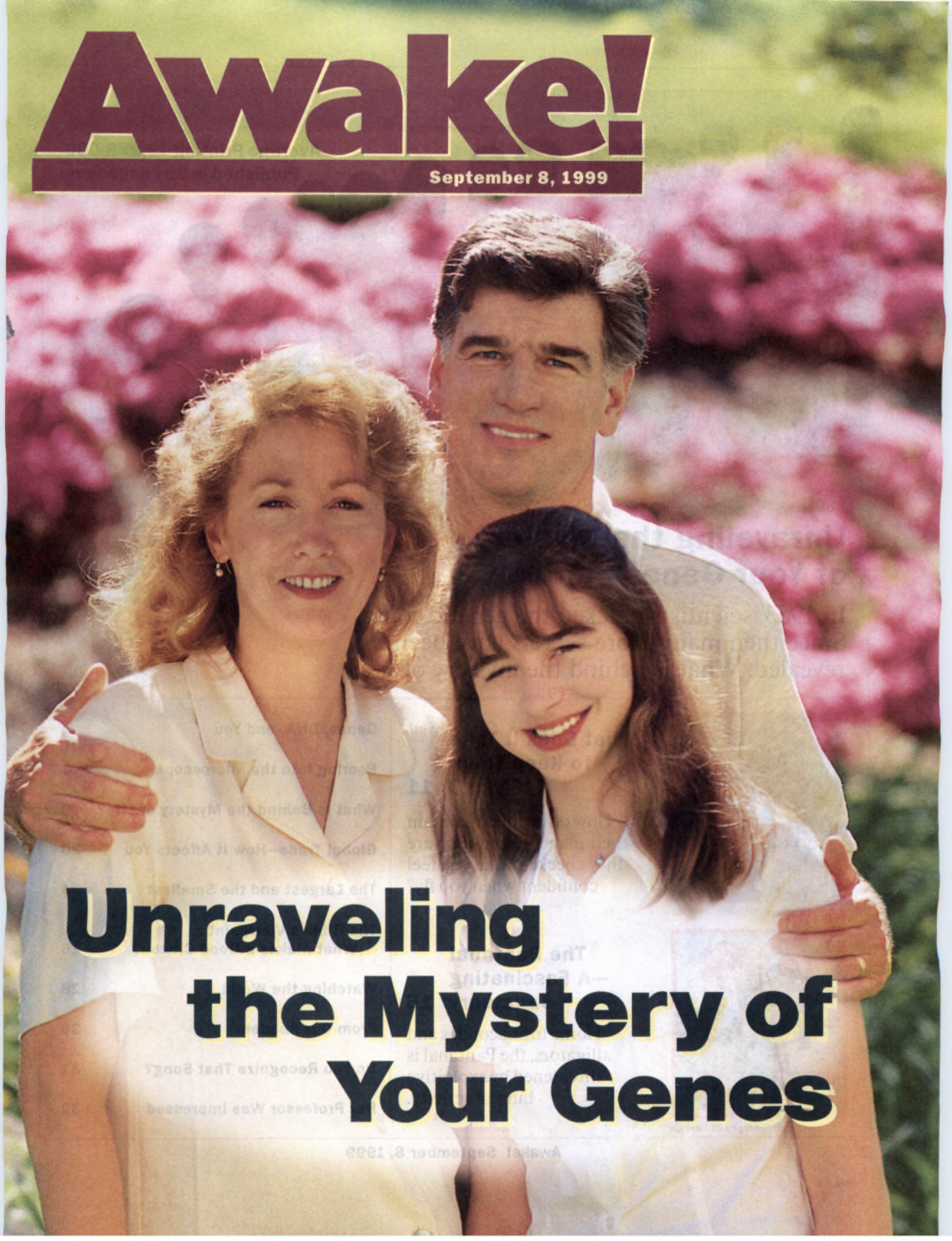
Awake!

September 8, 1999



Unraveling the Mystery of Your Genes

Awake!

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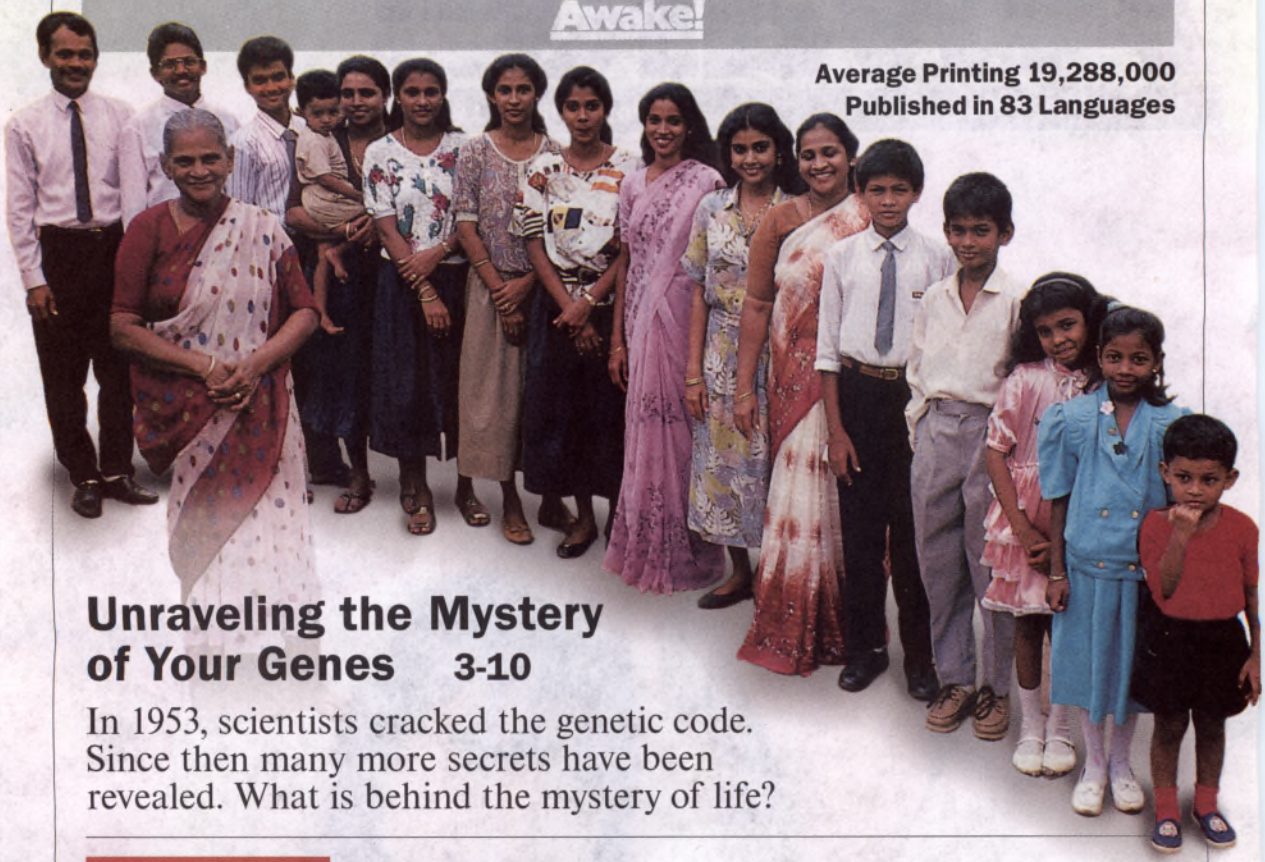

Unraveling the Mystery of Your Genes 3-10

In 1953, scientists cracked the genetic code. Since then many more secrets have been revealed. What is behind the mystery of life?

Courtesy of United Airlines

Georges El Sayegh

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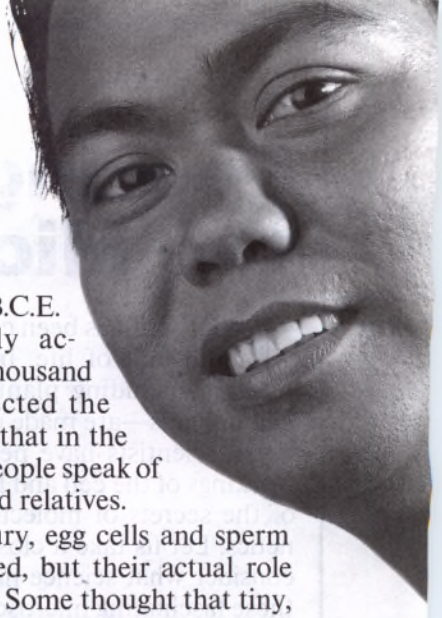
Genes, DNA, and You



TAKE a good, long look at yourself in the mirror. Note the color of your eyes, the texture of your hair, the shade of your complexion, and the shape of your body. Think about the talents that you possess. Why do you look the way you do? Why do you have the particular traits and talents that you do? Today the mystery is being clarified through an understanding of genetics—the study of heredity—and the effects of environment.

'Genetics?' you moan. 'That subject sounds too scientific and too difficult to understand!' However, have you ever told someone that she has her father's green eyes but her mother's red hair and freckles? If so, you already know a basic fact of genetics—physical traits are passed from parent to child. In addition, that fact may be the decisive start to your understanding how man got here—by evolution or by creation. To begin, let us see how each of us carries the heritage of many generations.

Your body is made up of tiny living units called cells—some 100 trillion of them, according to one estimate. Inside each cell, within its nucleus, there are thousands of genes. They are individual units of heredity that control the cell and therefore determine some of your characteristics. Many genes may order your blood type; others, your hair texture, your eye color, and so on. So each cell carries a miniature blueprint or codebook made up of genes, which contains all the instructions needed to build, repair, and run your body. (See diagram, page 5.) Could all of this have happened by accident?

How the Mystery Was Unraveled

The theory that traits were inherited through the blood was devised by Aristotle in the fourth century B.C. and was generally accepted for over a thousand years. This so affected the thinking of the day that in the English language, people speak of bloodlines and blood relatives.

In the 17th century, egg cells and sperm cells were discovered, but their actual role was misunderstood. Some thought that tiny, fully formed creatures were present in either the egg or the sperm. By the 18th century, though, researchers correctly recognized that an egg and a sperm combine to form an embryo. Nevertheless, an accurate explanation of heredity was still to come.

It wasn't until 1866 that an Austrian monk named Gregor Mendel published the first correct theory of heredity. From his experiments with garden peas, Mendel discovered what he called "discrete hereditary elements" hidden in sex cells, and he asserted that these were responsible for the passing on of traits. These "discrete hereditary elements" we now call genes.

About the year 1910, genes were found to be located on cell structures called chromosomes. Chromosomes consist primarily of protein and DNA (deoxyribonucleic acid). Since scientists were already aware of the important role of proteins in other cell functions, they assumed for many years that chromosomal proteins carry genetic information. Then, in 1944, researchers presented the first proof that genes consist of DNA, not protein.

In 1953, when James Watson and Francis Crick discovered the chemical structure of DNA, coiled threadlike molecules, man's unraveling of the mystery of life took a great step forward.

Peering Into the Microscope

THE cell has been called the fundamental unit of life. Indeed, living things —including plants, insects, animals, and humans—are made up of cells. Over the years, scientists have peered into the inner workings of the cell and have unlocked many of the secrets of molecular biology and genetics. Let us take a closer look at cells and consider what science has discovered about these fascinating microscopic units of life.

A Peek at the Microscopic

Cells vary in shape. Some are rectangular; others are square. There are round cells, egg-shaped cells, and some that simply look like blobs. Consider the amoeba, a one-celled organism that has no defined shape at all. Instead, it changes its form as it moves. Interestingly, the function of a cell is often suggested by its shape. For example, some muscle cells are long and thin and contract as they perform their work. Nerve cells—which relay messages throughout the body—have long branches.

Cells also differ in size. Most, though, are too small to be seen by the naked eye. To illustrate the size of an average cell, look at the period at the end of this sentence. About 500 average-size cells could fit within that little dot! If that seems tiny, consider that some bacterial cells are about 50 times smaller. The largest cell? That designation belongs to the yolk of an ostrich egg—a one-celled "giant," which is about the size of a baseball or a cricket ball!

Since most cells cannot be seen with the naked eye, scientists employ instruments, such as the microscope, to study them.* Even then, some intricate details of a cell cannot be fully discerned. Consider this: An electron microscope can magnify a cell some 200,000 times—an enlargement that would make an ant appear more than half a mile long. Yet, even at this magnification, some of the cell's detail is missed!

Scientists have thus found the cell to be amazingly intricate. In his book *The Fifth Miracle,* physicist Paul Davies states: "Each cell is packed with tiny structures that might have come straight from an engineer's manual. Minuscule tweezers, scissors, pumps, motors, levers, valves, pipes, chains, and even vehicles abound. But of course the cell is more than just a bag of gadgets. The various components fit together to form a smoothly functioning whole, like an elaborate factory production line."

* To study the chemical content and characteristics of cells, scientists also use a centrifuge, an instrument that separates their components.

Awake!®

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

Would you welcome more information? Write Watch Tower at the appropriate address on page 5. Publication of *Awake!* is part of a worldwide Bible educational work supported by voluntary donations.

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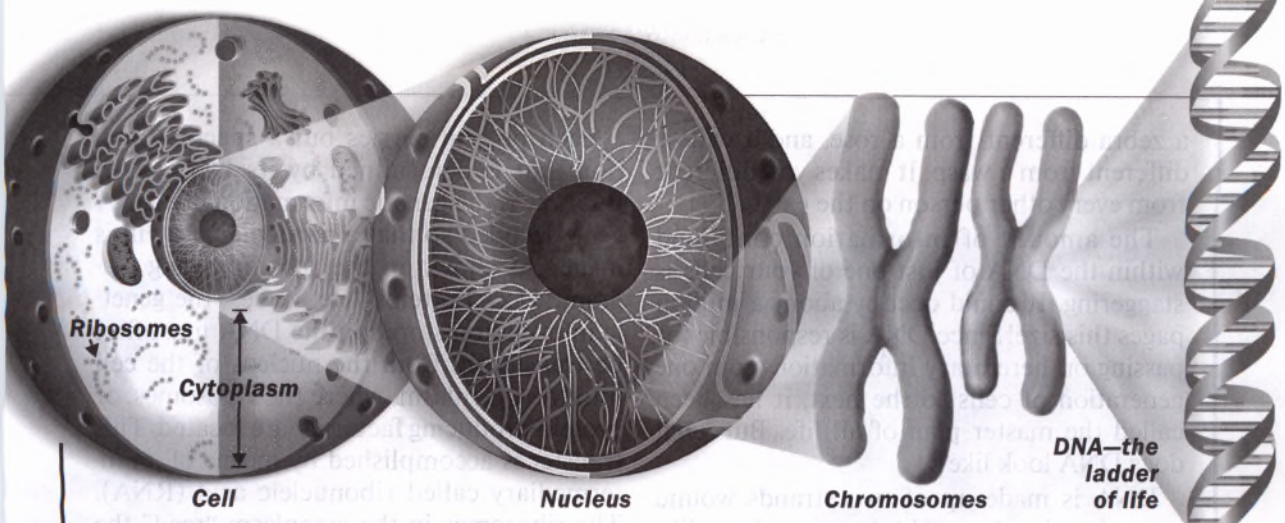

A Look Inside the Cell Inside each cell is a *nucleus*—the cell's command center. Contained within the nucleus are *chromosomes*, which consist of tightly coiled *DNA* molecules and protein. Our genes are located on these DNA molecules. *Ribosomes*, the protein-producing factories, are located in the cell's *cytoplasm*, which is outside the nucleus.

DNA—The Molecule of Heredity

Humans as well as multicelled plants and animals start as a single cell. After that cell reaches a certain size, it divides and forms two cells. Then these two cells divide and form four cells. As the cells continue to divide, they specialize—that is, they differentiate, becoming muscle cells, nerve cells, skin cells, and so forth. As the process continues, many of the cells group together to form tissues. Muscle cells, for example, join forces and form muscle tissue. Different types of tissues form organs, such as the heart, the lungs, and the eyes.

Underneath the thin covering of each cell lies a jellylike fluid called *cytoplasm*. Beyond that is the *nucleus*, which is separated from the cytoplasm by a thin membrane. The nucleus has been called the cell's control center because it directs nearly all the cell's activities. Inside the nucleus lies the cell's genetic program, written in deoxyribonucleic acid—DNA, for short.

DNA molecules lie tightly coiled in the chromosomes of the cell. Your genes, which are sections of the DNA molecules, contain all the information necessary to make you what you are. "The genetic program carried in DNA makes every living thing different from all other living things," explains *The World Book Encyclopedia*. "This program makes a dog different from a fish,

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a zebra different from a rose, and a willow different from a wasp. It makes you different from every other person on the earth."

The amount of information contained within the DNA of just one of your cells is staggering. It could occupy about a million pages this size! Since DNA is responsible for passing on hereditary information from one generation of cells to the next, it has been called the master plan of all life. But what does DNA look like?

DNA is made up of two strands wound around each other and takes on a shape like that of a spiral staircase or a twisted ladder with rungs. The two strands are connected by combinations of four compounds called bases. Each base of one strand is paired with a base on the other strand. These base pairs form the rungs of the twisting DNA ladder. The exact order of the bases in the DNA molecule is what determines the genetic information it carries. Simply put, this sequence determines virtually everything about you, from the color of your hair to the shape of your nose.

DNA, RNA, and Protein

Proteins are the most abundant macromolecules found in cells. It has been estimated that they account for more than half the dry weight of most organisms! Proteins are made up of smaller building blocks called amino acids. Some of these are made by your body; others must be obtained from your diet.

Proteins have many functions. For example, there is hemoglobin, a protein found in red blood cells, which transports oxygen throughout your body. Then there are antibodies, which help your body to ward off disease. Other proteins, such as insulin, help you to metabolize foods as well as regulate various cellular functions. In all, there may be thousands of different kinds of proteins in your body. There may be hundreds within just a single cell!

Each protein carries out a specific function that is determined by its DNA gene. But how is the genetic information in a DNA gene decoded so that a particular protein is made? As shown in the accompanying diagram "How Proteins Are Made," the genetic information stored in the DNA must first be transferred from the nucleus of the cell into the cytoplasm, where the ribosomes, or protein-producing factories, are located. This transfer is accomplished by means of an intermediary called ribonucleic acid (RNA). The ribosomes in the cytoplasm "read" the RNA instructions and assemble the proper sequence of amino acids to form a particular protein. Thus, there exists an interdependent relationship between DNA, RNA, and the formation of proteins.

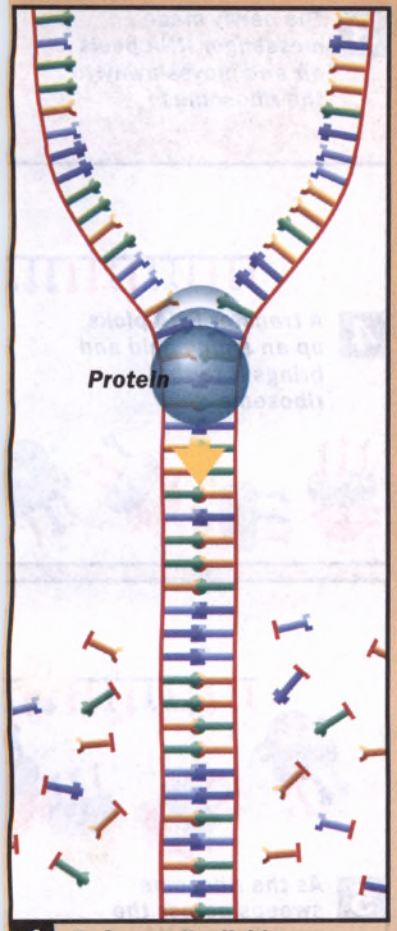
Where Did It Begin?

The study of genetics and molecular biology has intrigued scientists for decades. Physicist Paul Davies is skeptical that a Creator could be behind it all. Still, he acknowledges: "Each molecule has a specified function and a designated place in the overall scheme so that the correct objects are manufactured. There is much commuting going on. Molecules have to travel across the cell to meet others at the right place and the right time in order to carry out their jobs properly. This all happens without a boss to order the molecules around and steer them to their appropriate locations. No overseer supervises their activities. Molecules simply do what molecules have to do: bang around blindly, knock into each other, rebound, embrace. . . . Somehow, collectively, these unthinking atoms get it together and perform the dance of life with exquisite precision."

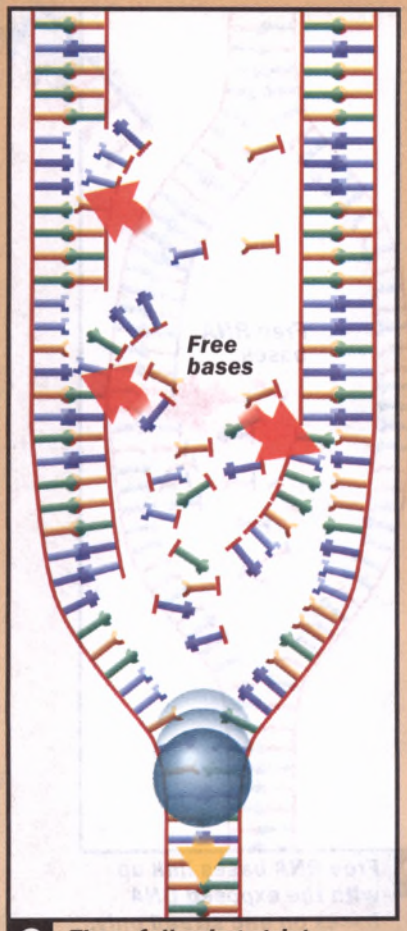
With good reason, many who have studied the inner workings of the cell have concluded that there must be an intelligent force responsible for its creation. Let us consider why.

How DNA Replicates

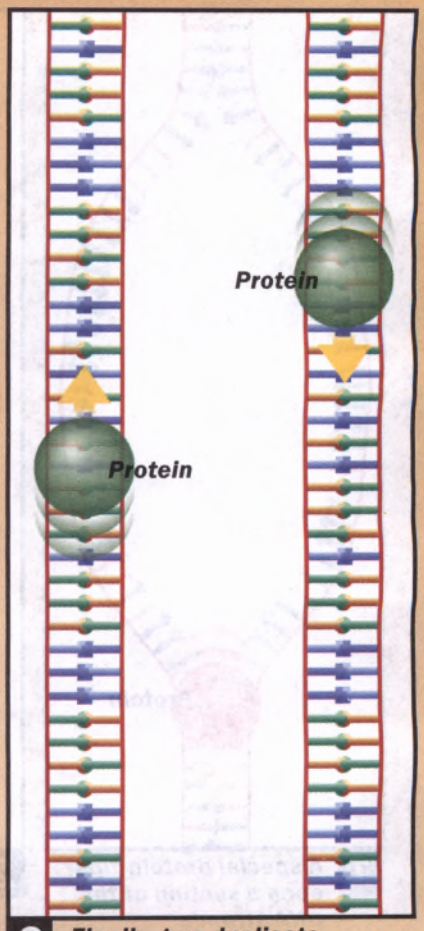
For the sake of visual simplicity, the twisted DNA helix has been flattened



1 *Before cells divide to produce the next generation of cells, they must replicate (make a copy of) the DNA. First, proteins help to unzip sections of the double-stranded DNA*



2 *Then, following strict base-pairing rules, free (available) bases in the cell are linked together with their matching bases on the two original strands*



3 *Finally, two duplicate codebooks are made. So when the cell divides, each new cell gets an identical DNA codebook*

The DNA base-pair rule:

A always with T

A — T *Thymine*

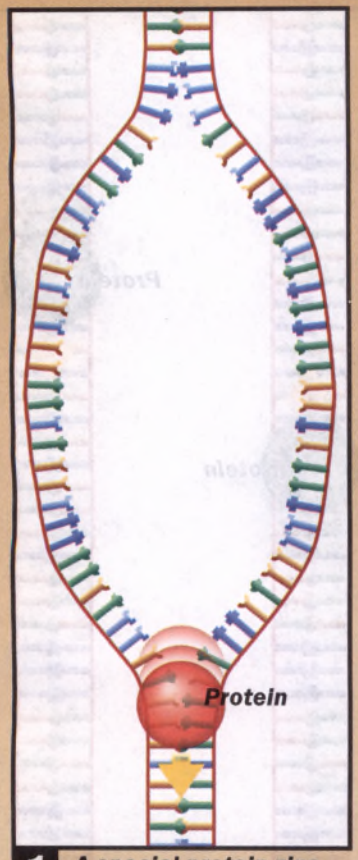
T — A *Adenine*

C always with G

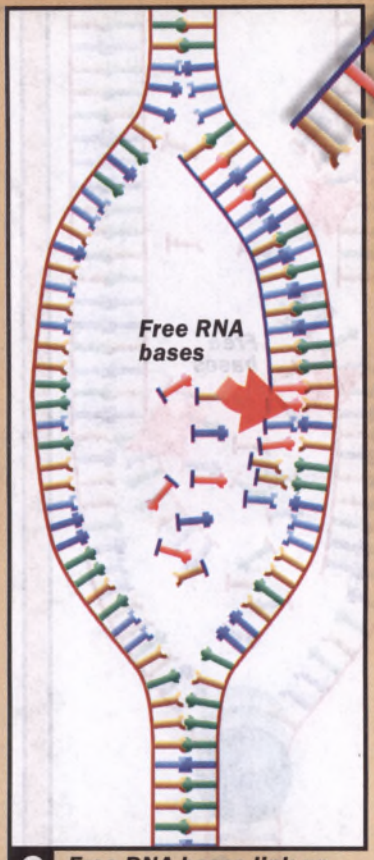
C — G *Guanine*

G — C *Cytosine*

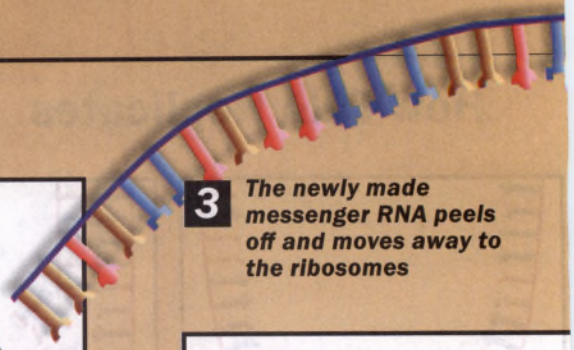
How Proteins Are Made



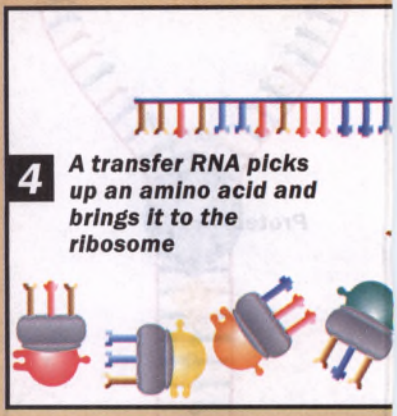
1 A special protein zips open a section of the DNA strands



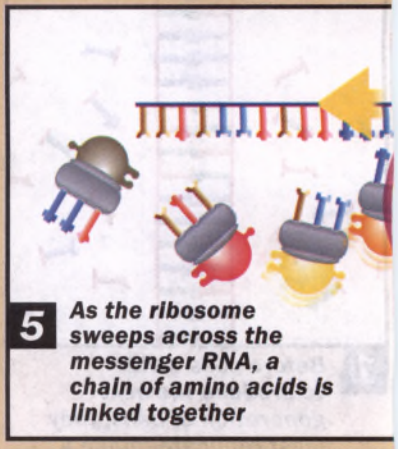
2 Free RNA bases link up with the exposed DNA bases on one strand only, thus forming a strand of messenger RNA



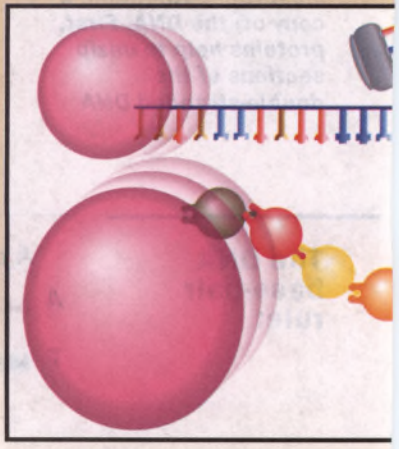
3 The newly made messenger RNA peels off and moves away to the ribosomes



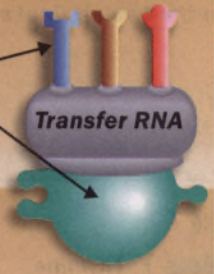
4 A transfer RNA picks up an amino acid and brings it to the ribosome



5 As the ribosome sweeps across the messenger RNA, a chain of amino acids is linked together



Transfer RNA has two important ends:



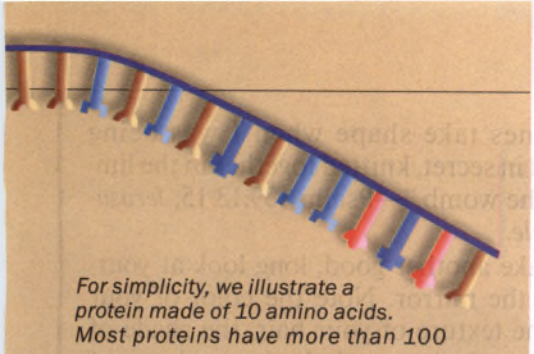
One recognizes the messenger RNA code

The other carries the correct amino acid

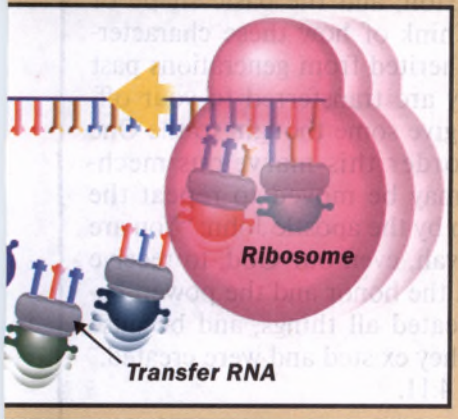
RNA bases use U rather than T, so U pairs with A

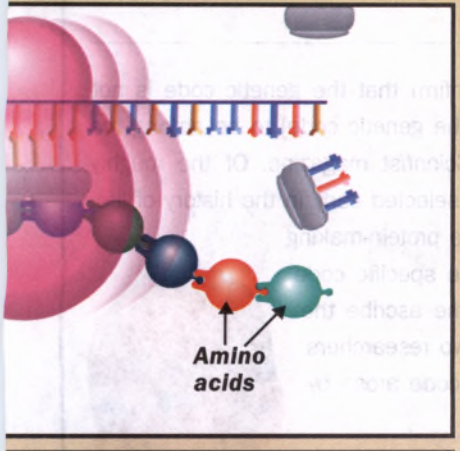
A *U* Uracil

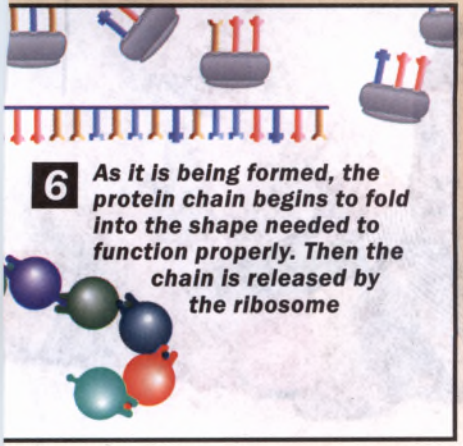
U *A* Adenine



For simplicity, we illustrate a protein made of 10 amino acids. Most proteins have more than 100







What Is Behind the Mystery of Life?

THE DNA molecule does amazing things. DNA fulfills both the roles that your cells require of genetic material. First, the DNA is accurately duplicated so that information can be passed on from cell to cell. Second, the DNA sequence tells the cell what proteins to make, thereby determining what the cell will become and what function it will serve. However, DNA does not carry out these processes on its own. Many specialized proteins are involved.

DNA alone cannot create life. It contains all the instructions needed to make all the proteins a living cell needs, including the very ones that copy DNA for the next cell generation and the ones that help DNA to make new proteins. Still, the incredible amount of information stored in the DNA genes is useless without RNA and the specialized proteins, which include ribosomes, needed to "read" and use that information.

Neither can proteins alone produce life. An isolated protein cannot generate the gene that has the code for making more of that same type of protein.

So, what has unraveling the mystery of life shown? Modern genetics and molecular biology have provided ample evidence of the highly complex and interdependent relationships between DNA, RNA, and protein. These findings imply that life depends on having all these elements *simultaneously*. Thus, life could never have come about spontaneously by chance.

The only reasonable explanation is that a supremely intelligent Creator coded the instructions in DNA and simultaneously made the fully formed proteins. The interaction between them was so well devised that once begun, this process would ensure

that proteins would continue to copy DNA to make more genes, while other proteins would decode genes to make more proteins.

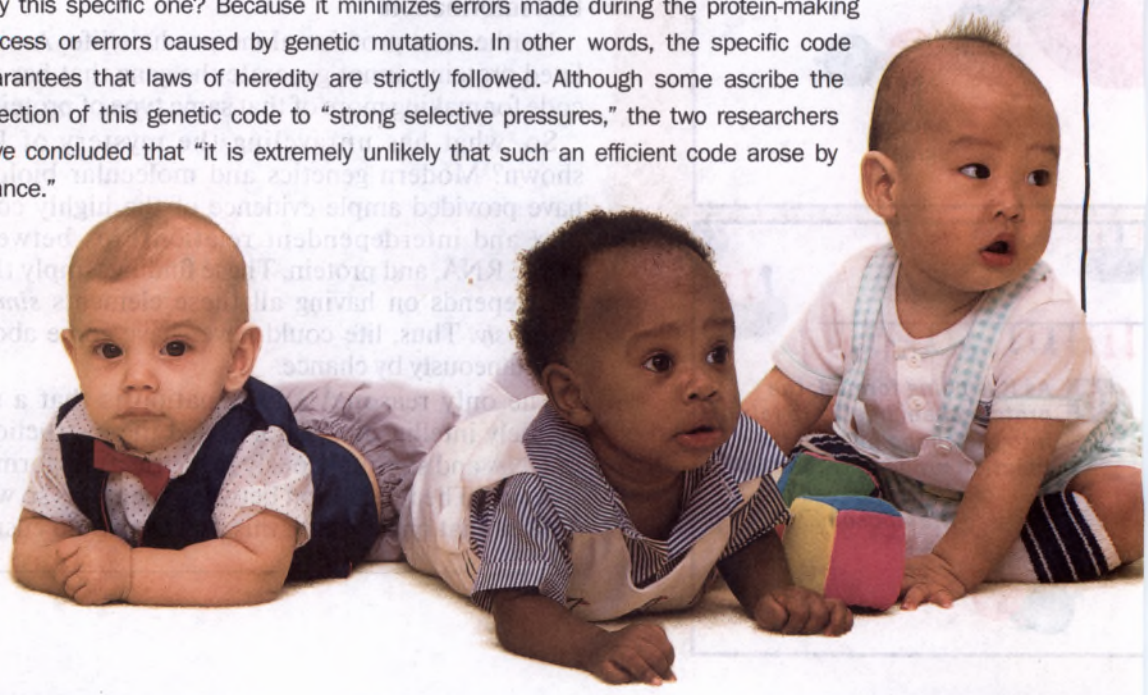
Clearly, the marvelous cycle of life was set in motion by the Master Designer, Jehovah God.

Wonderfully Made

Although it is not a scientific book, the Bible sheds some light on the role of the Creator, who designed the code of life. Some three thousand years ago, King David of Israel, who knew nothing of today's advances in genetic research, said in poetic language to his Creator: "It was you who created my inmost self, and put me together in my mother's womb; for all these mysteries I thank you: for the wonder of myself, for the wonder of your works. You know me through and through, from having watched my bones take shape when I was being formed in secret, knitted together in the limbo of the womb."—Psalm 139:13-15, *Jerusalem Bible*.

So take another good, long look at yourself in the mirror. Note the color of your eyes, the texture of your hair, the shade of your complexion, and the basic shape of your body. Think of how these characteristics were inherited from generations past and how they are transferred to your offspring. Now, give some thought to the One who put in order this marvelous mechanism. You may be moved to repeat the words written by the apostle John: "You are worthy, Jehovah, even our God, to receive the glory and the honor and the power, because you created all things, and because of your will they existed and were created."—Revelation 4:11.

Blind Chance? Recent findings of two British scientists confirm that the genetic code is not simply the product of random chance. "Their analysis has shown [the genetic code] to be among the best of more than a billion billion possible codes," notes *New Scientist* magazine. Of the roughly 10^{20} (1 followed by 20 zeros) possible genetic codes, only one was selected early in the history of life. Why this specific one? Because it minimizes errors made during the protein-making process or errors caused by genetic mutations. In other words, the specific code guarantees that laws of heredity are strictly followed. Although some ascribe the selection of this genetic code to "strong selective pressures," the two researchers have concluded that "it is extremely unlikely that such an efficient code arose by chance."



What Does It Take To KEEP THEM FLYING?

"LADIES and gentlemen, welcome to New York City's John F. Kennedy International Airport." That announcement to arriving passengers marks the beginning of a flurry of activity in and around the aircraft as its occupants leave. Have you ever wondered what happens to the plane at this point?

Commercial aircraft make money only while flying passengers or cargo, not while sitting on the ground. Therefore, airlines aim for the highest possible utilization of their fleets. As passengers wait for their baggage, the aircraft is being swiftly prepared for the next flight. Mechanics swing into action by reviewing the aircraft log for any mechanical problems noted by the last flight crew. Any matters affecting the safe operation of the plane, also called no-go items, are corrected.

The aircraft's wheels, tires, brakes, and engine oil levels are checked. Cleaning crews tidy up the passenger cabin. The kitchen units, or galleys, are resupplied with food and beverages. Fuel is pumped into the wing tanks. Before the aircraft is again ready for departure, the flight crew performs an exterior walk-around inspection, checking for any conditions that might compromise safety.

This turnaround service and immediate maintenance is performed on thousands of aircraft every day. But that is only a tiny fraction of what it takes to keep a large passenger plane safe to fly. Just as automobiles need periodic servicing, airplanes regularly require a series of extensive and expensive maintenance checks. Who perform these aircraft maintenance services? How is the work carried out?

How the Planes Are Kept Airworthy

According to the U.S. Air Transport Association, member airlines carry more than 95 percent of the air traffic, both passenger and freight, in the United States. In 1997 those airlines had about 65,500 aircraft mechanics on the job. Along with engineers and other maintenance personnel, the aircraft mechanics' mission is to keep the aircraft airworthy and to ensure passenger comfort. That means inspecting, repairing, and overhauling the multitude of specialized parts —the machines within the machine—that make an airplane fly.* Such scheduled maintenance includes everything from overhauling jet engines weighing over four tons to replacing worn-out cabin carpets.

Most mechanical problems get immediate attention. However, the aircraft maintenance program schedules other maintenance on the basis of the number of months the aircraft has been in use or the number of cycles# and the number of hours each aircraft has flown, not on the total number of miles it has flown. The program begins with maintenance recommendations made by the aircraft manufacturer to the airplane operators, which must

* A 747-400 has six million parts, half of which are fasteners (rivets and bolts), and 171 miles of electrical wiring.

A cycle equals one takeoff and one landing.

be acceptable to government aviation authorities. Each aircraft has its own tailored maintenance program, from light to intermediate to heavy checks. These checks are designated by letters, such as *A, B, C, D, L,* or *Q*.

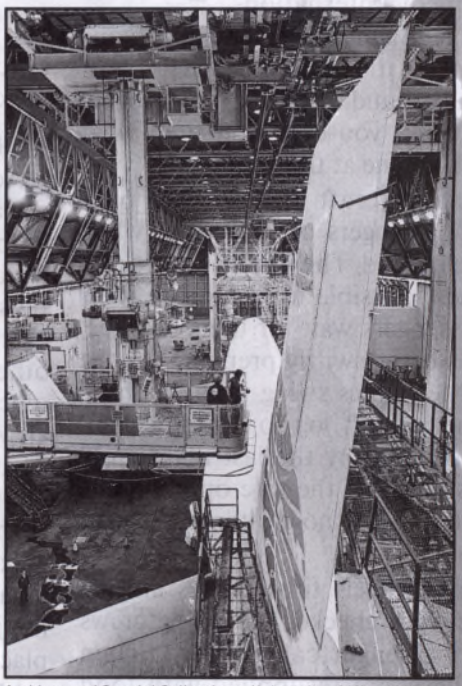
One 747-200 took about eight years to accumulate some 36,000 hours of flying time. When it did, it was time to head to the hangar for a heavy check, sometimes called a D check. Commenting on this complex and time-consuming check, *Overhaul & Maintenance,* an aviation-management magazine, says: "The goal . . . is to, as much as possible, return an entire airframe to its original condition. . . .

Courtesy of Pan Am Historical Foundation

A D check takes between 15,000 and 35,000 hrs. of labor, and can put a plane out of service for 15 to 30 days, or more. The total cost averages between $1 million and $2 million." "A typical D check is 70% labor and 30% material," said Hal Chrisman of The Canaan Group, an aerospace-management consulting firm. Of course, some of that cost is included in your airline ticket.

What a D Check Involves

Once the aircraft is parked inside the hangar—a huge complex of aircraft service areas, support shops, and warehouses—the maintenance team goes to work. Worktables, platforms, and scaffolds are rolled into position for access to otherwise unreachable areas of the plane. Seats, floors, walls, ceiling panels, galleys, lavatories, and other equipment are opened or removed from the aircraft to permit close inspection. The aircraft is essentially gutted. Following step-by-step instructions, workers examine the aircraft for signs of metal cracks and corrosion. Whole sections of the aircraft's landing gear, hydraulic systems, and engines may be replaced. The D check requires the skills of engineers, technical writers, quality control inspectors, avionics technicians,* sheet-metal workers, and airframe and power-plant mechan-



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* "Avionics" is an abbreviation for aviation electronics.

ics,* most of whom are government licensed. When cabin equipment mechanics, painters, and cleaners are added, the number of maintenance personnel swells to well over 100 per day. Scores of others provide essential equipment, parts, and logistics support.

* The airframe and power-plant certificate allows a mechanic to approve flight work that he or she has performed on airplane structures, systems, and engines.

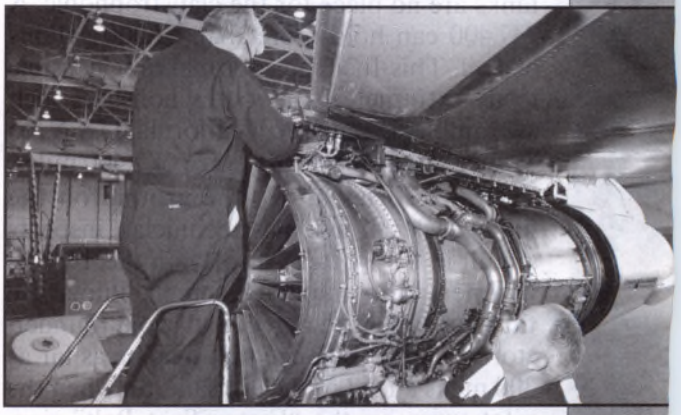
Courtesy of United Airlines

◀ Courtesy of United Airlines

Over time, in-flight vibrations, fuselage pressurization cycles, and the jolts of thousands of takeoffs and landings cause cracks in the metal structure of the aircraft. To address this problem, aviation employs diagnostic principles similar to those used in the field of medicine. Both use such tools as radiology, ultrasonics, and endoscopy to detect what the human eye cannot see.

For a conventional medical X ray, the patient is placed between a sheet of film and an X-ray beam. To X-ray the landing gear, wings, and engines, maintenance inspectors use similar methods. For example, a sheet of X-ray film is placed at a desired point on the engine exterior. Next, a long metal tube is placed inside the hollow shaft that runs the length of the engine. Finally, a pill of radioactive iridium 192—a powerful isotope—no bigger than a pencil eraser, is cranked into the tube to expose the X-ray film. The developed film helps to reveal cracks and other flaws that may require that the engine be repaired or replaced.

Courtesy of United Airlines



During the D check, samples of the aircraft's fuel and its hydraulic fluids are sent for laboratory analysis. If microorganisms are found in the fuel sample, antibiotics are prescribed. To kill jet-fuel bugs—fungi and bacteria that can get into fuel tanks through the air, water, and fuel—the tanks are treated with a biocide, a form of antibiotic. This treatment is important because the by-products of microbial growth can corrode the protective coatings on the surface of the tanks. Fuel probes in the tanks can also be affected and thus cause the pilots to receive inaccurate fuel gauge readings.

As a result of normal wear, vibrations, and

internal seal damage, fuel tanks can develop leaks. A supervisor asks his assembled D-check crew, "Does anyone want to be a 'frogman'?" The joyless but necessary chore falls to John. Looking somewhat like a scuba diver without flippers, he dons special cotton coveralls, puts on a respirator connected to a fresh-air supply, and takes tools, sealant, and a safety light with him. Through a small opening in the bottom of the wing, he squeezes his way into the defueled wing tank, locates the source of the fuel-tank leak, and seals it.

Built into the wings of the plane, the fuel tanks of a 747 are a maze of walled compartments connected by small openings. Fuel tanks are no place for the claustrophobic. A 747-400 can hold more than 57,000 gallons of fuel. This fuel capacity makes it possible to fly extremely long routes nonstop, such as from San Francisco, California, U.S.A., to Sydney, Australia—a distance of 7,400 miles.

Three stories above the ground on the flight deck, an avionics technician inspects a built-in test-pattern display on the TV-like weather radar indicator screen. Pilots use this instrument to detect and avoid thunderstorms and turbulence that may be as far as 300 miles ahead of the airplane. So when the pilot turns on the "Fasten Seat Belt" sign, he may have seen turbulence on his radar screen. However, to prevent injuries, many airlines request that when seated, passengers keep their seat belts fastened at all times, even if the captain turns off the sign. Atmospheric changes in the form of clear-air turbulence are often encountered before pilots have time to turn it on.

During the D check, safety equipment, such as life vests and emergency lighting, is checked or replaced. When a check of the passenger emergency oxygen system is under way, oxygen masks dangle like oranges on branches. Jet airplanes routinely cruise at altitudes of four to seven miles above the earth, where the oxygen content and the atmospheric pressure are insufficient to sustain life. How is this problem solved? The aircraft's pressurization system draws in outside air and then compresses it. This air is finally supplied to the cabin at an acceptable temperature. If the air pressure in the cabin falls below safe levels, oxygen masks automatically drop from overhead compartments. The emergency oxygen is supplied to the passengers until the aircraft descends to an altitude where the emergency oxygen is no longer needed. On some airplanes, oxygen masks are stowed in passenger seat-back compartments, not in overhead compartments. That is why it is important to pay attention to preflight passenger briefings, which identify the location of the oxygen masks.

A heavy maintenance check is also the time to install new cabin walls and ceiling panels as well as to replace carpets, curtains, and seat cushion covers. Galley equipment is disassembled, cleaned, and sanitized.

Ready to Fly

After 56 days of inspections, checks, repairs, and maintenance, the aircraft is ready to leave the hangar and resume flying passengers and cargo. Only a small fraction of the maintenance operations have been mentioned here. But before flying again, the aircraft may be test-flown by a special crew to ensure that all systems function properly. It is reassuring to consider briefly how much expertise and technology go into keeping the aircraft that you fly in mechanically sound.

However, the best single tool in aircraft maintenance is said to be the human element —sharp eyes and alert minds. The trained personnel take their jobs very seriously. They know that poor maintenance can cause big problems. Their goal is to provide reliable aircraft that will speed you to your destination safely and comfortably.—*Contributed by a U.S. aviation safety inspector.*

THE PANTANAL

A Fascinating Sanctuary

BY *AWAKE!* CORRESPONDENT IN BRAZIL

THE tourist became angry when Jerônimo urged him not to throw a beer can into the river. "Is this river yours?" he asked. "No," Jerônimo replied, "it is *ours*. But if you keep throwing garbage into it, soon none of us will be able to fish here."

This reveals just one of the ways that the Pantanal—a vast area including parts of Brazil, Bolivia, and Paraguay—is being threatened today. The Portuguese word *pântano* means "swamp or marsh." But the Pantanal is not flat, so its waters do not

Georges El Sayegh

stagnate. Instead, they glide slowly and smoothly, leaving the fertile plain covered with a variety of grasses. Would you like to learn more about this vast region? Join me as I travel with a group of tourists to one of the world's most fascinating ecological sanctuaries.

Alligators and Anacondas!

Leaving São Paulo, we head westward by bus for Corumbá, a distance of about 750 miles. As we enter the Pantanal region, huge birds fly overhead, as if to welcome us. There is a jabiru (*tuiuiú*), with a wingspan of eight and a half feet. It almost needs a runway to take off! "The vigorous motion of the wings creates a fluttering sound from the friction with the air," writes Haroldo Palo, Jr., who spent two years in the Pantanal. "During the [jabirus'] pairing and mating rituals," he adds, "two or three males soar together . . . , showing off spectacular dives that can be seen from afar."

The dry season has arrived, and the water level is low. Hence, fish are easy prey for the birds. Look! A jabiru and a heron are fishing among the alligators! The alligators are feasting on the vicious piranha fish. As you may know, the piranha have extremely sharp teeth and are attracted to prey that is bleeding. While we would certainly not want to be near one, the alligators seem to be oblivious to—and exempt from—any danger.

A jaguar

A yellow swallowtail

After crossing a river by ferry, we take a drive to a ranch. Suddenly, our driver stops and points to a huge snake crossing the

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Great white herons

dusty road. "It's an anaconda," he says. "Better take a picture quickly. You don't see them up close very often!" The mere sight quickens the pulse, for the anaconda —reaching up to 30 feet in length—is one of the largest of all snakes. The anaconda is also speedy, I realize, as it vanishes into the bush. This is fine with me. Indeed, if the anaconda had not fled, I am sure that my trembling hands would have blurred the picture anyway!

The Life of the *Pantaneiro*

The Pantanal is home to vast herds of cattle. Caring for them is the work of the *pantaneiro*. He is actually a mixture of cowboy and farmer, a descendant of Indian, African, and Spanish dwellers. The *pantaneiro* tames horses and herds cattle from one end of the ranch to the other. We see several herds, each of which is composed of about a thousand head of cattle. Each herd is guided by six men. The cook is up front, followed by a herdsman with a trumpet made from a bull's horn. Behind are more cowboys. One is the owner of the herd, and the others round up the lagging animals and the strays.

Jerônimo, mentioned at the outset, is a *pantaneiro*. Although it is more tiring, he is rowing us along the Abobral River instead of using a motorboat because the sound of a motor can frighten the birds. The reverential tone of his voice reflects his love for and interest in his home, the Pantanal. "Look! There on the riverbank—an alligator sunning itself," Jerônimo says. Farther along, he points out the den of a pair of otters. "It is their home," he says. "I always see them there." From time to time, Jerônimo fills his cup with water from the river to ease his thirst. "Isn't the water polluted?" we ask.

An anaconda and an alligator

Georges El Sayegh

"Not yet," he answers. "You can drink some too if you want." We are not entirely convinced.

The *pantaneiro* has an optimistic view of life. His desires are few, and his work is his recreation. He leaves home at dawn and returns at night, earning the minimum wage (about $100 a month) plus room and board —and he can eat meat to his heart's content. "On my farm," says one farmer, "the *pantaneiro* eats what he wants and as much as he wants. He is not a slave. If he's not content, he can say: 'Boss, give me my money. I'm leaving.'"

A Zoo Without Cages

The hotel-farm where we stayed is also home to many birds and animals, such as macaws, parrots, parakeets, jabirus, jaguars, capybaras, and red deer. A descendant of the Guaná Indian tribe whose family has lived in the Pantanal for 100 years told us: "We feed the birds here. Many of them were confiscated by the forest police from suspected poachers." His wife said that at first they had just 18 parakeets, but now they have about 100 of them. "Our objective is to return them to their own habitat," she says.

These six-inch piranhas have extremely sharp teeth

A macaw

Georges El Sayegh

In this zoo without cages, we took pictures of macaws eating peacefully next to pigs and chickens. Tourists from all over the world are delighted with the profusion of bird and animal life and the landscape of the Pantanal. And the sunsets are astounding! One day, a young Japanese tourist was dazzled by flocks of birds returning to their roosts at sunset. Then the warning from the farmhand—"Miss, be careful. There are jaguars here!"—sent her running to her room. However, by the next day, she overcame her fright and was feeding biscuits

to the macaws. We even photographed her feeding one mouth to beak. Her fear was gone!

One morning before sunrise, we went outside to look at the stars. It seemed as if we could reach out and touch them. An indescribable view! Here in the Pantanal, we could almost "hear" the silence. The sights and sounds moved us to give thanks to the Creator for this paradisaic scene. One advertising folder said: "If someone asks you someday if paradise exists, you can say: 'Without a doubt, the Pantanal is a part of it.'"

An Ecological Sanctuary Profaned

During the past 20 years, the press has dedicated much space to discussing the threat that hangs over the Pantanal. In his book *Pantanal,* Haroldo Palo, Jr., writes about the different ways that the Pantanal ecosystem is being polluted. Briefly, they include the following.

■ *Silting of the rivers.* "In recent years, the Taquari River has been so silted up that it is impossible to navigate near its mouth, thus isolating . . . those living on its banks. The same process is occurring in the other rivers that flow into the Pantanal basin."

■ *The drought cycle.* "I fear that if . . . we had a drought cycle of 15 or 20 years, as has occurred previously, there could be catastrophic consequences for the region's flora and fauna."

■ *Herbicides and mercury.* "The mechanized agriculture carried on outside the Pantanal uses herbicides that infiltrate groundwater and end up poisoning the rivers that flow nearby. Or they are carried by surface water along with the soil, causing the rivers to become silted up. In the Poconé Pantanal, another big threat is gold mining, which pollutes the water with mercury."

■ *Hunting.* "Although prohibited by law, this is practiced in most of the Pantanal without control. With the exception of a few enlightened farmers who are protecting their natural riches and others who defend them for economic interests in the exploitation of tourism, animal life and the scenery are at the mercy of opportunistic interests."

Return to the Concrete Jungle

What a contrast we note on our return to São Paulo! Instead of yellow *ipês,* purple *ipês,* and red sage, we are confronted with a jungle of skyscrapers. Instead of clean transparent rivers abounding in fish, rivers converted into sewers. Instead of the melodious songs of birds, the deafening roar of thousands of trucks and cars with their honking horns. Instead of clear blue skies, signs announcing "Condition of Air: Bad." Instead of peace between man and animal, the fear of human predators.

We stayed for two weeks in the Pantanal, too short a time to get to know the different regions with their exotic names, such as Poconé, Nhecolândia, Abobral, Nabileque, and Paiaguás—each one with its own characteristics. But it was an unforgettable experience. The flora and fauna are like a balm for the eyes, a symphony to the ears, and a tonic for the heart.

IN OUR NEXT ISSUE

War—Will It Ever End?

How Can I Cope With Injustice?

"Your Daughter Has Diabetes!"

GLOBAL TRADE
How It Affects You

WHEN Peter lost his job with the multinational corporation where he had worked for 20 years, the dismissal notice put the blame squarely on "the globalization of the economy." When Thailand's currency, the baht, lost more than half its value, the finance minister of that country went on TV castigating "globalization." When the price of rice increased by 60 percent in a country in Southeast Asia, headlines at the news kiosk announced: "It's the Globalization!"

What exactly is the globalization of the economy? How and why does it affect your country as well as the money in your pocket? What is behind this trend?

What Is Globalization?

As an economic phenomenon, globalization is a shift from distinct national economies to a global economy. In today's "global village," the production of goods has been internationalized, and money flows freely and instantly across borders. It is virtually trade without borders. In this system multinational corporations wield vast power, while anonymous investors can foster material prosperity or cause devastating depression in any part of the world.

Globalization is both a cause and a result of the modern information revolution. It is driven by dramatic improvements in telecommunications, incredible increases in computing power, and the development of information networks, such as the Internet. These technologies are helping to overcome the barriers of physical distance. With what results?

Mixed Blessing?

According to its proponents, globalization can be a whirlwind of trade and investment that builds economies and spurs development in even the world's poorest countries. For example, during the 1990's alone, foreign investors have poured one trillion dollars into developing economies. This phenomenal increase in international investment has made the building of roads, airports, and factories possible in poorer nations. Globalization has indeed been a force that has raised living standards for some across the world. Peter Sutherland, chairman of the Overseas Development Council, says that "until recently, it took at least two generations for living standards to double, but in China, living standards now double every 10 years." Globalization is perceived as bringing unprecedented opportunities to billions of people. The staggering expansion of world trade has induced a wave of productivity and efficiency and has created new jobs.

Its critics, however, counter that globalization can also bring down economies overnight. A few clicks of a computer mouse

can devalue a national currency very quickly, washing away the life savings of millions of breadwinners. Ominous words from the mouth of an influential Wall Street analyst can instantly cause a herd of panicked investors to sell their stocks in Asia, creating a huge capital vacuum that could eventually drive millions into poverty. A board of directors can decide to close a plant in Mexico and open up one in Thailand instead —creating jobs in Asia while condemning hundreds of families in Latin America to destitution.

Many point out that globalization has made life more difficult for large segments of human society and that it threatens to leave part of the world behind. "It is no coincidence that the disappointing economic performance in much of Sub-Saharan Africa reflects a failure to integrate into the world economy and, thus, to trade successfully and attract investment," said Sutherland.

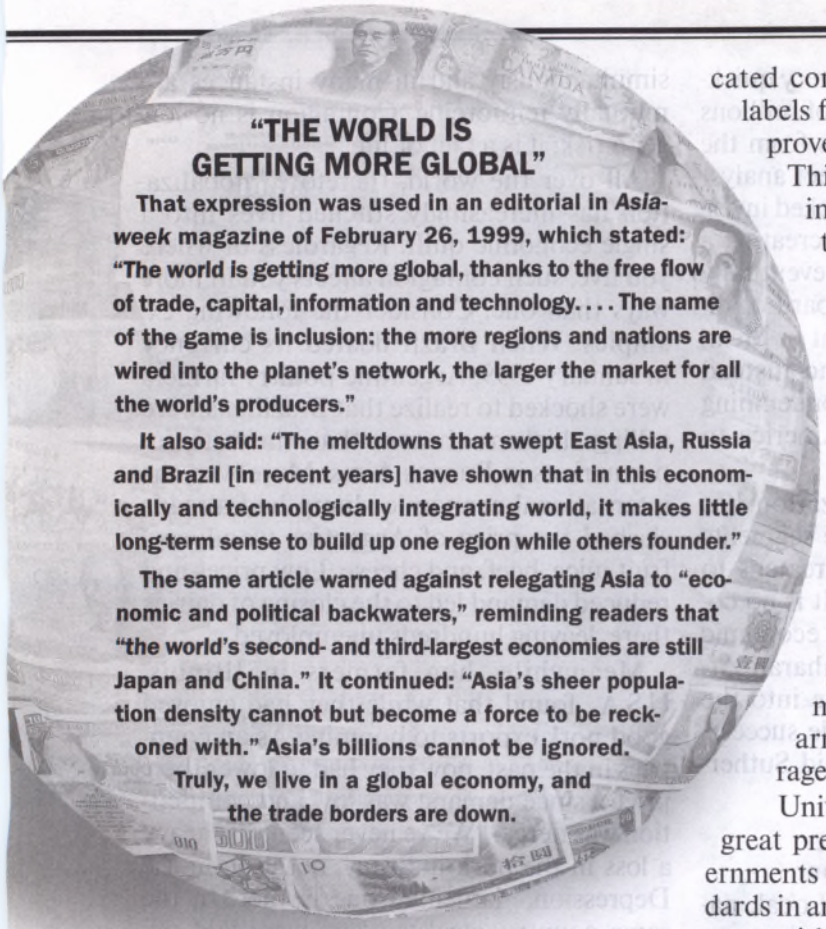
Contagious Effects That Can Make You Rich or Poor

How does this concern you? Local, national, and regional economies have become interlocked and interdependent. Thus, disease symptoms in one economy may quickly spread to infect others—including your country's. For instance, the global financial storm that devastated Asia in 1997 and Russia and Latin America in 1998 and 1999 now threatens to inflict significant damage on the prosperity of the United States, countries in Europe, and many other financially stable nations. Economies that looked healthy one moment have become seriously ill the next—apparently not because of any new development within their own borders but because of a shock from abroad. Economists call this phenomenon "financial contagion." Says Lionel Barber of the *Financial Times:* "The financial shocks are occurring simultaneously and in many instances are mutually reinforcing. Contagion is no longer a risk; it is a fact of life."

All over the world, therefore, globalization has increasingly stitched lives into a single economic quilt. Regardless of where you live, such contagion affects you in more ways than one. Consider the following examples. When Brazil floated its currency in January 1999, Argentine poultry farmers were shocked to realize that Brazilians were selling chickens cheaper than theirs to supermarkets in Buenos Aires. Moreover, the international economic slump had already slashed the price of Argentine wood, soy, fruit juice, beef, and cheese. Low prices and reduced demand led to the closing of dairies there, leaving hundreds unemployed.

Meanwhile, hog farmers in Illinois, U.S.A., found that while they had enjoyed good pork exports to booming Asian countries in the past, now they had to lower their prices, since demand was low and competition was fierce. "We've never seen this heavy a loss in the pork industry, not even in the Depression," lamented one farmer. In the same country, steel workers were laid off, as their companies were facing a deluge of steel imports from China, Japan, Russia, Indonesia, and other countries—all of them with weak currencies that made their exported goods very cheap. Because of a lack of Asian buyers, unsold grain piled up in the United States, to the dismay of farmers in that country.

The implications of globalization are further compounded by the fact that banks and pension funds in wealthy countries have lent to or invested heavily in "emerging markets"—a euphemism for some economies in the developing world. Thus, when such economies collapsed during the 1997-99 financial crisis, this had a direct bearing on ordinary citizens who either



"THE WORLD IS GETTING MORE GLOBAL"

That expression was used in an editorial in *Asiaweek* magazine of February 26, 1999, which stated: "The world is getting more global, thanks to the free flow of trade, capital, information and technology. . . . The name of the game is inclusion: the more regions and nations are wired into the planet's network, the larger the market for all the world's producers."

It also said: "The meltdowns that swept East Asia, Russia and Brazil [in recent years] have shown that in this economically and technologically integrating world, it makes little long-term sense to build up one region while others founder."

The same article warned against relegating Asia to "economic and political backwaters," reminding readers that "the world's second- and third-largest economies are still Japan and China." It continued: "Asia's sheer population density cannot but become a force to be reckoned with." Asia's billions cannot be ignored. Truly, we live in a global economy, and the trade borders are down.

were pensioners or had savings in banks that had suffered losses. Almost everyone has felt the cold shiver of loss, directly or indirectly.

For Richer, for Poorer

A closer examination of the globalization process reveals that it has created expanding islands of wealth in poor countries and swelling seas of poverty in wealthy countries. How so? David Korten partly answers this question in his book *When Corporations Rule the World:* "Rapid economic growth in low-income countries brings modern airports, television, express highways, and air-conditioned shopping malls with sophisticated consumer electronics and fashion labels for the fortunate few. It rarely improves living conditions for the many. This kind of growth requires gearing the economy toward exports to earn the foreign exchange to buy the things that wealthy people desire. Thus, the lands of the poor are appropriated for export crops. The former tillers of these lands then find themselves subsisting in urban slums on starvation wages paid by sweatshops producing for export. Families are broken up, the social fabric is strained to the breaking point, and violence becomes endemic. Those whom growth has favored then need still more foreign exchange to import arms to protect themselves from the rage of the excluded."

Universally, globalization has placed great pressure on working people as governments force down wages and labor standards in an attempt to attract foreign investment with the promise of low costs. While some newly industrialized countries have profited from increased exports as a result of freer global trade, poorer nations have been largely excluded from the feast.

How grave has global inequality become? Just consider a single statistic quoted by Korten: "There are now [in 1998] 477 billionaires in the world, up from only 274 in 1991. Their combined assets are roughly equal to the combined annual incomes of the poorest half of humanity—2.8 billion people." The culprit? "This is a direct consequence of an unregulated global economy."

Driven by Greed—A Healthy Trend?

What is globalization's basic flaw? Commenting on the financial crisis of 1997-98,

Globalization has been blamed for widening the gap between the rich and the poor

editor Jim Hoagland said that future historians "will find a trail of missed opportunities, flawed international cooperation and human greed." Some people ask: 'Can there be global peace and prosperity with an economic system that pits a wealthy minority against a poverty-stricken majority in a life-and-death struggle? Is it ethical for a small number of winners to enjoy extravagant wealth while a much larger number of losers are forced into humiliating deprivation?'

Truly, insatiable greed and moral deficiency have created a world of tremendous financial inequality. What a lawyer said 2,000 years ago is still true: "The love of money is a root of all sorts of injurious things." (1 Timothy 6:10) Are human governments prepared to deal successfully with such inherent flaws in man's imperfect character? Fernando Cardoso, president of Brazil, voiced his concerns: "The task of providing a human dimension to development in the era of Globalization has become a major challenge, since all of us have to deal . . . with the ethical vacuum which the idolatry of the marketplace has caused."

"Epic Struggle of Power and Values"

In a lecture to the 22nd World Conference of the Society for International Development, Korten expressed his doubts about some of the beneficial effects of the global economy. He stated that there is "an epic struggle of power and values between people most everywhere and the institutions of the global economy. The outcome of this struggle will likely determine whether the 21st century marks the descent of our species into an anarchy of greed, violence, deprivation, and environmental destruction that could well lead to our own extinction. Or the emergence of prosperous life-centered civil societies in which all people are able to live without want in peace with one another and in balance with the planet."

THE LARGEST AND THE SMALLEST

"Kill not the moth
nor butterfly."
WILLIAM BLAKE (1757–1827).

DID you ever watch a butterfly flutter by? Who but the most insensitive of creatures does not stop in his tracks to admire the beauty and fragility of this dainty insect? And they are found all over the world in such variety of size and design that there are said to be anywhere from 15,000 to 20,000 species!

What is the largest butterfly you have ever seen? If you live in Papua New Guinea, then you might have seen the largest in the world —Queen Alexandra's birdwing, with a wingspan of about 11 inches. If your home is in North or Central America, you might have been privileged to see a Homerus swallowtail, with a wingspan of up to six inches. The largest butterfly in Africa is the African giant swallowtail, which has a wingspan of just over nine inches.

The largest and the smallest butterflies, the Queen Alexandra's birdwing and the pygmy blue (both actual size)

Butterflies: Allyn Museum of Entomology, Florida Museum of Natural History

What about the smallest butterflies? Where are they found? *The Illustrated Encyclopedia of Butterflies,* by Dr. John Feltwell, states that "the North American Pygmy blue . . . is probably the smallest butterfly in the world, with a wingspan of 1/2–3/4in (15-19mm)." The smallest butterfly in Britain is the small blue, with a wingspan of seven eighths of an inch.

In many parts of the world, there are butterfly houses where you can walk around and actually have these winged beauties settle on you. You can learn so much about this fascinating creation and its life cycle—its metamorphosis from a tiny egg to a caterpillar to a chrysalis to a full-fledged butterfly. So the next time you see a butterfly flutter by, stop, admire, and wonder. You will be looking at a miracle—whether large or small!

What Makes a Good Citizen?

AFTER World War II, many people in Europe and Japan who considered themselves to be good, law-abiding citizens found themselves tried and convicted for war crimes. Among them were high-ranking military officials, scientists, and other professionals. In an effort to justify their actions, some of these criminals explained that they were simply obeying orders, as would be expected of any good citizen. Their self-proclaimed good citizenship, however, led them to commit terrible crimes against humanity.

On the other hand, there are those who disregard the authority of the State. Some openly reject governmental authority, while others are ready to break the law as long as there is little danger of getting caught. Of course, few would deny that there is need for obedience to authority, for without it there would be anarchy and chaos. However, the question is, How far should the discharge of civic duty and obedience to law go? Consider some basic principles that helped the first-century Christians to have a balanced view of their responsibilities to the State.

Christian Subjection to the Authorities

First-century Christians willingly submitted to the laws and regulations of those who were "superior authorities"—that is, the ruling powers of the day. (Romans 13:1) Christians believed it was right "to be in subjection and be obedient to governments and authorities as rulers." (Titus 3:1) Although they recognized Christ as their heavenly King, they were also law-abiding subjects of their human rulers and posed no threat to the security of the State. In fact, they were encouraged to "have honor for the king" at all times. (1 Peter 2:17) The apostle Paul even encouraged Christians: "I therefore exhort, first of all, that supplications, prayers, intercessions, offerings of thanks, be made concerning all sorts of men, concerning kings and all those who are in high station; in order that we may go on leading a calm and quiet life with full godly devotion and seriousness."—1 Timothy 2:1, 2.

First-century Christians conscientiously paid whatever taxes were demanded of them, even though at times this was an onerous burden. They followed the inspired direction given by the apostle Paul on this matter: "Render to all their dues, to him who calls for the

"Pay back, therefore, Caesar's things to Caesar"

tax, the tax." (Romans 13:7) In the view of Jesus' disciples, the Roman government and its officers were ruling by God's permission and in a sense were serving as "God's public servants," in that they provided a measure of peace and stability in society.—Romans 13:6.

"Ready for Every Good Work"

First-century Christians were encouraged to accept civic duties imposed by the State. Jesus Christ himself advised his disciples to be willing at times to do even more than the minimum demanded by the civil authorities. "If someone under authority impresses you into service for a mile," he said, "go with him two miles." (Matthew 5:41) In following this advice, Christians showed that they did not wish to take the benefits of living in a civilized society without giving something in return. They were always "ready for every good work."—Titus 3:1; 1 Peter 2:13-16.

They genuinely loved their neighbors and looked for ways to help them. (Matthew 22:39) Because of this love and their adherence to high moral standards, the first-century Christians were a force for good in their community. Their neighbors had ample reason to be delighted about living next door to a Christian. (Romans 13:8-10) Christians demonstrated their love by more than simply abstaining from badness. They were encouraged to be outgoing and active in the interests of others, to "work what is good [not simply toward fellow believers but] toward all," just as Jesus Christ had.—Galatians 6:10.

"Obey God as Ruler Rather Than Men"

There were, however, limits to their obedience to secular authorities. *They would not do anything that would violate their conscience or damage their relationship with God.* For example, when the religious authorities in Jerusalem ordered the apostles to stop preaching about Jesus, they refused to comply. "We must obey God as ruler rather than men," they declared. (Acts 5:27-29) Christians steadfastly refused to get involved in idolatrous emperor worship. (1 Corinthians 10:14; 1 John 5:21; Revelation 19:10) With what results? "Condemnations followed," says historian J. M. Roberts, "not for being Christian, but for refusing to do something the law commanded."—*Shorter History of the World.*

Why in this instance did they 'refuse to do something the law commanded'? They recognized that "the superior authorities" wielded power by God's permission and thus served as "God's minister" in maintaining law and order. (Romans 13:1, 4) But Christians still viewed God's law as superior. They remembered that Jesus Christ had established this balancing principle for those who would be his followers: "Pay back, therefore, Caesar's things to Caesar, but God's things to God." (Matthew 22:21) Their obligations to God had to take precedence over Caesar's demands.

That this was the right course is shown by what resulted when many professed Christians failed to follow these fine principles. Apostate leaders of Christendom, for example, became "pliant men [used] as instruments of civil government, notably in the raising and maintenance of military forces," says military historian John Keegan. Their followers ended up taking sides in wars that spilled the blood of millions of innocent victims. Says Keegan: "The law of God fell on deaf ears when men's blood was up."

The first-century Christians, however, provide a shining example in striking the right balance. They were good citizens. They discharged their civic duties and responsibilities well. But they firmly adhered to clear Bible principles and followed their Bible-trained conscience in all aspects of life. —Isaiah 2:4; Matthew 26:52; Romans 13:5; 1 Peter 3:16.

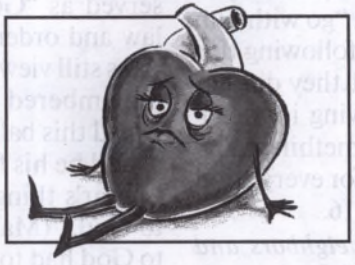
Infected Hemophiliacs Compensated

Charging them with "omission of vigilance and control" and "delay in the withdrawal of [infected] products," the Rome Civil Court has ordered the Italian Ministry of Health to pay compensation to 385 hemophiliacs who contracted hepatitis or the AIDS virus from infected blood products. A third of them have already died. According to attorney Mario Lana, president of the Italian Forensic Union for the Safeguard of Human Rights, "this sentence recognizes a precise causal relation between the culpable and imprudent conduct of the Italian State and the damages suffered by the hemophiliacs." In Italy, some 2,000 hemophiliacs have contracted the AIDS virus, and almost 5,000 have got hepatitis C. As a result of being administered these infected blood products, 1,246 Italians have died.

Deadly Cholera Outbreak

A deadly outbreak of cholera in February forced the city council of Lusaka, Zambia, to place a ban on "street vending of all fresh foods," reports the *Times of Zambia*. Additionally, hotels and restaurants were placed on "24-hour surveillance as the cholera death toll in the capital shot to 42," says the report. Health officials expressed concern that the diarrheic disease had also "continued to increase in other parts of the country." To combat the problem, officials for the Health and Education Ministry set up a cholera task force to hire more garbage collectors and to chlorinate shallow wells, which are easily contaminated by groundwater. Daniel M'soka, a spokesman for the Lusaka City Council, said: "Our aim is to reduce the scourge of cholera."

Neglected Hearts



"Instead of taking steps to improve their health, Canadian women are doing an abysmal job of taking care of their hearts," says the newspaper *National Post*. A recent survey of 400 Canadian women aged 45 to 74, sponsored by the Heart and Stroke Foundation of Canada, found that "only 30% maintained a healthy weight, 36% were physically active, and 74% reported being under stress because of the multiple roles they now juggle." Foundation spokeswoman Elissa Freeman concluded that "women are taking better care of the men in their lives than they are of themselves." According to the report, "heart disease and stroke account for 40% of women's deaths—more than 41,000 annually."

Male Fertility Dropping

"The average sperm count of men in the United States and Europe has plummeted by more than 50 percent since the late 1930s," reports *World Watch* magazine. "The finding fuels ongoing concerns that male reproductive health may be deteriorating, and that environmental pollutants may be the cause." This conclusion is based on 61 studies that have been published since 1938, involving more than 14,000 participants. It is thought that certain environmental chemicals disrupt the body's endocrine system and interfere with its ability to control growth, development, and reproduction. About 60 chemicals are known to cause such disruptions. However, "only a tiny fraction of the estimated 80,000 manufactured chemicals in use today have been screened for endocrine-disrupting effects," says *World Watch*.

An "Invisible Disease"

"An estimated 15 to 18 million children in developing countries are affected by high levels of lead in their blood," reports the Environment News Service. In India, for example, a link has been established between children's intellectual capacity and the amount of lead they have consumed. According to Dr. Abraham George, children "lose their intellectual capacities . . . as protracted exposure to lead affects their brain," reports *The Indian Express*. The main source of lead poisoning in In-

dian cities is automobiles that still use leaded gasoline. Because lead poisoning has a relatively low profile compared with such problems as poverty and hunger, Dr. George calls it an "invisible disease."

Influenza Still Killing

Over 300 leading experts on influenza recently gathered at the World Health Organization (WHO) headquarters in Geneva, Switzerland, to discuss how to combat the deadly disease. Despite major strides over the past 50 years, influenza continues to kill hundreds of thousands of people a year, reports the United Nations Department of Public Information. In order to improve influenza prevention and control, WHO will publish a plan designed to help prepare for what it calls "an eventual influenza pandemic." The director-general of WHO, Dr. Gro Harlem Brundtland, said: "Time to react may be very short—from the first recognition of a new subtype and the onset of a full-blown pandemic."

Monarch Butterfly Threatened

Every autumn millions of monarch butterflies migrate more than 2,000 miles from Canada to their wintering grounds in California and the Sierra Madre mountains of central Mexico. Recently, however, the monarch's sanctuaries in Mexico have been threatened by erosion and the illegal logging of the *oyamel* fir tree (a timber tree of the Abietaceae family). As a result, "over the past two years, the number of monarchs wintering here has diminished by 70 percent," reports *The News* of Mexico City. While tourism provides income for some of the local people, others have been making a living by hauling away truckloads of the protected trees at night. "If the destruction continues," *The News* says, "North America's summer monarchs could virtually disappear."

Child Abuse Awareness Growing?

According to *El Universal,* a newspaper of Caracas, the percentage of sexually abused children in Venezuela has increased from 1 out of every 10 children in 1980 to 3 out of every 10 children today. In 1980 the average age of an abused child was between 12 and 14. Today the majority are under three years of age. Who are the main perpetrators of such horrific crimes? The idea that they are furtive strangers lurking around school playgrounds waiting to tempt children with candies is simply not realistic. *El Universal* explains that 70 percent of the offenders are relatives or family friends. Over half of that number are stepparents, and the remainder are generally someone in authority, such as an older brother, a cousin, or a teacher.

Car Crazy

According to the American Automobile Manufacturers Association, the United States recently reached the one hundred million mark in the production of motor vehicles. "It took 25 years to turn out the first million machines," reports *Compressed Air* magazine. Today, however, "current production is at the rate of 30 passenger cars and ten trucks and buses per minute every working day." If you take into account assembly plants, parts factories, sales and service people, and professional drivers, the automotive industry in the United States employs about 1 out of every 7 wage earners. It is estimated that about 40 million vehicles are currently operating in the United States.

Education Crisis

"The developing world is facing an education crisis with 125 million children, mostly girls, not in school and a further 150 million dropping out before they can read or write," reports England's News Unlimited. Presently, in developing countries, 1 out of every 4 adults, or 872 million people, are illiterate. Moreover, the education crisis is compounded when countries with high illiteracy rates borrow money from wealthier countries. Why? Because money that is badly needed for education is often diverted to pay off debts. Thus the cycle of illiteracy is repeated, which perpetuates poverty.

Not Anti-Semitic Thank you for not hiding things that you regret having said. Although I would like to have read an apology for this statement, your this-was-the-context explanation was adequate. Please carry on with your fine work, knowing that your readers appreciate the depth and honesty of *Awake!*

W. H., United States

The reader refers to statements in the "Declaration of Facts," a resolution adopted in 1933 at a convention in Berlin, Germany. (See "Jehovah's Witnesses—Courageous in the Face of Nazi Peril," in the July 8, 1998, issue of "Awake!") As the article noted, nothing said in the 1933 declaration was intended to express or condone hostility toward Jews, and we regret it if some statements give that impression today. If anyone back in the 1930's interpreted the "Declaration of Facts" to mean that Jehovah's Witnesses were anti-Semitic, this misimpression could easily have been corrected by observing the courageous and compassionate acts of individual Witnesses in behalf of Jews. Moreover, Watch Tower Society publications were among the first to expose and express outrage at the treatment of Jews in Europe.—ED.

Raising Seven Sons I couldn't resist taking this opportunity to thank you for the article "The Challenges and Blessings of Raising Seven Sons." (January 8, 1999) I have found that raising a teenager is quite challenging, especially as a widow. It wasn't until this article that I realized that it is very possible I will get through this stage in my children's lives.

A. R., United States

I too come from a family of seven. Up until recently, we had been serving Jehovah unitedly. However, about six months ago, one of my younger sisters was disfellowshipped. When I first saw the article, I did not want to read the story of a successful family. I prayed that I could benefit from the article without feeling envious. I was very much encouraged to learn that there is a family having experiences similar to ours and that Jehovah is concerned about our situation. I want to thank the Dickmans for sharing their story. I am sure that my parents and my younger siblings got much encouragement and comfort from this article.

W. Y., Japan

Facial Marks Heartfelt thanks for the article "Facial Marks—Nigeria's Fading 'Identity Card.'" (January 8, 1999) My husband and I have friends from Africa with facial scars, and we wondered what they were. We received the answer to our question in your article.

M. V., Italy

Lions Thank you for the article "Lions —Africa's Majestic Maned Cats." (January 22, 1999) This article was very important to me, since I have liked lions for years. I admire them very much because they are beautiful and brave. One day I would like to be with "the maned young lion."—Isaiah 11: 6-9.

E. A. S., Brazil

Plants Versus Pollution The little article "Plants Versus Pollution" (January 22, 1999) really stood out. The information proved beyond a doubt that there has to be a loving, caring, intelligent Creator. It showed how Jehovah created the earth to care for itself, even when threatened by man's efforts to ruin the earth. The article also sustained my hope of living in the Paradise that Jesus promised at Luke 23:43.

R. J., United States

Do You Recognize That Song?

Marsh wren

Rose-breasted grosbeak

RECOGNIZE what song? Some popular song from the past? Yes, songs from the very distant past, possibly the oldest songs ever heard on earth. What are they? Birdsongs.

Many people identify birds by their colors, their design, their flight pattern, and their nesting habits. But have you ever listened carefully in order to identify birds by their songs?

With some birds this is quite easy, since they do not have much variety in their calls. Take the mischievous crow, for example. Although one of the most intelligent of birds, its raucous "caw, caw" identifies it immediately. Rooks are also noted for their noisy cawing presence. Another bird, whose woeful call can drive you crazy at night, is the whippoorwill. Its name echoes its call, which seems to go on endlessly, especially when you want to sleep.

In contrast, "marsh wrens often have repertoires of more than 100 songs; mockingbirds, 100 to 200. One brown thrasher displayed more than 2,000 songs"! —*Audubon,* March-April 1999.

It is usually the males that sing, to mark out a territory and attract females. However, at times, some females join the avian chorus. This is true of Baltimore, or Northern, orioles, cardinals in North America, and rose-breasted grosbeaks.

Do you know the birds in your part of the world? In many countries, recordings of birdsongs are available that could help you to recognize birds by their calls. You can even buy clocks that mark each hour with the song of a different bird. At least you would learn 12 calls pretty quickly!

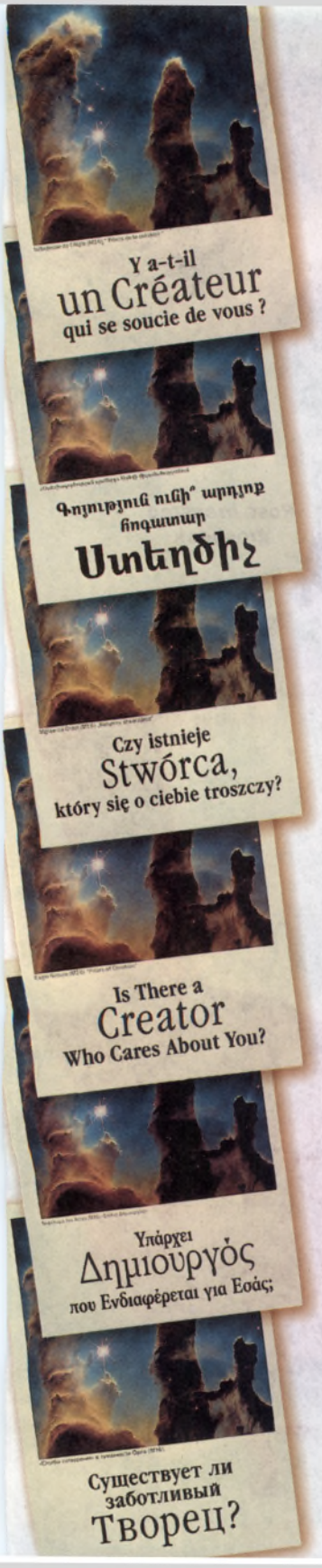
Cardinal

HER PROFESSOR WAS IMPRESSED

IN May 1998, the new 192-page paperback book *Is There a Creator Who Cares About You?* began to be released in countries around the world. By now, well over ten million copies have been printed in 33 languages. Appreciation for this faith-strengthening publication has come from many quarters.

A nursing student from South Carolina, in the United States, exclaimed about the book: “I could not believe my eyes to open to chapter 4 and read a quote from the book that we are using in class!

“The following Monday, I asked my professor if I could talk to him for just a minute. I gave the book to [him] and told him I knew that he would find the information refreshing. I showed him page 54 about the brain. He read it to himself and said, ‘This is interesting! I’ll check it out.’ After giving a copy of the book to my professor, I also left one with each of two fellow classmates who wanted a copy.”



Covers: J. Hester and P. Scowen (AZ State Univ.), NASA