reacts this way because its body is bristling with sense organs—as many as 1,900 on just one segment. These receptors give the worm a sense of touch, the capacity to taste, and the ability to detect light.

The worm grips the soil with the aid of small, hairlike projections called setae. Each segment of the worm has sets of setae that act somewhat like the oars of a rowboat. The worm plunges them into the soil, pulls itself along, and then retracts them. The worm can "paddle" in either direction using one set of setae at a time or, if startled, can anchor one end of its body while rapidly retracting the other end. The athletic skill displayed in timing these "oar strokes" would make an Olympic rowing team envious.

If a bird nips off a worm's tail segments, some species of worms simply regrow them—but they never regrow more segments than are lost. It seems that each segment generates a tiny electrical charge and that worms regrow lost segments until a preset maximum charge is regained.

The thousands of sense organs and the complex muscle systems are all wired into the cerebral ganglion, located at the mouth end of the worm. Experiments have shown that in addition to their physical talents, worms have a limited capacity for memory and can even learn to avoid danger.

Worms

BY AWAKE! WRITER
IN AUSTRALIA

Why So Slimy?

The slimy surface of the worm, which many find so revolting, actually allows the little creature to breathe. The worm's skin is porous, and blood vessels close to the skin absorb oxygen from the air or from oxygenated water while releasing carbon dioxide. But these gases can interchange only if the skin is moist. If a worm dries out, it will slowly choke to death.

On the other hand, if a worm is trapped in its burrow during heavy rain, the oxygen supply in the water will be quickly exhausted. This is one reason why worms crawl to the surface after a downpour. If they don't evacuate, they will suffocate.

A Planet Crawling With Productive Plowmen

Over 1,800 species of earthworms share our planet. They inhabit all but the driest and coldest parts of the earth. Under the savannas of South Africa, there may be as few as 7 worms in every square foot of soil, while on a forest floor in Canada, there may be over 70 worms per square foot.

Worms till the soil, increasing its fertility



In New Zealand, earthworms are divided into three basic types. The first type contains fast-breeding, fast-moving worms that live among rotting organic matter on top of the earth. The second and most widely distributed type consists of worms that burrow horizontally through the top layers of soil. Worms of the third type bore vertically into the ground and may spend several years—a worm's entire life span—in one burrow. These are the musclemen of the worm world. They have powerful rings of muscles around their heads that enable them to push and chew their way into the earth. One of the largest worms in the world is found in southern Australia. This giant may grow to over four feet in length and weigh a pound.

As worms squirm through the earth's surface, they act like miniature plowmen. Munching their way through manure, soil,

The giant Gippsland worm, an endangered species in Australia, can grow to over four feet in length



Courtesy Dr A. L. Yen

and decaying vegetation, they produce a waste product called worm castings—a product they manufacture in enormous quantities. It has been estimated that worms working under the green fields of England annually churn out about eight tons of castings per acre. More impressive are the worms that inhabit the Nile Valley. These worms may deposit up to 1,000 tons of castings per acre. As worms till the soil, it becomes better aerated and more water absorbent and increases in fertility.

Scientists have discovered that the worm's digestive system converts nutrients into forms that plants can absorb, so worm castings are bursting with plant food. In addition, many harmful microorganisms found in rotting manure and vegetation are destroyed as they pass through a worm's gut. Thus, worms clean the soil as they feed. An ideal recycling machine, they thrive on waste while manufacturing nutritious food.

Harnessing Worm Power

The worm's remarkable recycling powers are being harnessed by the waste-disposal industry. One company in Australia makes use of a total of 500 million worms in several waste-processing plants. The worms are housed in specially designed beds and are served a menu of either pig manure or human waste mixed with shredded wastepaper.

Worms convert waste into nutrient-rich plant food

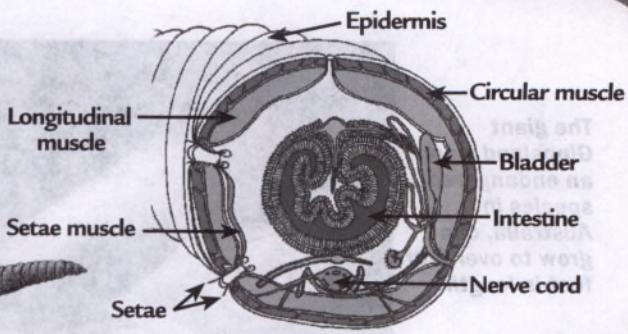


and other organic matter. These worms consume between 50 and 100 percent of their own body weight each day and produce a nutrient-rich plant food that is marketed widely.

Studies have revealed another possible use for worms—as a source of food. Worms contain the same beneficial amino acids as beef. On a dry weight basis, they are packed with 60 percent protein and 10 percent fat and contain calcium and phosphorus. Already, in some lands, people eat earthworm pies. In other parts of the world, they fry earthworms and even eat them raw.

While worms may never become the most popular animals in the world, the world would certainly be a different place without them. So the next time you admire a tranquil country scene, spare a thought for the army of earthworms that are beneath your feet, busily plowing, fertilizing, and maintaining that beautiful view.

The Anatomy of an Earthworm



J. Soucie © BIODIDAC

Behold the **MIGHTY HIPPO!**

BY AWAKE! WRITER IN KENYA

THE large pool within the sprawling Masai Mara Game Reserve in Kenya is bathed in the quiet radiance of the evening sun. As the sun descends on the horizon, the waters reflect a golden-brown resplendence. A few feet away, herds of zebras and wildebeests (gnu) approach the pool at a leisurely pace. Suddenly and with much apprehension, the animals stand still, their eyes firmly fixed on a huge boulderlike object floating near the edge of the pool. After boisterously agitating the waters, the "boulder" sinks out of sight. The grazers have just beheld a vicious aquatic animal—the hippopotamus.

Found in pools, rivers, and lakes in eastern Africa, the hippo is surpassed in size only by the elephant. When full-grown, the hippo may reach a length of 15 feet and a shoulder height of 5 feet. Its weight may be about four tons. The word "Behemoth" mentioned in the Bible book of Job is generally considered to refer to the hippopotamus.



Not surprisingly, the Bible describes this massive beast as having bones that are as "tubes of copper," and it compares them to "wrought-iron rods."
—Job 40:15-18.

Thick-skinned, hairless, and seemingly clumsy, the barrel-shaped hippo would certainly fare badly in any beauty contest. The legs of the hippo are short, causing one to wonder how they manage to support such a colossal frame. But do not underestimate the power of those stubby legs. On land the hippo can run faster than man. In water it has been known to outdo a small man-powered boat or even a motorboat.

Aquatic Life

Hippos are sociable animals, typically living in groups of 10 to 15 led by a dominant bull, though larger groups numbering about 150 have been seen. They are amphibious and emerge from the water—mainly at night—to feed on the lush vegetation found on the shores. Generally, they avoid straying far from the water. In the dry season, however, some hippos have been known to walk up to six miles in search of food.

It is unclear how hippos mark their territories. A startling habit of spreading their dung around with the tail is thought by some to be a way of impressing female hippos or of intimidating a rival. Under attack, they neigh like a horse, and they bellow or roar when fighting. Loud snorts are audible

even when the animals are submerged. The lead bull gives himself away with a MUH-Muh-muh call.

The hippo spends the whole day partially or totally submerged in water, and its large body is well suited for this. Although it may not be an accomplished swimmer like its amphibious neighbors, the hippo can stay submerged for up to 15 minutes! Its nostrils, eyes, and ears are located on one level, making it possible for the animal to hide the rest of its body underwater. It is here, underwater, that several of the hippo's activities—including courtship and mating—take place.

After a gestation period of about eight months, a single offspring is born in shallow waters. Suckling occurs either on land or in ankle-deep water. As strong as it is, the hippo takes parenting seriously, treating the baby with surprising tenderness. Indeed, a floating mother with a young hippo riding on her back is a remarkable phenomenon to behold. Of course, the seemingly benign animal will put up a fierce fight against any attempt to get the baby off her back!

The hippo's skin is well suited for aquatic life. Significant changes become evident once the animal emerges onto land. Glands situated under the skin secrete thin mucus with a reddish-brown color and a high salt content. Seen from a distance, the pigment makes the animal appear to be sweating blood. The slime, however, protects

the skin both in water and on dry land. In ancient African communities, the skin of the hippo was cut into strips and soaked in oil. Then the strips were twisted and dried to make a dreaded whip that was used in territorial fights.* *Grzimek's Animal Life Encyclopedia* notes that after tanning—a process that takes at least six years—the hippo skin "is as hard as rock and about four and a half centimeters [one and three quarters inches] thick."

The Impressive but Frightening Yawn

The mouth is certainly the most striking feature of the hippo. On land the animal uses its one-and-a-half-foot-wide lips to graze near the water. Yet, the mouth is not just a feeding instrument. When the hippo opens its jaws 150 degrees, it is not merely a yawn but a threatening display of aggressiveness. Defending the ever-diminishing territory leads to serious fights between opponents. The open mouth reveals huge lower canines. These weapons of defense may reach a length of 12 inches above the gum line.

The hippo's mouth is dangerous not only to other hippos but also to humans. Any human efforts to coexist with the hippo have proved futile. The animal will make an unprovoked attack on those who venture too close to its domain. Furthermore, if a hippo is wounded, it is even more irritable and

* The hippo's Swahili name—*kiboko*—means "whip."

hence capable of inflicting greater damage on any intruder. Even boats have been capsized by the huge jaws of an angry hippo.

On land the hippo is as brutish as it is in water. For example, it is extremely dangerous to be between a grazing hippo and the water. Indeed, in some parts of Africa, unsuspecting villagers have been attacked by hippos that found their path to the water blocked. The animal inspires fear in both man and beast and must be treated with the utmost caution and respect.

Will the Hippo Survive?

Grazing on land, a lone hippo is vulnerable to attack by lions. Nevertheless, the hippo's most threatening enemy seems to be man. "People have greatly reduced both the number of hippopotamuses and the size of the area in which they live," says the *World Book Encyclopedia*. "Hunters have killed large numbers of them, and farmers have made cropland out of many areas where hippotamuses once made their home."

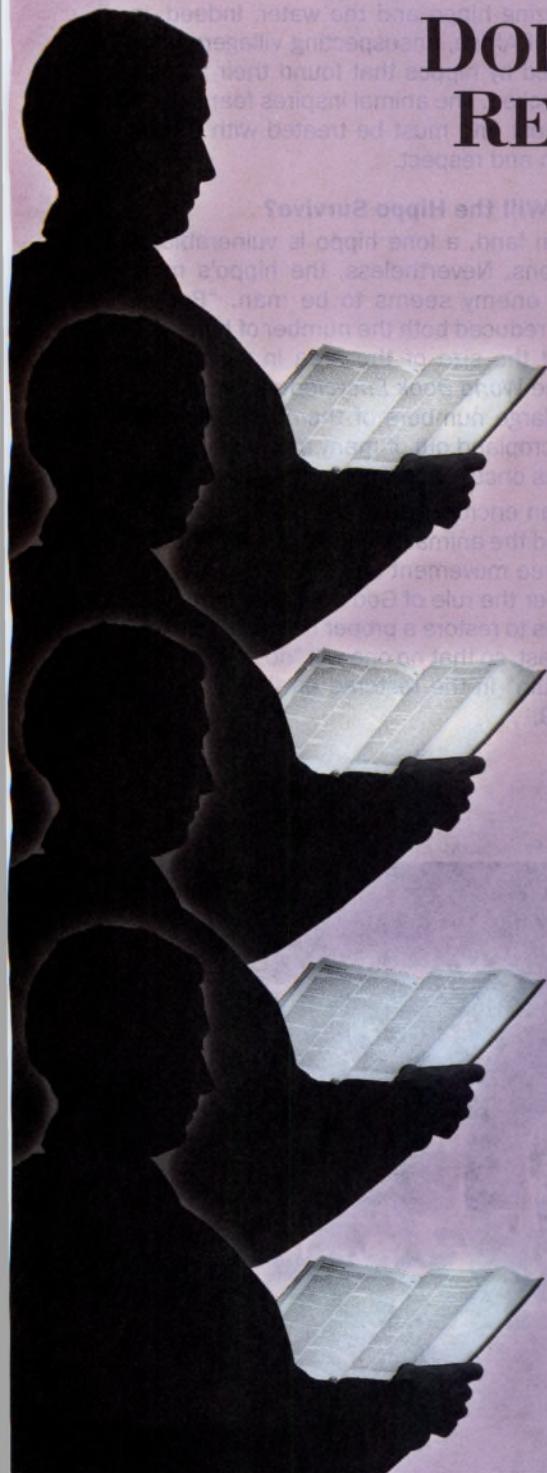
Yes, human encroachment on the hippo's habitat has forced the animal into a small area, thus inhibiting its free movement and breeding patterns. Happily, under the rule of God's Kingdom, the Creator promises to restore a proper balance between man and beast, so that no one will "do any harm or cause any ruin" in the restored earthly Paradise.
—Isaiah 11:9.

◀ Elizabeth DeLaney/Index Stock Photography



The Bible's Viewpoint

DOES CHRISTIAN UNITY REQUIRE UNIFORMITY?



RELIGION today seems to be characterized by disunity. Even within the walls of one church, people may have a variety of conflicting beliefs in matters of doctrine and conduct. One writer put it this way: "It's even difficult to find two people who believe in exactly the same God. These days, it seems, every human being is a theologian unto himself."

In stark contrast with this, the apostle Paul exhorted first-century Christians in Corinth to "speak in agreement" and to "be fitly united in the same mind and in the same line of thought." (1 Corinthians 1:10) Some today criticize Paul's admonition. 'People are different,' they argue, 'and it is wrong to insist that all Christians think or act in the same way.' But was Paul really recommending robotic conformity? Does the Bible allow for personal freedom?

Unity, Not Uniformity

In another of his letters, Paul urged Christians to serve God with their "power of reason." (Romans 12:1) Certainly, then, he would not have been trying to turn members of the Corinthian congregation into unthinking automatons. But why did he tell them to be "fitly united in the same mind and in the same line of thought"? Paul gave this counsel because the congregation in Corinth was experiencing a serious problem. Factions had developed, so that some viewed Apollos as their leader while others favored Paul or Peter or held only to Christ. Such disunity was no trivial matter, for it threatened the peace of the congregation.

Paul wanted the Corinthians to "observe the oneness of the spirit in the uniting bond of peace," just as he later admonished the Christians at Ephesus. (Ephesians 4:3) He was encouraging the brothers to follow Jesus Christ unitedly, not to be split into disunited groups, or sects.

In this way they would enjoy a peaceful harmony of purpose. (John 17:22) Paul's counsel to the Corinthians thus served to readjust their thinking and promote unity, not uniformity.—2 Corinthians 13:9, 11.

Unity is also important in matters of doctrine. Footstep followers of Jesus realize that there is really only "one faith," just as there is only "one God and Father." (Ephesians 4:1-6) Hence, Christians make sure that what they believe is in harmony with the truth that God has revealed in his Word about himself and his purposes. They are united in their belief about who God is and what he requires. They also live up to the clear moral standards set out in God's Word. (1 Corinthians 6:9-11) In this way Christians remain united, both doctrinally and morally.

Dealing With Differences

This does not mean, however, that each Christian is told precisely how to think and what to do in all of life's situations. Most matters involve personal choice. Consider an example. A number of first-century Christians in Corinth had reservations about eating meat that may have come from an idol temple. Some believed strongly that partaking of the meat would constitute an act of false worship, while others felt that where the meat came from was irrelevant. In dealing with this sensitive issue, Paul did not make a rule that would tell Christians what to do. Instead, he acknowledged that people might make different decisions on the matter.*—1 Corinthians 8:4-13.

Today Christians may make decisions that differ from those of other Christians when it comes to matters of employment, health, recreation, or some other area that involves personal choice. Such variety could disturb some. They might wonder if differences in outlook could lead to disputes or divisions in the con-

* For example, it is possible that some who worshiped idols before becoming Christians could not distinguish between eating the meat and engaging in an act of worship. Another valid concern was that weaker Christians might get the wrong impression and be stumbled.

gregation. However, such an outcome is not inevitable. To illustrate: Music composers have only a limited number of notes to work with, yet the possibilities for making beautiful music are endless. Similarly, Christians make choices that are within the boundaries of godly principles. However, they have a degree of latitude when making certain personal decisions.

How is it possible to preserve Christian unity while maintaining respect for individual choice? The key is love. Love for God moves us to submit willingly to his commandments. (1 John 5:3) Love for fellowman moves us to respect the rights of others to make conscientious decisions in personal matters. (Romans 14:3, 4; Galatians 5:13) Paul set a fine example in this regard when he submitted to the authority of the first-century governing body in a matter involving doctrine. (Matthew 24:45-47; Acts 15:1, 2) At the same time, he encouraged everyone to respect the conscience of fellow Christians in matters that have been left to personal decision.—1 Corinthians 10:25-33.

Clearly, no one should be condemned for making a conscientious decision that does not conflict with Bible principles. (James 4:12) On the other hand, loyal Christians would not insist on their personal rights to the detriment of the consciences of others or at the expense of congregation unity. Nor should they claim freedom of action to do something clearly forbidden by God's Word. (Romans 15:1; 2 Peter 2:1, 19) Love for God should move us to attune our conscience to God's thinking. This, in turn, will keep us united with fellow believers.—Hebrews 5:14.

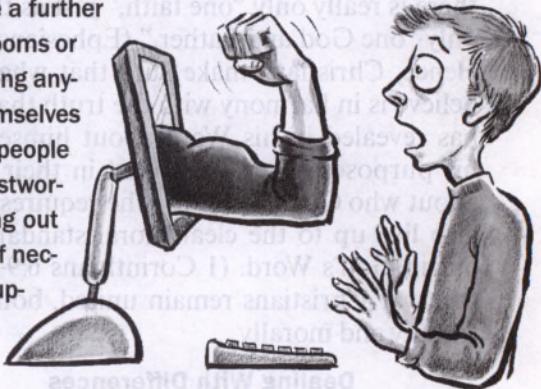
In Our Next Issue

- When Insects Spread Disease
- Math Is for Everyone
- "It Never Rains in Lima?"

Watching the World

Text-Message Bullying

"One in every four teenagers has been a victim of bullying via a computer or mobile phone," says *The Guardian* of London. A report by the British charity National Children's Home (NCH) revealed that 16 percent of young people between the ages of 11 and 19 "received threatening text messages on their mobiles," while a further 11 percent had been harassed either through Internet chat rooms or via E-mail. The NCH says that the children "are either not telling anyone and suffering in silence, or confiding in people who themselves don't know how to deal with it effectively." It advises young people not to put up with the bullying but to tell a responsible, trustworthy person what is happening; to be very careful about giving out phone numbers and E-mail addresses; and to change these if necessary. The NCH advises that "if you receive messages that upset you, make a record of the times and dates and report them to police," says *The Guardian*.



Nicotine and SIDS

Researchers in France and Sweden may have discovered why smoking increases the risk of sudden infant death syndrome (SIDS), reports the French daily *Le Figaro*. Animal studies have revealed that exposure to nicotine can interfere with respiratory reflexes during sleep. "A lack of oxygen (hypoxia) during sleep, which can happen spontaneously during brief pauses in respiration (apnea), ordinarily sets off a powerful cardiorespiratory excitation, as well as arousal. But if this protective response is altered, apnea and hypoxia are exacerbated and can lead to respiratory failure," says the report. The researchers propose that in humans this protective response can be impaired by a continual exposure to nicotine transmitted in a smoking mother's blood to the fetus during pregnancy. The result might be "a decrease in the efficiency of respiratory

and arousal reflexes in response to sleep apneas, and thus an increase in the risk of sudden infant death." SIDS, says *Le Figaro*, "remains the primary cause of mortality in France in the first year of life."

"Erotic" Pop Culture

Through fashion, advertising, media, and show business, "contemporary pop culture is aggressively taking advantage of human fascination with sex," says the Polish weekly *Polityka*. According to designers, "fashion fuels eroticism, and eroticism fuels fashion." The underlying premise is, 'The more you expose, the sooner you will be noticed.' Likewise, sex and eroticism in advertising "make a commercial more memorable," thus promoting sales, says Dr. Ewa Szczesna, a University of Warsaw expert on culture semiotics (signs and symbols). "The boundaries of what is considered to be erotically stimulat-

ing have been significantly redefined," she adds. According to *Polityka*, experience has shown that advertisers would cross any boundary for money.

Media Growth in India

Newspaper readers in India have increased from 131 million to 155 million in the three-year period from 1999 to 2002, according to a survey conducted by the National Readership Studies Council. The country's readers of print media—combining the readership of newspapers, magazines, and other periodicals—total 180 million. However, with more than 65 percent of India's population of over one billion being literate, there is much room for readership expansion. Television viewers number 383.6 million, while radio reaches 680.6 million listeners. Just over 6 million people now access the Internet compared with 1.4 million in 1999. About half of all the

homes in India having television now have cable and satellite subscriptions, an increase of 31 percent in three years.

Increase in Kidnapping

"Fifteen years ago, kidnapping barely existed [in Mexico]," reports *The News of Mexico City*. "But crime began increasing in the 1980s, and an economic crash in 1994-95 seemed to make fundamental changes in Mexico, turning kidnapping—and crime generally—into a growth industry." It appears that no one is immune from being kidnapped. "Maids are held for 500 dollars in ransom; a *Tijuana* girl, 12, was kidnapped . . . by college students trying to raise money for school; and some people have gone so far as to fake their own kidnappings to collect from their families or businesses," says *The News*. "[Kidnapping has] become part of the fabric of life. Mexico has developed a culture in which ransoms are quickly paid and the police are rarely notified." In fact, according to victims,

security specialists, and even court records, "police are often involved in kidnappings, and a weak and corrupt judicial system often means they won't be caught."

Language Skills Declining

"About 20 percent of primary, middle and high school students rarely read books for fun and about 80 percent of middle and high school teachers feel that the Japanese-language proficiency of students has deteriorated," says *The Yomiuri Shimbun*, a Japanese daily. Researchers at the National Institute for Educational Policy Research surveyed "2,120 students from the fourth year in primary school to the second year in high school, and 259 teachers at primary, middle and high schools," says the report. They found that "reading less has worsened [the students'] reading comprehension, vocabulary and writing skills." Many of the teachers surveyed blamed the trend on the reduced reading habits of the adults, including teachers, with whom

students associated. They also "pointed to the adverse effects of video games."

Air Pollution Deaths Now Exceed Road Fatalities

"The World Health Organization reports that 3 million people now die each year from the effects of air pollution. This is three times the 1 million who die each year in automobile accidents," says a report published by the Earth Policy Institute. Governments work hard to reduce road fatalities, but "they pay much less attention to the deaths people cause by simply driving the cars. While deaths from heart disease and respiratory illness from breathing polluted air may lack the drama of deaths from an automobile crash, with flashing lights and sirens, they are no less real," says the report. "Air pollutants include carbon monoxide, ozone, sulfur dioxide, nitrogen oxides, and particulates"—all of which stem from the combustion of fossil fuels such as coal and gasoline.

"Talking" Plants

Researchers at the Institute for Applied Physics at the University of Bonn, Germany, have developed laser-driven microphones that can "listen" to plants. The microphones pick up sound waves produced by ethylene gas, which is given off by plants when they are under stress. Bonn University scientist Dr. Frank Kühnemann says: "The

more a plant is subjected to stress, the louder the signal we get on our microphone." In one case an apparently healthy cucumber "was virtually shouting," according to readings. "A closer study showed that it had developed mildew, yet the symptoms were not visible." In fact, mildew takes eight or nine days to form visible spots, and only then can farmers detect the problem. "By eavesdropping on plants," says *The Times of London*, "it should be possible to develop an early-warning system to detect pests and disease. Knowing the stress level of fruit and vegetables can also be an aid in efficient storing and transporting."



From Our Readers

Young People Ask Thank you for the article "Young People Ask . . . Why Doesn't My Parent Love Me?" (September 22, 2002) I am 16 years old, and I haven't seen my biological father since I was 4. This article



expressed exactly how I feel. It was correct in saying that few things wound more than rejection by a parent. Thank you for this spiritual food at the proper time.

J. J., United States

My parents decided to get a divorce 13 years after their separation. I did not understand why I was suffering so much, since I thought I had dealt with the trauma long ago. Understanding the reason for my profound sadness helps me to be more specific in my prayers and to throw even this burden upon Jehovah.

M. D., Italy

My father left my family when I was six years old. Since then he has had minimal contact with me. For years I have battled with feelings of guilt. As a result, I have never been good at communicating my feelings to others. The experiences in your article touched me and helped me to see that I am not alone in this situation. Please do not underestimate the benefits we readers gain from these articles and the gratitude we feel for them!

A. H., England

I am 16 years old, and my father just divorced my mother. My younger brother, older sister, and I have been crushed. This article was just incredible. The moment I started reading it, I burst into tears. It described every feeling I have been experiencing inside. The wording was so tender and loving. The more I read, the more I was touched. Many times I have wondered if I was really worthy of my father's love. That is why I found so much comfort in this article. It is the best feeling to know that even if my human father doesn't love me, Jehovah always will. I don't have to worry

that he will suddenly change and turn his back on me.

A. M., United States

Our family grew up with an alcoholic father, and my mother suffered a lot. We children didn't get much attention. I felt I was worthless and even thought that I wanted to die. I asked for help in my prayers. When this article came, I was so thankful. I received comfort from the thought that even people in this situation can choose a happy, successful outcome by putting Bible principles to work. I realize that I too can be happy!

A. I., Japan

Vanilla I am a bit concerned about the article "Vanilla—A Spice With a Long History." (September 22, 2002) Years ago I read an article about a toxic vanilla from Mexico. Many people buy it and do not know that it can be toxic.

P. D., United States

"Awake!" responds: Some vanilla produced in Mexico—as well as in other countries—contains extract of tonka beans, which has a high concentration of coumarin. This chemical has been banned by the U.S. Food and Drug Administration because of its possible toxic effects. Since it may not be possible to detect the presence of coumarin simply by sight or smell, consumers are advised to buy vanilla only from reputable sources. Additionally, since pure vanilla extract is expensive because of the cost of its production, a "bargain" that is "too good to be true" should be viewed with due caution.

"The Drum With a Thousand Faces"

BY AWAKE! WRITER IN SENEGAL

"IT BELLOWS, screeches, cries and screams. It whispers and it sings. . . . It is the drum with infinite range, the drum with a thousand faces." What was it that aroused this writer's imagination? The African hand drum called a djembe.

The djembe is at the heart of the drumming tradition of some West African tribes. Typically, djembe rhythms are linked with cultural events of village life, ranging from marriages, deaths, and births to festivals, harvests, and even the purchase of new clothing.

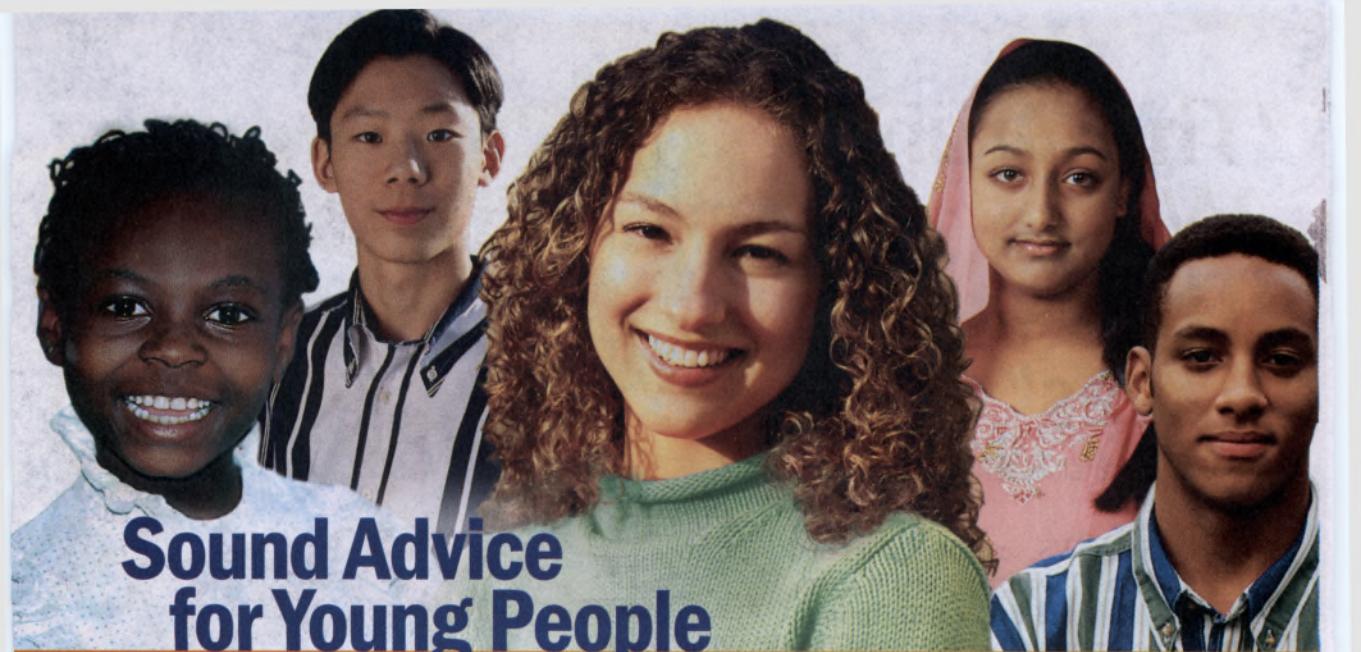
Djembes come in various shapes and sizes. In fact, Burkina Faso, Guinea, Mali, and Senegal each have their own unique style of djembe. The instrument is fashioned from a solid log, which is hollowed out and shaped into a drum shell. Some have modest ornamentation, while others are crafted with elaborate carvings.

Once the shell is complete, a skilled drum maker transforms the wooden skeleton into a unique musical instrument. First, the drum maker chisels, scrapes, and sands the shell until it is the precise dimension that will produce the desired sound. This craftsman may also coat the inside of the drum with palm oil and allow it to dry in the sun. This helps preserve the wood.

The drumhead of the djembe is made from goatskin and is attached to a metal ring and placed on top of the drum. It is held in place by a network of cords connected to two other rings. How tight does the drum maker pull the cords? It all depends on the sound he wants to produce. As the craftsman tunes the drum, he periodically checks it by playing his favorite beat.

The djembe entralls both Africans and visitors alike. Indeed, once you experience a jam session put on by skilled musicians, it is hard to forget "the drum with a thousand faces."





Sound Advice for Young People

While offering magazines near a courthouse in California, U.S.A., Bill, one of Jehovah's Witnesses, was approached by a man who asked to see all the Awake! magazines that Bill had with him. Bill relates: "Earlier some in the congregation had given me some older magazines, so I was able to show the man a wide variety.

"The man quickly separated the magazines and made a stack of the ones he had not yet read. He asked if he could have the stack of magazines. He identified himself as an employee of the county court and said that he was in charge of counseling young people in trou-

ble. He explained that he obtains Awake! in order to photocopy the 'Young People Ask' articles. He then files the articles by subject

He commended Jehovah's Witnesses for publishing such good information to help young people. He added that he would be looking for me in the coming weeks to pick up any new Awake! magazines that I could supply."



and keeps them on hand to give to the young people he counsels. The man said: 'The subjects discussed are typical problems troubling young people today.'