

Awake!

January 22, 2000

**LIFE
A PRODUCT
OF DESIGN**



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Scientists are trying to copy the brilliant designs evident in nature. But who deserves credit for life's marvelous designs?



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COPYING LIFE'S MARVELOUS DESIGNS

Toddlers tumble and bump their heads. Older children fall from trees and off bicycles. Athletes crash into one another on the playing field. Motorists have countless road accidents. Yet, in spite of all these falls, bumps, and crashes, we often escape without serious injury. We tend to take the toughness and resilience of our bodies for granted. But as scientists are beginning to discover, from our bones to our skin, we are the product of truly brilliant designs.

THE combination of strength and toughness—with relatively light weight—permeates nature. Tender saplings push through cracks in concrete and rock and force the cracks wide open as they grow into healthy trees. In turn, trees can withstand winds that topple power poles and rip houses apart. Woodpeckers bore into wood and subject their heads to forces that would turn an ordinary brain to pulp. Crocodile and alligator hides deflect spears, arrows, and even bullets. (Compare Job 41:1, 26.) Such things have both awed and baffled humans for thousands of years.

Over the past 40 years, major leaps in technology have given scientists powerful new tools to use in studying the secrets behind these designs, most of which are hidden deep within the living cell. On this microscopic scale, the quality of design is truly breathtaking and staggering in complexity. The aim of science, however, is not just to crack the secrets underlying nature's remarkable materials but to copy them—at least in general

principle. So promising is this field of study that it has led to the creation of a new science called biomimetics, from the Greek *bī'os*, meaning "life," and *mi'me-sis*, meaning "imitation."

Biomimetics Promises a Better World

"Biomimetics is the study of biological structures [and] their functions," explains the book *Biomimetics: Design and Processing of Materials*. It adds that this study is for the purpose of 'stimulating new ideas and developing these ideas into synthetic systems similar to those found in biological systems.'

Scientist Stephen Wainwright says that "biomimetics will engulf molecular biology and replace it as the most challenging and important biological science of the 21st Century." Professor Mehmet Sarikaya claims: "We are on the brink of a materials revolution that will be on a par with the Iron Age and the Industrial Revolution. We are leaping forward into a new era of materials. Within the next century, I think biomimetics will significantly alter the way in which we live."

In fact, it has already begun to alter our world, as we shall see. But first, let us look briefly at a few of the as-yet-unfathomed marvels scientists are busy studying. We will also examine the sobering implications behind the word "design" and see how these give meaning to the amazing world around us.

LEARNING FROM DESIGNS IN NATURE

"Many of our best inventions are copied from, or already in use by, other living things."—Phil Gates, *Wild Technology*.

AS MENTIONED in the preceding article, the aim of the science of biomimetics is to produce more complex materials and machines by imitating nature. Nature manufactures its products without causing pollution, and they tend to be resilient and light, yet incredibly strong.

For example, ounce for ounce, bone is stronger than steel. What is its secret? Part of the answer lies in its well-engineered shape, but the key reasons lie deeper—at the molecular level. "The success of living organisms lies in the design and assembly of their smallest components," explains Gates. As a result of peering into these smallest components, scientists have isolated the substances that give natural products from bone to silk their envied strength and light weight. These substances, they have discovered, are various forms of natural composites.

The Miracle of Composites

Composites are solid materials that result when two or more substances are combined to form a new substance containing properties that are superior to those of the original ingredients. This can be illustrated by the synthetic composite

fiberglass, which is commonly used in boat hulls, fishing rods, bows, arrows, and other sporting goods.* Fiberglass is made by setting fine fibers of glass in a liquid or jellylike matrix of plastic (called a polymer). When the polymer hardens, or sets, the end result is a composite that is lightweight, strong, and flexible. If the kinds of fibers and the matrix are varied, an enormously broad range of products can be made. Of course, man-made composites are still crude compared with those found naturally in humans, animals, and plants.

In humans and animals, instead of fibers of glass or carbon, a fibrous protein called collagen forms the basis of the composites that give strength to skin, intestines, cartilage, tendons, bones, and teeth (except

* Strictly speaking, fiberglass refers to the glass fibers in the composite. However, in common usage the term refers to the composite itself, which is made of plastic and fiberglass.

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.

Awake!®

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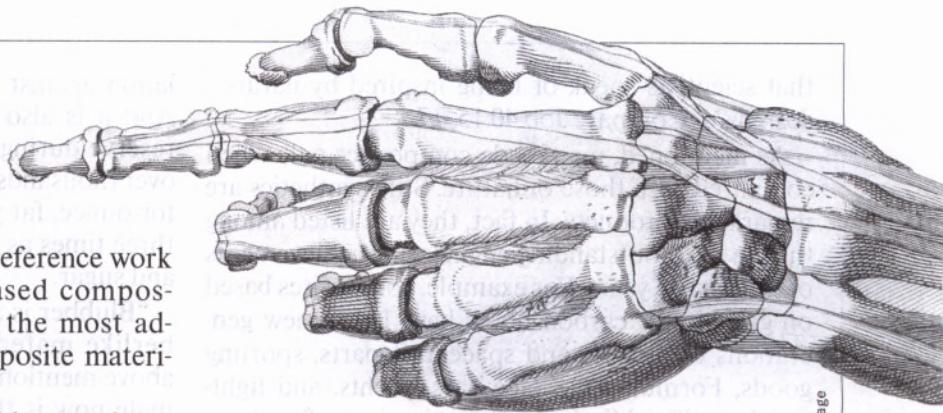
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Semimonthly ENGLISH

**Ounce for ounce,
bone is stronger
than steel**



for the enamel).^{*} One reference work describes collagen-based composites as being "among the most advanced structural composite materials known."

For example, consider tendons, which tie muscle to bone. Tendons are remarkable, not just because of the toughness of their collagen-based fibers but also because of the brilliant way these fibers are woven together. In her book *Biomimicry*, Janine Benyus writes that the unraveled tendon "is almost unbelievable in its multi-leveled precision. The tendon in your forearm is a twisted bundle of cables, like the cables used in a suspension bridge. Each individual cable is itself a twisted bundle of thinner cables. Each of these thinner cables is itself a twisted bundle of molecules, which are, of course, twisted, helical bundles of atoms. Again and again a mathematical beauty unfolds." It is, she says, "engineering brilliance." Is it any surprise

* Vegetable composites are based on cellulose rather than collagen. Cellulose gives wood many of its coveted qualities as a building material. Cellulose has been described as a "tensile material without peer."

An Extinct Fly Helps to Improve Solar Panels

While visiting a museum, a scientist saw pictures of an extinct fly preserved in amber, says a report in *New Scientist* magazine. He noticed a series of gratings on the insect's eyes and suspected that these might have helped the fly's eyes to capture more light, especially at very oblique angles. He and other researchers began conducting experiments and confirmed their hunch.

Scientists soon made plans to try to etch the same pattern of gratings onto the glass of solar panels. This, they hope, will increase the energy generated by solar panels. It might also eliminate the need for the costly tracking systems presently required to keep solar panels pointed at the sun. Better solar panels may mean less fossil fuel use and, thus, less pollution—a worthy goal. Clearly, discoveries like this one help us to appreciate that nature is a veritable mother lode of brilliant designs just waiting to be found, understood and, where possible, copied in useful ways.

Anatomie du gladiateur combattant.... Paris, 1812, Jean-Gabert Salvage

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that scientists speak of being inspired by nature's designs?—Compare Job 40:15, 17.

As mentioned, man-made composites pale when compared with those of nature. Still, synthetics are remarkable products. In fact, they are listed among the ten most outstanding engineering achievements of the past 25 years. For example, composites based on graphite or carbon fibers have led to new generations of aircraft and spacecraft parts, sporting goods, Formula One race cars, yachts, and lightweight artificial limbs—to mention just a few items in a rapidly growing inventory.

Multifunctional, Miraculous Blubber

Whales and dolphins don't know it, but their bodies are wrapped in a miracle tissue—blubber, a form of fat. "Whale blubber is perhaps the most multifunctional material we know," says the book *Biomimetics: Design and Processing of Materials*. Explaining why, it adds that blubber is a marvelous flotation device and so helps whales surface for air. It provides these warm-blooded mammals with excellent insu-

lation against the cold of the ocean. And it is also the best possible food reserve during nonfeeding migrations over thousands of miles. Indeed, ounce for ounce, fat yields between two and three times as much energy as protein and sugar.

"Blubber is also a very bouncy rubberlike material," according to the above-mentioned book. "Our best estimate now is that acceleration caused by the elastic recoil of blubber that is compressed and stretched with each tail stroke may save up to 20% of the cost of locomotion during extended periods of continuous swimming."

Blubber has been harvested for centuries, yet only recently has it come to light that about half the volume of blubber consists of a complex mesh of collagen fibers wrapped around each animal. Although scientists are still trying to fathom the workings of this fat-composite mix, they believe that they have discovered yet another miracle product that would have many useful applications if produced synthetically.

An Eight-Legged Engineering Genius

In recent years scientists have also been looking very closely at the spider. They are keen to understand how it manufactures spider silk, which is also a composite. True, a broad range of insects produce silk, yet spider silk is special. One of the strongest materials on earth, it "is the stuff that dreams are made of," said one science writer. Spider silk is so outstanding that a list of its amazing properties would seem unbelievable.

Why do scientists use superlatives when describing spider silk? Besides

Giving Credit Where It Is Due

In 1957, Swiss engineer George de Mestral noticed that the small, tenacious burs clinging to his clothes were covered with tiny hooks. He studied these burs and their hooks, and soon his creative mind caught fire. He spent the next eight years developing a synthetic equivalent of the bur. His invention took the world by storm and is now a household name—Velcro.

Imagine how de Mestral would have felt had the world been told that no one designed Velcro, that it just happened as the result of a string of thousands of accidents in a workshop. Clearly, fairness and justice demand that credit be given where it is due. Human inventors obtain patents to ensure that it is. Yes, it seems that humans deserve credit, financial rewards, and even praise for their creations, which are often inferior imitations of things in the natural world. Should not our wise Creator receive acknowledgment for his perfect originals?

being five times stronger than steel, it is also highly elastic—a rare combination in materials. Spider silk stretches 30 percent farther than the most elastic nylon. Yet, it does not bounce like a trampoline and so throw the spider's meal into the air. "On the human scale," says *Science News*, "a web resembling a fishing net could catch a passenger plane."

If we could copy the spider's chemical wizardry—two species even produce seven varieties of silk—imagine how it could be put to use! In vastly improved seat belts as well as in sutures, artificial ligaments, lightweight lines and cables, and bulletproof fabrics, to name just a few possibilities. Scientists are also trying to understand

how the spider makes silk so efficiently—and without the use of toxic chemicals.

Nature's Gearboxes and Jet Engines

Gearboxes and jet engines keep today's world on the move. But did you know that nature also beat us to these designs? Take the gearbox, for example. Gearboxes allow you to change gears in your vehicle so as to get the most efficient use out of the motor. Nature's gearbox does the same, but it does not link engine to wheels. Rather, it links wings to wings! And where can it be found? In the common fly. The fly has a three-speed gearshift connected to its wings, allowing it to change gears while in the air!

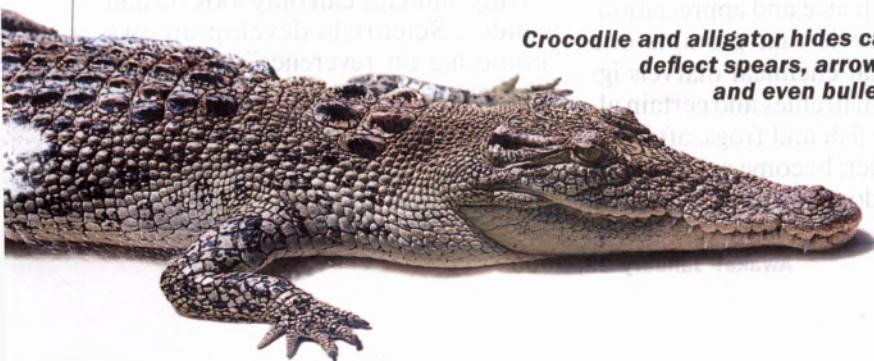


Whale blubber provides flotation, heat insulation, and food reserves

© Dave B. Fleetham/
Visuals Unlimited

Spider silk Is five times stronger than steel, yet highly elastic

Crocodile and alligator hides can deflect spears, arrows, and even bullets

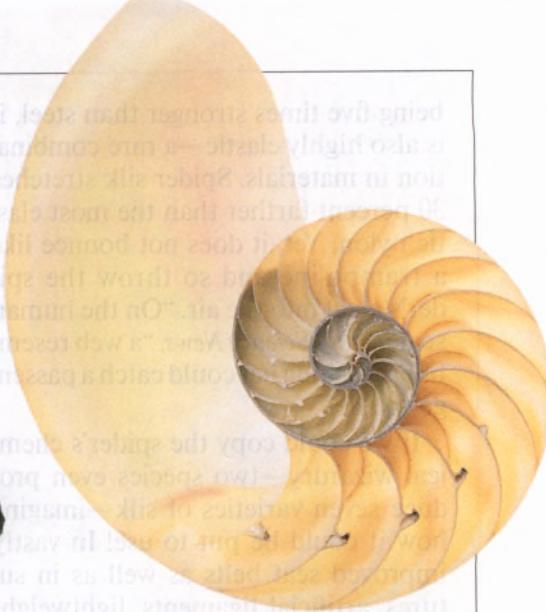




**A woodpecker's brain
is protected by very
dense bone that acts
as a shock absorber**



**The nautilus has special
chambers that enable it to
regulate its buoyancy**



**Chameleons change
color to blend with
their surroundings**

The squid, the octopus, and the nautilus all have a form of jet propulsion that drives them through the water. Scientists view these jets with envy. Why? Because they are composed of soft parts that cannot break, that can withstand great depths, and that run silently and efficiently. In fact, a squid can jet along at up to 20 miles an hour when fleeing predators, "sometimes even leaping out of the water and onto the decks of ships," says the book *Wild Technology*.

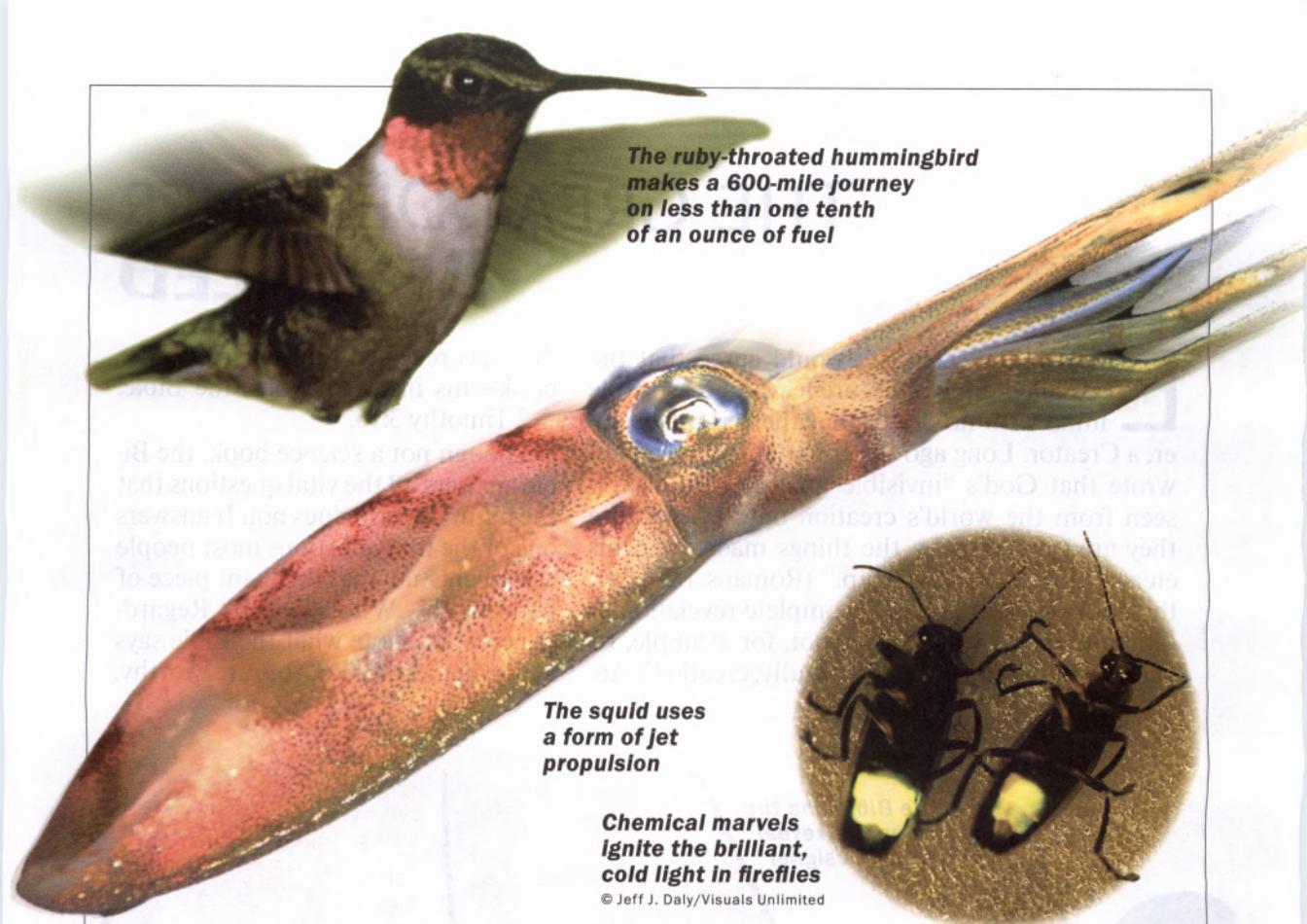
Yes, taking just a few moments to reflect on the natural world can fill us with awe and appreciation. Nature truly is a living puzzle that prompts one question after another: What chemical marvels ignite the brilliant, cold light in fireflies and certain algae? How do various arctic fish and frogs, after being frozen solid for the winter, become active again when they thaw out? How do whales and seals stay

under the water for long periods without a breathing apparatus? And how do they repeatedly dive to great depths without getting decompression sickness, commonly called the bends? How do chameleons and cuttlefish change color to blend with their surroundings? How do hummingbirds cross the Gulf of Mexico on less than one tenth of an ounce of fuel? It seems that the list of questions could go on endlessly.

Truly, humans can only look on and wonder. Scientists develop an awe "bordering on reverence" when they study nature, says the book *Biomimicry*.

Behind the Design—A Designer!

Associate professor of biochemistry Michael Behe stated that one result



The ruby-throated hummingbird makes a 600-mile journey on less than one tenth of an ounce of fuel

The squid uses a form of jet propulsion

Chemical marvels ignite the brilliant, cold light in fireflies

© Jeff J. Daly/Visuals Unlimited

of recent discoveries within the living cell "is a loud, clear, piercing cry of '*design!*'" He added that this result of efforts to study the cell "is so unambiguous and so significant that it must be ranked as one of the greatest achievements in the history of science."

Understandably, evidence of a Designer creates problems for those who adhere to the theory of evolution, for evolution cannot account for the sophisticated design within living things, especially at the cellular and molecular levels. "There are compelling reasons," says Behe, "to think that a Darwinian explanation for the mechanisms of life will forever prove elusive."

In Darwin's time the living cell—the foundation of life—was thought to be simple, and the theory of evolution was conceived in that era of relative ignorance. But now science has gone past that. Molecular biology and biomimetics have proved beyond all doubt that the cell is an extraordinarily complex system packed with exquisite, perfect designs that make the inner workings of our most sophisticated gadgets and machines look like child's play by comparison.

Brilliant design leads us to the logical conclusion, says Behe, "that life was designed by an intelligent agent." Is it not reasonable, therefore, that this Agent also has a purpose, one that includes humans? If so, what is that purpose? And can we learn more about our Designer himself? The following article will examine those important questions.

THE GREAT DESIGNER REVEALED

EVEN many scientists would agree that the so-called book of nature leaves a reasonable mind with no doubt that there is a Designer, a Creator. Long ago the Christian apostle Paul wrote that God's "invisible qualities are clearly seen from the world's creation onward, because they are perceived by the things made, even his eternal power and Godship." (Romans 1:20) But the book of nature is not a complete revelation of God and of his will. It does not, for example, reveal the purpose of life. Thankfully, creation's Au-

thor has revealed himself in another book—his inspired Word, the Bible.
—2 Timothy 3:16.

Though not a science book, the Bible answers all the vital questions that the natural world does not. It answers one of the first questions most people ask when studying a brilliant piece of handiwork—Who made it? Regarding creation, note what the Bible says at Revelation 4:11: "You are worthy,

*The Bible and the
book of nature reveal
the Great Designer*



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." Yes, the Great Designer is Jehovah God, and his name appears some 7,000 times in the original manuscripts of the Bible.

About 3,500 years before our scientific era, a man by the name of Job, obviously a keen observer of nature and a thinking person, associated Jehovah's name with creation. Job said: "Ask, please, the domestic animals, and they will instruct you; also the winged creatures of the heavens, and they will tell you. Or show your concern to the earth, and it will instruct you; and the fishes of the sea will declare it to you." What do they all teach about creation? Job answers with a question: "Who among all these does not well know that the hand of Jehovah itself has done this?"—Job 12:7-9.

Jehovah's Purpose for Humans

The Bible also reveals Jehovah's purpose for humankind. What is that purpose? It is that righteous humans enjoy the gift of everlasting life in Paradise—right here on earth. "The righteous themselves will possess the earth, and they will reside forever upon it," says Psalm 37:29. Similarly, Jesus said: "Blessed are the meek: for they shall inherit the earth."—Matthew 5:5, *King James Version*.

Furthermore, thanks to a special kind of knowledge, the earth will remain a peaceful paradise. Says Isaiah 11:9: "They will not do any harm or cause any ruin in all my holy mountain; because the earth will certainly be filled with the knowledge of Jeho-

vah as the waters are covering the very sea." In fact, "the knowledge of Jehovah" is the key to endless life, peace, and happiness. Jesus confirmed this when he said: "This means everlasting life, their taking in knowledge of you, the only true God, and of the one whom you sent forth, Jesus Christ."—John 17:3.

In gaining everlasting life, humans will at last be able to enjoy the earth as God originally intended. And far from being boring, eternal life will be an endless adventure of discovery and joy.

A Thrilling Challenge!

Ecclesiastes 3:11 says: "Everything [God] has made pretty in its time. Even time indefinite he has put in their heart, that mankind may never find out the work that the true God has made from the start to the finish." Soon, with the natural human desire to live to "time indefinite," or forever, completely satisfied, we will be able to try to 'find out the work God has made from the start to the finish.' Yes, the whole earth will be our classroom, Jehovah will be our Teacher, and life will be a thrilling, unending voyage of discovery.

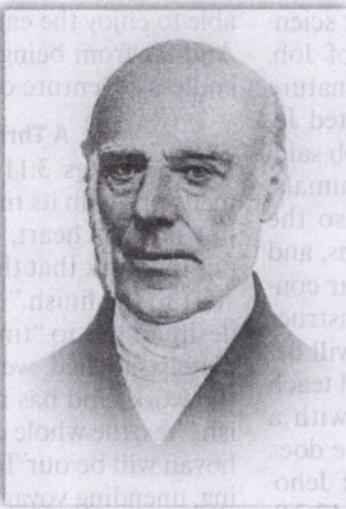
Picture yourself in Paradise, perfect in mind and body. You embrace challenges that you would not even dream of accepting now—and you know that you will be able to see them through to the very conclusion, whether that takes a hundred years or a thousand. Perhaps you may even be able to use your perfect faculties to copy some of Jehovah's designs—but in ways that are far superior to mankind's present efforts, which often harm and pollute. Yes, like Jehovah, you will be governed by love in all that you do.—Genesis 1:27; 1 John 4:8.

Why do we know that this is not just fanciful dreaming? Because of Jehovah's two magnificent "books." Yes, the Bible and creation furnish irrefutable proof that nothing is impossible for our Grand Designer and Creator. So why not get to know him and his Son, Jesus Christ, better now? You could not engage in a more interesting, worthwhile, and promising endeavor.

Joachim Barrande's "Kingly Gift"

BY AWAKE! CORRESPONDENT IN THE CZECH REPUBLIC

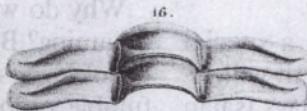
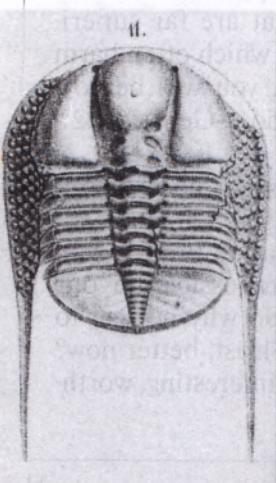
"MORE than a kingly gift, the most gallant homage to have been paid to the Czech nation!" That is how a journalist described the legacy that the Czech National Museum received from Joachim Barrande, the noted 19th-century paleontologist. Barrande's "kingly gift" to the Czech people consisted of an important collection of more than 1,200 crates full of fossils, which he had spent decades collecting, studying, and classifying. While you might not be inclined to rhapsodize over a collection of old fossils, Barrande's gift is far more valuable to paleontologists than a treasure trove!



Portrait: Z knihy Vývoj české přírody, 1931

A paleontologist is a scientist who uses fossil remains to study life in past geologic periods. Paleontology is a relatively new science. During the Middle Ages, fossils were dismissed as "jokes of nature" or were thought to be remains of dragons. By the 18th century, however, people in the upper classes were beginning to take an interest in collecting fossils. Scientists in many countries also began to take an interest in the study of fossils. Joachim

Barrande was one of them. What do we know about Barrande, and what did he contribute to the field of paleontology? Since he was a contemporary of Charles Darwin, what were Barrande's views on Darwin's theory of evolution?



Barrande Makes a Career Change

Joachim Barrande was born in 1799 in Saugues, a small town in southern France. He studied engineering in Paris, specializing in road and bridge construction. At the same time, he took courses in natural science. It soon became apparent that he was gifted in that field. After graduation Barrande began working as an engineer, but when he caught the eye of the French royal family, he was invited to tutor the grandson of King Charles X. The subject—natural science. In 1830, as a result of a revolution in France, the royal family was exiled and eventually went to Bohemia. Barrande joined them there. It was in Prague, the capital of Bohemia, that Barrande again took up engineering.

As an expert in road and bridge construction, Barrande was assigned to survey the countryside around Prague for a proposed horse-drawn railway. While he was going about his work, Barrande noticed that

there was an abundance of fossils in the area. Taking a closer look, he was amazed to discover striking similarities between the strata of Bohemia and the strata of Britain. His

passion for the natural sciences rekindled, Barrande ultimately quit engineering and, for the next 44 years, devoted his life to the study of paleontology and geology.

Barrande's classroom was the fossil-rich countryside of central Bohemia. Each day brought new discoveries of exceptional beauty and variety. By 1846 he was ready to publish the initial results of his research. In this work he described and classified new trilobite species, which once inhabited the bottom of the sea.

Barrande continued collecting and studying fossils. Then, in 1852, he published the first volume of a monograph, or treatise, entitled *The Silurian System of Central Bohemia*.^{*} Volume I discussed the trilobites. This was followed by volumes devoted to crustaceans, chondrichthyes, cephalopods, lamellibranchs, and other fossilized organisms. During his lifetime he published 22 volumes in which he described in detail more than 3,500 species. The work is one of the largest monographs in the field of paleontology.

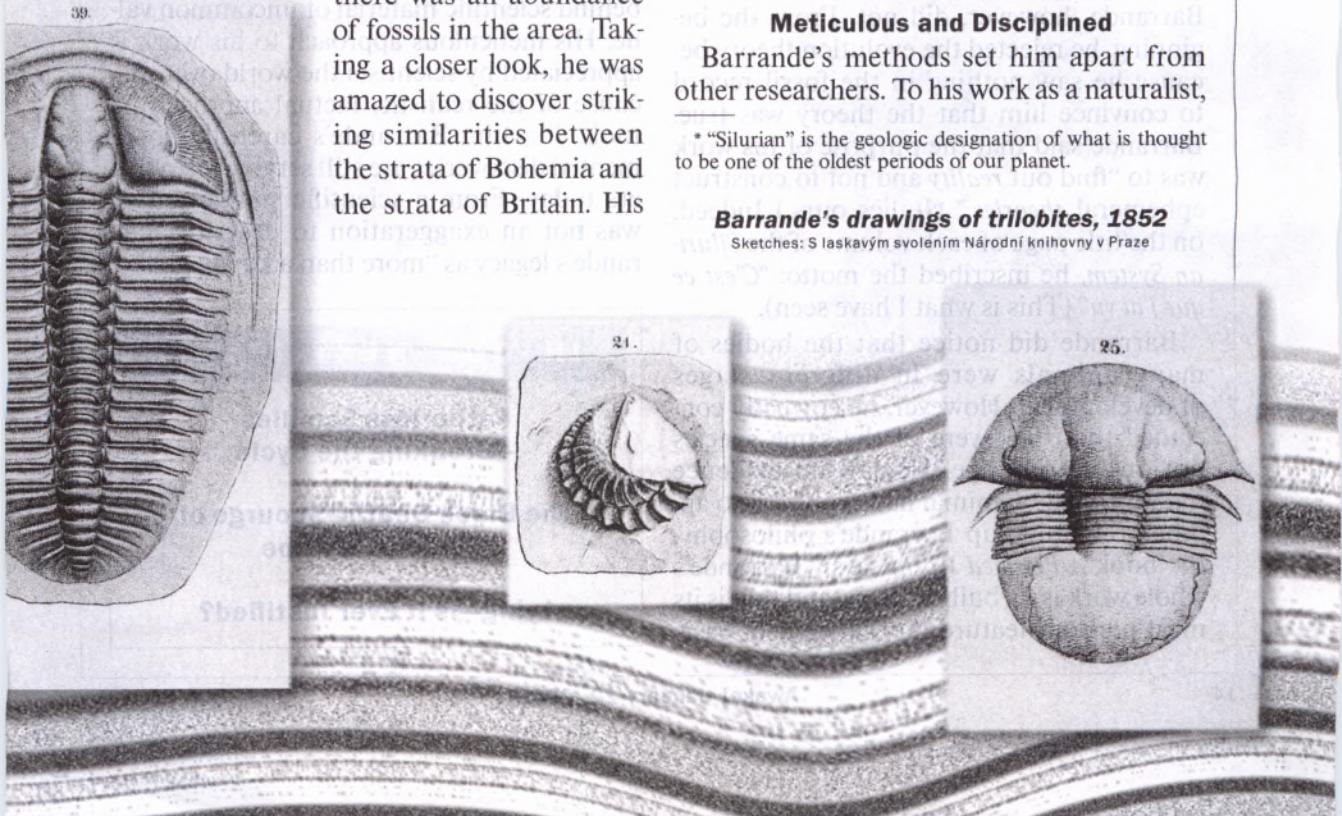
Meticulous and Disciplined

Barrande's methods set him apart from other researchers. To his work as a naturalist,

* "Silurian" is the geologic designation of what is thought to be one of the oldest periods of our planet.

Barrande's drawings of trilobites, 1852

Sketches: S laskavým svolením Národní Knihovny v Praze



he brought the discipline of an engineer. As a designer, he would not tolerate inaccurate calculations or drawings. As a paleontologist, he strove to attain a very high degree of precision in his drawings, taking great pains to ensure that they were accurate down to the finest detail. He personally retouched many of the drawings that were included in his monograph, although the originals had been sketched by a professional artist.

Barrande's meticulousness, however, was not confined to his drawings. After each volume of his monograph had been typeset, he personally checked the text. If he was not satisfied, he sent the offending parts back to be reset. Barrande's goal was to ensure that every work he published was as accurate as possible. He succeeded admirably. Today, almost 150 years later, researchers still use the *Silurian System* as a reference work.

What About Evolution?

When Charles Darwin's book *The Origin of Species* was published in 1859, many scientists jumped on the evolution bandwagon. Barrande, however, did not. From the beginning, he rejected the evolution theory because he saw nothing in the fossil record to convince him that the theory was true. Barrande said that the purpose of his work was to "find out reality and not to construct ephemeral theories." (Italics ours.) Indeed, on the title page of each volume of the *Silurian System*, he inscribed the motto: "*C'est ce que j'ai vu*" (This is what I have seen).

Barrande did notice that the bodies of many animals were in different stages of development. However, he correctly concluded that they were of the same species but of different age. He saw no evidence that one kind of animal had evolved into another. Summing up Barrande's philosophy, the book *A Petrified World* says: "Barrande's whole work is . . . built on facts, and that is its most precious feature. At this stage of basic

research, there is no room for speculation or guessing or for general theories either."

A Humble Man Gives a "Kingly Gift"

Despite his great success, Barrande did not fall prey to the snare of pride or dishonesty. Although he was at ease with the intelligentsia of Europe and spoke several languages, he never lost the common touch. He learned Czech in order to be closer to the people. This helped him in his work, as it allowed him to communicate with the stone quarriers who helped him acquire new specimens for his collection.

Barrande was a religious man, and what he found in nature strengthened his faith in God. He called fossils "medallions of the first creations." Moreover, in the introduction to his work, he referred to the emotions that moved him to keep studying: "It is a feeling of admiration, satisfaction, and recognition that pervades and charms the one who discovers or contemplates a part of the works of the Creator."

Joachim Barrande died in 1883, leaving behind scientific material of uncommon value. His meticulous approach to his work is appreciated by scientists the world over. Because of the realistic, factual approach he took, Joachim Barrande's carefully documented discoveries are still serving researchers today. From a scientific standpoint, it was not an exaggeration to describe Barrande's legacy as "more than a kingly gift."

IN OUR NEXT ISSUE

Fatherless Families —Breaking the Cycle

The Black Death—Scourge of Medieval Europe

Lying—Is It Ever Justified?



BRATISLAVA

From Ancient River-Crossing to Modern Capital

BY AWAKE! CORRESPONDENT IN SLOVAKIA

IMAGINE that you can travel back in time to the year 1741. The air is electric with anticipation. Festive fanfares can be heard as people push and shove to get as close as possible to the street where a procession is about to pass. Peasants in their Sunday best and proud burghers attired in the latest fashion are here, along with noblemen who have come to see and to be seen. Royal envoys are distributing gold and silver coins bearing the portrait of a young lady, while people shout in excitement. Why all the commotion? Maria Theresa, the archduchess of Austria, is heading into the city to be crowned as the new queen of Hungary.

Back to the present. If you wished to visit the location of this important coronation, where would you go? Not to Vienna, where today many tour-

ists admire Maria Theresa's royal palace, nor to Budapest, the capital of modern-day Hungary. You would have to visit Bratislava, a city located on the Danube River, some 35 miles east of Vienna.

Today's Bratislava, a city of about half a million people, is the capital of picturesque Slovakia. When compared with its neighboring capitals—Budapest, Vienna, and Prague—Bratislava now seems like a little sister. Yet, for over two centuries, it was the capital of Hungary and enjoyed all the glory attached to such a privileged status. Indeed, the coronations of 11 Hungarian rulers took place in this city. But what made it so special?

An Ancient Settlement

Bratislava boasts an advantageous position on the Danube,

Maria Theresa

Europe's second-longest river. In the past, the Danube slowed down at this point and became shallow, creating a natural crossing. People, along with their animals and carts, forded the river there long before bridges connected its banks. Thus, from ancient times the area around what is now Bratislava was a busy crossroads. As early as 1500 B.C.E., one of the Amber Routes, important trade ways connecting the north and the south of Europe, passed through the city. Later, traffic across the ford was controlled by a fortress on the nearby hill where Bratislava Castle is now located.

If you could go back in time, whom might you bump into at this crossing? Well, if you arrived about the fourth century B.C.E., you would be welcomed by the Celtic people who made this area a center of their culture. The hill served as a kind of acropolis for the local Celtic community, who produced pottery and struck coins.

What if you visited at the beginning of our Common Era? If you knew some Latin, you might have been able to converse with the locals, for by then the Romans had pushed their northern borders to the Danube. At the same time, however, you might also have met up with Germanic people arriving from the west.

If you scheduled your visit more toward the Middle Ages, say in the eighth century, you would find yourself entering an ethnic melting pot. By this time, what came to be called the Great Migration had occurred, and Slavic people from the east had begun to settle in the territory. The Hungarians had established their

home to the south and had also penetrated into the region of Bratislava. But somehow the Slavic element prevailed. Evidence of this is the Slavic name of the area's first real castle, which was built in the tenth century. It was known as Brezalauspurc, meaning "Castle of Braslav"—thought to have been named after a high-ranking army officer. From this designation, the Slovak name Bratislava was derived.

The Medieval City

In time, the country now called Slovakia became part of Hungary. A historical account dating from 1211 C.E. calls Bratislava Castle the best-fortified castle in Hungary. Thirty years later, this assessment was proved correct when the castle withstood attack by Tatar invaders. That success boosted the growth of the settlement around the castle, and in 1291, Hungarian King Ondrej III granted the town full privileges as a municipality. Its citizens thus gained the right to elect their own mayor, to transport their goods on the Danube River, and to trade freely "both on water and land." Since vineyards flourished on the city's sunny slopes, the citizens' right to sell wine out of their own homes was especially appreciated.

Later Hungarian kings granted the city additional privileges, which contributed to further expansion. In 1526, Bratislava began its long reign as the capital of Hungary, a position it held until 1784. Meanwhile, Bratislava's ethnic





**Slovak National
Theatre**

**A street in
the Old City**

mixture became ever more varied. Its mostly Slavic and Hungarian population was enriched by an influx of German and Jewish people. In the 17th century, as Turkish domination expanded westward and northward, many Croats sought refuge in the area of Bratislava, as did Czech exiles fleeing the Thirty Years' War between Catholics and Protestants farther west in Europe.

Bratislava in the 20th Century

By the beginning of the 20th century, Bratislava had become a multinational, multicultural city. At that time the surest way to get what you needed in a shop was to request it in German or Hungarian. But Czechs and Romanies (Gypsies) also played an important role, as did the Jewish community. Before World War I, only about 15 percent of the population was Slovak. But by 1921, Slovaks had become the

most numerous of the city's many nationalities.

Soon the dark clouds of World War II loomed over Europe. Thus began a sad part of Bratislava's history, which upset the city's ethnic harmony. First, the Czechs were forced



The New Bridge and the leaning tower

to leave. Then, the Romanies and the Jewish inhabitants were deported, and thousands eventually died in concentration camps. After World War II ended, the majority of the German-speaking residents were also deported. Eventually, members of each of these ethnic groups made their way back to their old hometown, and their presence still enriches the atmosphere of Bratislava.

A Visit to Bratislava Today

Why not join us on a short walk through today's Bratislava? First, we tour the beautifully reconstructed Bratislava Castle. From the castle garden, we enjoy a panoramic view of the city spreading out on both sides of the Danube River.

Down the hill, just below the castle area, we find ourselves in the Old City, the historic center of Bratislava. Walking through the colorful, narrow streets, we feel as if we were breathing the air of past centuries. We admire the attractive architecture of the palaces and burgher houses. If you wish, we can also stop at one of the historic cafés for a cup of coffee or tea and some of Bratislava's famous pastries filled with walnuts or poppy seeds.

All year round, visitors delight in strolling



along the banks of the Danube next to the Old City. Here they cannot miss a symbol of modern Bratislava—the New Bridge with its restaurant atop a leaning tower. The design gives the impression that the restaurant is hovering over the Petržalka housing area on the other side of the river.

If you get the feeling that there is a lot of building going on in Bratislava, you are right. Besides the recently reconstructed parts of the Old City, attractive steel-and-glass structures mushroomed during the 1990's, with more to come. It is these offices, business centers, and banks that give the city its modern look.

Naturally, you would like to have an attractive souvenir of your visit. So we can drop by the shops selling handmade products, such as beautiful lace tablecloths or dolls dressed in the national costume. Or if you prefer, we can go to the open-air Main Square Market, where you can shop just as the residents of Bratislava have been doing for centuries. Perhaps you may also want to visit the attractive branch office of the Watch Tower Society located in this city.

Maybe one day you will really visit Bratislava. And if you do, you will no doubt enjoy this colorful modern capital that grew from an ancient river crossing.



**Branch office and
Kingdom Hall of
Jehovah's Witnesses**

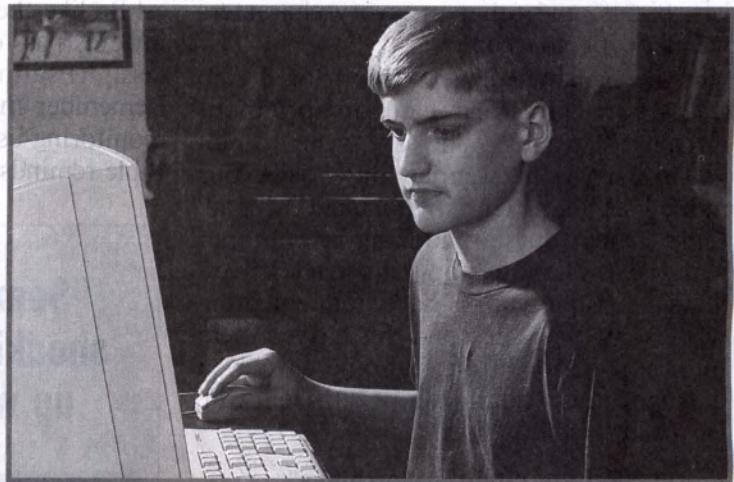
YOUNG PEOPLE ASK . . .

PICTURE yourself in the world's biggest library. Books, newspapers, catalogs, photographs, and recordings of every sort—on virtually every subject—surround you. All the latest information as well as much of the literature of past centuries is at your fingertips.

Well, the Internet can place such information at your fingertips. It enables a person to sit at his computer and exchange information with other computers and computer users anywhere in the world.* It allows users to sell products, to make purchases, to make banking transactions, to converse, to listen to the latest music recordings—all in the privacy of their own home.

Little wonder, then, that some experts predict that over 320 million people will be using the Internet by the end of this year. Use of the Internet is thus becoming commonplace in many parts of the world. With schools and libraries aggressively promoting its use, millions of young people have access to it. In the United States, nearly 65 percent of youths between the ages of 12 and 19 have already used or subscribed to on-line services.

Properly used, the Internet can be a source of helpful information on the weather, travel, and other subjects. Through it,



How Can I Avoid Dangers on the Internet?

you can buy books, car parts, and other things. Many use it for schoolwork.

Although the Internet can be useful, it can also seem like a library without librarians or other observers. One can browse it with the feeling that no one else is around. But this is one of the greatest dangers of using the Internet. Why? Because countless Web sites contain material that is morally corrupt and spiritually destructive. Thus, the Internet can expose young Christians to temptation. After all, humans are naturally curious—a tendency that Satan the Devil has long exploited. Satan certainly took advantage of Eve's curiosity and 'seduced her by his cunning.'—2 Corinthians 11:3.

Similarly, a young Christian could easily be seduced by unwholesome information if he is not determined to safeguard his spirituality. An article in *Better Homes and Gardens* explained: "The Internet is a bustling

* See the series "The Internet—Is It for You?" appearing in the July 22, 1997, issue of *Awake!*

frontier where brilliant pioneers hawk the latest information; but pedophiles, scam artists, bigots, and other unsavory characters wander cyberspace too."

A youth named Javier* says: "Some Web sites are shocking. They can pop up without warning." He adds: "They are trying to pull you in. They want to entice you—to get your money." A young Christian named John admits: "Once you start looking at improper material, it's hard to stop—it's so addictive." Some Christian youths have frequented unwholesome Web sites, and this has led them into more serious trouble. Some have even damaged their relationship with Jehovah. How can this be avoided?

"Seeing What Is Worthless"

Sometimes a Web-site address itself clearly indicates that the site contains objectionable material.* Proverbs 22:3 warns: "Shrewd is the one that has seen the calamity and proceeds to conceal himself, but the inexperienced have passed along and must suffer the penalty."

More commonly, though, the problem is that people may stumble upon an objectionable site purely by accident. The home page may contain lurid images that have been carefully designed to entice you into exploring the site—and returning to it over and over again![△]

Kevin describes what happened to one of his friends: "He had time on his hands and was curious. Viewing pornography soon became a pattern." Fortunately, this young Christian sought out an elder and received help.

Have you resolved what you will do if you stumble upon such a site? It is clear what a

Christian should do: Leave the site immediately—or even shut down the Internet browser! Be like the psalmist who prayed: "Make my eyes pass on from seeing what is worthless." (Psalm 119:37; compare Job 31:1.) Remember that even if no other human is monitoring us, we are not unobserved. The Bible reminds us that all things are "openly

"Some Web sites are shocking. They can pop up without warning"

exposed to the eyes of him with whom we have an accounting."—Hebrews 4:13.

Talking to your parents or to other mature Christians can strengthen your resolve not to revisit unwholesome sites. After all, if you fell into quicksand, would you struggle until you were in it up to your neck before calling for help?

What About Association On-Line?

Chat allows Internet users from all over the world to communicate instantaneously with one another. Businesses use it for on-line conferences and to provide customer service. Some chat rooms allow users to share information on technical matters, such as auto repair or computer programming. Some forms of chat allow friends and family members to communicate privately without the expense of long-distance telephone calls. Though there may be legitimate uses for this medium, are there any dangers?

There is a real need for caution when it comes to public chat rooms, for these can pose certain dangers. Writer Leah Rozen observed: "Techno-savvy teenagers are spend-

* Some names have been changed.

* The Web-site address is the string of characters that is used to access the Web site. Sometimes addresses contain words that identify the purpose of the site.

△ The home page is like an electronic storefront window. It explains what a site offers, who created it, and so on.

ing hours chatting online with anonymous strangers all over the country and, even, the world. Unfortunately, some of those strangers with whom teens may be talking online also happen to be adult perverts looking for sexual trysts with kids." An article in *Popular Mechanics* warned that "you have to be extremely careful" when using public chat



**Some families place the home computer
in an open area**

rooms. Giving out your name or address to a stranger could be an invitation to serious trouble! Why subject yourself to that danger?

A more subtle danger, though, lies in getting caught up in improper fellowship with strangers who do not respect Bible principles.* Researchers say that much of the teen talk in chat rooms focuses on sexual issues. The Bible's counsel at 1 Corinthians 15:33 is thus appropriate: "Do not be misled. Bad associations spoil useful habits." Bad associations via a computer link are dangerous. Should a God-fearing youth recklessly expose himself or herself to such risks?

* Such dangers can exist in public chat rooms established by well-meaning Christians for the purpose of discussing spiritual issues. Dishonest people and apostates have sometimes joined these discussions and insidiously attempted to persuade others to accept their unscriptural ideas.

Safeguards

In view of the dangers that the Internet presents, it must be used with caution. Some families, for example, place the computer in a well-traveled area, such as the living room. They may also establish the rule that the Internet only be used when others are at home. If your parents establish such restrictions, cooperate. (Proverbs 1:8) Clear guidelines are an evidence of their love.

If schoolwork requires that you use the Internet, why not keep track of how much time you spend on-line? Try to decide in advance how much time you will spend, using an alarm clock to remind you when the time is up. Tom suggests: "Plan ahead, know exactly what you're looking for, and stick to it—no matter how interesting other things look."

Caution is also needed when it comes to the use of E-mail. Christian youths are careful not to get caught up in reading vast quantities of E-mail, especially if much of the information is frivolous or unfounded. Excessive use of E-mail can eat up valuable time needed for schoolwork and spiritual activities.

King Solomon said: "To the making of many books there is no end, and much devotion to them is wearisome to the flesh." (Ecclesiastes 12:12) Those words could well apply to the Internet. Don't get so involved in the search for facts and figures that you neglect personal study of the Bible and participation in the Christian ministry. (Matthew 24:14; John 17:3; Ephesians 5:15, 16) Remember, too, that while communicating via the computer may have its place, there is no substitute for having face-to-face contact with fellow Christians. So if you really need to use the Internet, make a firm decision to use it wisely. Avoid dangerous sites, and do not spend excessive time on-line. "Safeguard your heart," and never become a slave of the Internet.—Proverbs 4:23.

A Close Shave

BY AWAKE! CORRESPONDENT IN AUSTRALIA

IFA man spends five minutes a day shaving and does so every day for 50 years, he will have spent just over 63 days of his life removing hair from his face! How do men feel about this daily ritual?

A recent informal survey yielded these comments about shaving: "I don't like it." "I hate it." "One of the hazards of life." "Something to be avoided whenever you can get away with it." If some men feel so strongly about removing their facial hair, why do they do it? Let's learn a little more about shaving. Perhaps we'll find the answer.

From Clamshells to Disposable Razors

Can you imagine shaving with a clamshell? A shark's tooth? Perhaps a sharp sliver of flint? Humans have shown remarkable ingenuity in choosing implements for shaving! In ancient Egypt men shaved using a copper razor that resembled a small axhead. More recently, in the 18th and 19th centuries, what became known as cutthroats were manufactured, primarily in Sheffield, England. Often ornately decorated, these razors had a hollow-ground steel blade that folded safely into the handle when not in use. These devices had to be handled with great care, and learning to master them no doubt cost more than a little skin and blood. For the less dexterous, initiation must have been traumatic. However, the 20th century promised relief.

In 1901 a man in the United States named King Camp Gillette patented a safety razor with a disposable blade. His idea took the world by storm and eventually led to a vari-



ety of designs, including razors with silver- or gold-plated handles. Recent developments include totally disposable razors, razors with twin or even triple blades, and razors with flexible, pivoting heads.

Not to be forgotten, of course, are electric razors, which first appeared on the market in 1931. Their efficiency and popularity have steadily increased, but the keen edge of a blade is still preferred by many who want a truly close shave.

An On-Again, Off-Again History

From earliest times mankind has had an on-again, off-again relationship with beards.

Ancient Egyptians, says the book *Everyday Life in Ancient Egypt*, "were not remarkable for body hair and prided themselves on being clean-shaven, using well-made razors which they kept in neat leather cases." This custom may explain why the Hebrew prisoner Joseph shaved prior to appearing before Pharaoh.—Genesis 41:14.

Assyrians were a race of splendidly bearded men. To the point of vanity, they lavished care and attention on their beards, having them elaborately curled, plaited, and arranged.

Israelite men of old wore beards of moderate length, and they used a razor to keep them well trimmed. So, what did God's Law mean when it commanded Israelite men not to 'cut their sidelocks short around' or "destroy the extremity" of their beards? This was not a command against trimming one's hair or beard. Rather, it discouraged



Tips for Shaving With a Blade

The book *Men's Hair* makes the following suggestions for effective shaving with a blade.*

1. Softening your whiskers: The only way to soften facial hair really well is to apply plenty of hot water. If possible, shave after taking a shower, as this allows more time for the water to soften the whiskers.

2. Applying preshave products: All the various soaps, lathers, creams, and gels accomplish essentially three things. (1) They lock moisture into the whiskers, (2) they keep them erect, and (3) they lubricate the skin so that the razor slides over it more easily. Choose the product that works best for you. Oh, have you tried hair conditioner? It is also designed to soften hair.

* This article discusses shaving for men. In many countries women also shave parts of their bodies, and so they too might find some of the points mentioned to be helpful.

3. Using the right razor in the right manner:

The right razor is a sharp razor. Blunt razors can damage your skin. Cut with the grain of hair growth. Shaving against the grain may give a close shave, but it can cut whiskers below skin level and cause them to grow into surrounding tissue instead of out through the pores of the skin. According to some sources, careless shaving habits—by men and women—can cause viral infections leading to warts.

4. After-shave skin protection: Each time you shave, you remove a microscopic layer of skin, leaving your skin vulnerable. Therefore,

it is important to rinse all residues off your face with clean water—warm at first, then cool to close your pores and seal in moisture. If you wish, you can apply a moisturizing after-shave lotion to protect and refresh your skin.



What Are Whiskers?

Whiskers are hairs that grow on the face. They are made of keratin and related proteins. Keratin is a fibrous, sulfur-containing protein manufactured by the body of man and animal and is the basic building block of hair, nails, feathers, hooves, and horns. Of all the hair on the human body, the

whiskers are among the toughest and most resilient, being as hard to cut as a copper wire of equivalent thickness. There are as many as 25,000 on the face of the average man, and they grow at the rate of about half a millimeter every 24 hours.

Men: A Pictorial Archive from Nineteenth-Century Sources/ Dover Publications, Inc.

Israelite men from imitating the extreme religious practices of neighboring pagan nations.* —Leviticus 19:27; Jeremiah 9:25, 26; 25:23; 49:32.

In ancient Greek society, beards were normally worn by all except the nobility, who were often clean-shaven. In Rome the habit of shaving seems to have started in the second century B.C.E., and for several centuries thereafter, a daily shave remained the custom.

With the fall of the Roman Empire, however, the beard once again prevailed, doing so for 1,000 years until the second half of the 17th century, when shaving became the vogue. The clean-shaven look continued through the 18th century. But then, by the

mid-to-late 19th century, the pendulum began to swing the other way. Hence, photographs of C. T. Russell, the first president of the Watch Tower Society, and fellow Christian W. E. Van Amburgh show both men wearing stylish, well-trimmed beards that were dignified and appropriate for their time. In the early part of the 20th century, however, shaving enjoyed a resurgence of popularity that has endured in most countries to our day.

Are you one of those millions of men who use a blade to go through that daily ritual before the mirror? If so, you no doubt want to make it as painless, bloodless, and effective as possible. To that end, you might like to consider the suggestions in the box "Tips for Shaving With a Blade." Likely you already employ some of these suggestions. Whatever the case—enjoy clean, close shaving!

* See *Insight on the Scriptures*, Volume 1, pages 266 and 1021, published by the Watchtower Bible and Tract Society of New York, Inc.

Shaving has an on-again, off-again history

Museo Egizio di Torino



24

Egyptian



Assyrian

Photographs taken by courtesy of the British Museum



Roman

MAPPING THE HEAVENS THEN AND NOW

BY AWAKE! CORRESPONDENT IN THE NETHERLANDS

THE sight of stars sprinkled across the black, velvety sky has often filled man with awe, and throughout history it has moved him to express his admiration for the Creator of such beauty. Long ago, a poet exclaimed: "The heavens are declaring the glory of God; and of the work of his hands the expanse is telling." (Psalm 19:1) However, ancient observers of the night sky saw more than beauty.

Finding Figures in the Sky

Astronomers in times past noticed that the entire body of stars appeared to be moving in an orderly way. Although stars passed along the sky from east to west, they did not change their positions in relation to one another.* In other words, each night the same specific groupings of stars were visible. Since

* Unknown to ancient peoples, this apparent movement of stars is caused by the rotation of the earth around its axis. For the same reason, the sun seems to rise and set.

man wanted to bring some order to those countless points of light, he connected stars into groups. With a little imagination, these groups resembled animals, people, or inanimate objects. In this way the practice of regarding set configurations of stars as constellations came about.

Some of the constellations we know today were first described in ancient Babylon. Among these are the 12 constellations representing the signs of the zodiac. These played—and still play—an important role in astrology, the divination of the supposed influence of the stars on human affairs. Looking for omens in the stars, though, is condemned in the Bible. (Deuteronomy 18:10-12) Yet, worshipers of Jehovah God were aware of the existence of constellations. The Bible book of Job, for instance, speaks about Jehovah as the one "making the Ash constellation, the Kesil

Aplan's Star Chart, 1540

By permission of the British Library
(Maps C.6.d.5.: Aplan's Star Chart)



constellation, and the Kimah constellation." —Job 9:9.

The names of many of the constellations that we know today are from Greek mythology. Names like Cepheus, Cassiopeia, Andromeda, and Hercules can still be found on modern-day star charts.

Star Charts From the Past

About 150 C.E., the Greek astronomer Ptolemy produced a summary of the astronomical knowledge of his time. This summary, entitled *Almagest*, contains a list of 48 constellations. Charts and atlases of the sky that were made in the centuries after Ptolemy usually featured the same 48 constellations. In fact, until about the 16th century, the number of constellations did not change.* Later, 40 other constellations were added. In 1922 the International Astronomical Union officially adopted the list of these 88 constellations.

Besides constellations, Ptolemy's publication includes a list of more than a thousand stars, with information about their brightness and their position in the sky. Not only does Ptolemy give the position of a star in celestial longitude and latitude but he adds more detail. For instance, one star in the Ursa Major, or Great Bear, constellation is described as "the star at the beginning of the

* These 48 constellations were known in Mesopotamia, the Mediterranean, and Europe. Later, they were also known by those who immigrated to North America and Australia. However, other peoples, such as the Chinese and the North American Indians, went by a different division of the sky.

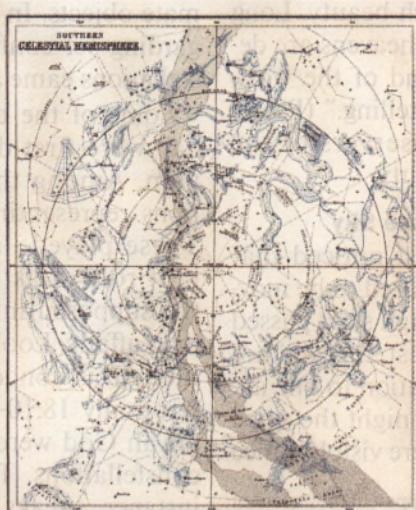
tail," and the location of a comet is given as "to the left of Andromeda's right knee." Thus, "every good astronomer," notes one textbook, "had to know his celestial anatomy!"

Why, though, are most ancient constellations located in the northern sky? That is because the practice of regarding certain groups of stars as constellations originated in the Mediterranean area, where the northern sky is visible, explains a uranographer, or cartographer of the sky. Only later, when man began to explore the southern sky, were new constellations identified. Some of these newer constellations have names such as Chemical Furnace, Pendulum Clock, Microscope, and Telescope.

"The Christian Starry Sky"

In 1627, German scholar Julius Schiller published a star atlas with the title *Cœlum Stellatum Christianum* (The Christian Starry Sky). He felt that it

was about time to depaganize the heavens. Thus, he set out to remove the pagan figures from the sky and replace them with figures from the Bible. The book *The Mapping of the Heavens* explains that he allotted "the northern heavens to the New Testament and the southern to the Old Testament." "Schiller's southern hemisphere was transformed into a cavalcade of Old Testament subjects — Job takes the place of the Indian and the Peacock, the Centaur is transformed into Abraham and Isaac." In the Northern Hemisphere, "Cassiopeia becomes Mary Magdalene, Perseus St Paul, while the twelve Zodiac



Southern Hemisphere as mapped in the 19th century

signs are conveniently replaced by the twelve apostles."

Only one small constellation survived this cleanup. That was Columba (Dove), which supposedly represented the dove that Noah sent out to find dry land.

Maps in Transition

In time, the appearance of star charts changed. In the 17th century, after the invention of the telescope, a need arose for charts that provided more accurate positions of the stars. In addition, the elaborate decorations that cluttered earlier charts became less prominent and eventually disappeared. Today, most star atlases contain only stars, star clusters, nebulas, galaxies, and other objects of interest to the observer of the night sky.

In the middle of the 19th century, catalogs that were more comprehensive began to be made. One of the pioneers in this field was German astronomer Friedrich Wilhelm Argelander. Together with a number of assistants, he began the huge undertaking of making a catalog of the stars in the northern sky. With a telescope, they located about 325,000 stars and measured the position and the degree of brightness of each of them. Since the observatory in which they worked was located in the German city of Bonn, the catalog became known as the *Bonner Durchmusterung* (Bonn Overall Survey). It was published in 1863. After Argelander's death, his work was continued by one of his assis-

tants. He mapped the stars of the southern sky and published his work as the *Südliche Bonner Durchmusterung* (Bonn Southern Overall Survey). The final survey was published in 1930. It was issued at Cordoba, Argentina. These catalogs have retained their value to the present day.

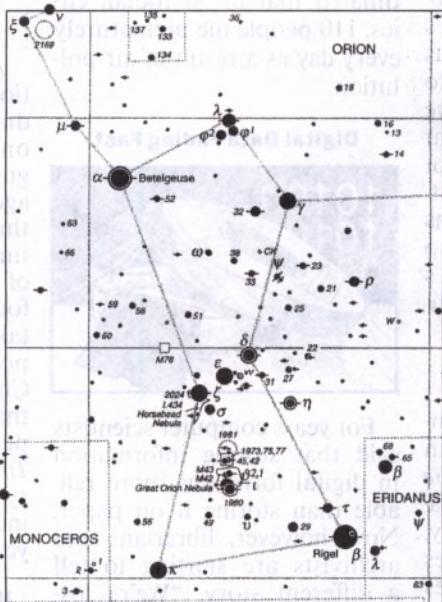
Today and Tomorrow

The work of Argelander and his successors was followed by even better catalogs. However, in more recent years, after the arrival of space telescopes, unheard-of mapmaking feats became possible. With the help of the Hubble Space Telescope, astronomers have now compiled a catalog that contains approximately 15 million stars!

A recent development in the mapping of the heavens is the publishing of two new catalogs by the European Space Agency. These are based on observations made with the space telescope of the Hipparcos satellite. The accuracy of these catalogs is as yet

unequaled. Based on these catalogs, new printed star atlases have been created. One is a comprehensive atlas in three volumes called the *Millennium Star Atlas*.

That title may remind Bible readers of the Millennium, or Christ's Thousand Year Reign of peace, mentioned in the Bible. (Revelation 20:4) During that time man will undoubtedly learn much more about the awesome universe, of which even today's largest star atlases can chart only a minor part.



Constellation Orion as it appears on a modern star chart

Jesuits Denied Registration in Russia

The Russian Ministry of Justice has denied the application of the Society of Jesus for registration as an independent religious organization, reports the *National Catholic Reporter*. The Society of Jesus, commonly known as the Jesuits, was established in 1540. Under Russia's new religion law, most religious organizations are required to reregister in order to receive legal recognition. Groups that are denied registration cannot print or distribute religious literature, invite foreign citizens for religious activities, or set up educational facilities. Jehovah's Witnesses were reregistered nationally on April 29, 1999.

Suicides Soar in Japan

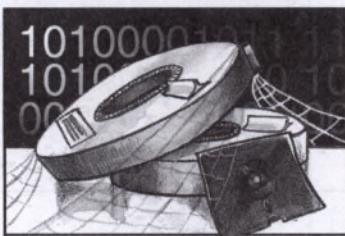
In Japan more people committed suicide in 1998 than in any previous year, reports *The Daily Yomiuri*. According to Japan's National Police Agency, 32,863 people killed themselves in 1998—more than three times the number killed in traffic accidents in Japan. Much of the increase has been attributed to financial problems caused by unemployment, which has gripped the nation following a recent economic slump. Suicide is the sixth leading cause of death in Japan.

Deadly Air Pollution

"Road traffic is the fastest growing source of pollution in Europe and in some countries more people are dying as a result of this air pollution than are being killed in [traffic] ac-

cidents," reports Reuters news service. According to a study by the World Health Organization, 21,000 people in Austria, France, and Switzerland die prematurely every year from respiratory or heart diseases that are triggered by air pollution. In a separate report, it is estimated that in 36 Indian cities, 110 people die prematurely every day as a result of air pollution.

Digital Data Fading Fast



For years computer scientists said that storing information in digital form was more reliable than storing it on paper. Now, however, librarians and archivists are starting to tell a different story. "We're losing vast amounts of important scientific and historical material because of disintegration or obsolescence," says *Newsweek* magazine. Digital storage systems such as disk drives are sensitive to heat, humidity, oxidation, and stray magnetic fields. And depending on storage conditions, the magnetic tape used to store digital data might last only a decade, says the magazine. Another challenge for those trying to preserve digital information is the rapid change in technology. The hardware that is used

to store data changes so rapidly that systems quickly become obsolete. Says Abby Smith, of the Council on Library and Information Resources: "Information doesn't have much of a chance, unless you keep a museum of tape players and PCs [personal computers] around."

India's Population Passes One Billion

According to the United Nations Population Division, India's population passed the one billion mark in August 1999. Just over 50 years ago, India's population was one third of what it is now. If it continues to grow at its present rate of 1.6 percent a year, in about four decades, India will overtake China as the world's most populous nation. "India and China already account for more than one-third of the world's people," reports *The New York Times*. In less than half a century, life expectancy in India has increased from 39 years to 63 years.

U.S. Marriage Rate Dropping

A study by Rutgers University's National Marriage Project found that the U.S. marriage rate has dropped to its lowest point in recorded history, reports *The Washington Post* on its Web site. The study also noted that immediately following World War II, 80 percent of the nation's children were being raised in a family with two biological parents. Today, however, the figure has dropped to 60 percent. "The percentage of teenage girls who said having a child out of wedlock is a 'worthy lifestyle' increased from

33 percent to 53 percent in the past two decades," says the report. Little wonder that the report said: "The institution of marriage is in serious trouble!"

Education Woes in Africa

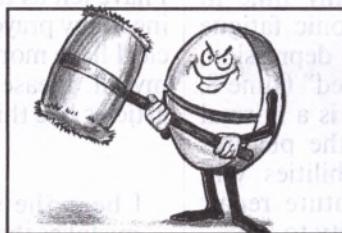
Over 40 million school-age children in sub-Saharan Africa do not go to school, reports All Africa News Agency. A number of problems have plagued the region's school systems. For example, as a result of economic problems, many schools have no water and few or no toilets. There are shortages of textbooks, and teachers are poorly trained. In addition to economic woes, there is a high incidence of pregnancy among teenage girls, which is a major cause of their high drop-out rate. AIDS has also had a negative impact on school attendance. "Early sexual activity among adolescents has led to higher AIDS infection among adolescents," says Africa News. In some cases girls who have not contracted AIDS are required to stay home to care for relatives who are stricken with the disease. Says Dr. Edward Fiske, a primary education specialist for the United Nations Educational, Scientific, and Cultural Organization: "With no school, the future for most countries in Sub-Saharan Africa hangs on balance."

Mummy Found to Have Prosthetic Toe

"A prosthetic toe found attached to a mummy seems to have been used in life before being buried with its owner 2,500 years ago," reports *The Sunday Times* of London. The fake toe, made of linen impregnated with animal glue and plaster of Par-

is, is described by Dr. Nicholas Reeves as "a sophisticated production, beautifully designed, skilfully and strongly made, and clearly a special order." The toe came fitted with a toenail and was coated with a flesh-like tint. A series of eight holes were drilled in the toe for attachment. The holes closely follow the line of a Y-thong sandal strap so that when the toe was in place, the holes would have been concealed by the sandal's strap.

Headaches From Painkillers!



Those who take medication for headaches three or more times a week may be suffering from medication misuse headache (MMH). Thought to affect 1 in 50 persons, MMH is caused by simple remedies, such as aspirin, as well as by prescription painkillers. When the analgesic effect wears off, the medication can cause a headache that the patient mistakes for a normal headache or a migraine. The patient takes more painkillers, thus repeating the cycle. Dr. Tim Steiner, of Imperial College, London, explains that "any patient complaining of chronic daily headache should be assumed to have MMH." He also notes that although the condition has been recognized for some years, most family doctors are unfamiliar with it and simply prescribe stronger painkillers, when all that is needed

is for patients to stop taking them, reports *The Sunday Telegraph* of London.

Tongue Care

Bacteria that hide on the back of your tongue can produce sulfur gases that cause bad breath, says a report in the *Prince George Citizen* newspaper. "Bacteria thrive in a dry, oxygen-free environment which is why they live in the crevices and pits away from the air we send down to our lungs," states the report. Brushing and flossing your teeth will help, but only about 25 percent of bacteria are eliminated by brushing. Dentist Allan Grove believes that tongue scraping, an ancient tradition in Europe, is "the single most important thing you can do to prevent bad breath." Using a plastic scraper "is far better than a brush for keeping the tongue clean and pink," says the *Citizen*.

A New Eye on the Universe

The Gemini North telescope, based on Mauna Kea, in Hawaii, opened its eye on the universe in June 1999. Its light-collecting mirror, which is 26.5 feet in diameter, will enable astronomers to view the faintest objects in the distant reaches of deep space, reports the *Independent* newspaper of London. Both the Gemini North and the space-based Hubble telescopes aid astronomers to see events that happened long ago and thus "to look back in time." The advantage of the Hubble telescope is that it is located in space. Gemini, though ground-based, relies on computer equipment to subtract distortion caused by atmospheric disturbance, and it produces images as distinct as those from Hubble—if not more so.

FROM OUR READERS

Weight I want to thank you from the bottom of my heart for the article "Young People Ask . . . How Can I Conquer My Obsession With Weight?" (May 22, 1999). For some time now, all I have been able to think about is my physique and my weight. I am ashamed of myself when I look in the mirror, and I hardly get on the scale anymore. After reading this article, though, I realize that it's what's inside that counts.

L. R., France

Disabilities I spend most of my time in a wheelchair. My wife has chronic fatigue syndrome and suffers from deep depression. The series "Hope for the Disabled" (June 8, 1999) brought out that grieving is a normal reaction to serious loss. Also, the pictures in the article "When All Disabilities Will Disappear" helped make the future repair of our infirmities more of a reality to me.

C. W., United States

I lost my left foot in an accident when I was just four years old. Your series helped me to deal with my frequent bouts of depression. Please keep up the good work of combating prejudice.

A.J.T.P., Brazil

People need to know that disabled individuals have feelings and emotions like everyone else and that we can and do get hurt. People sometimes look at you as if you were a freak and make rude comments, or they act as if you did not even exist. Disabled people are neither stupid nor lazy nor helpless. Given a chance, many of us can cook, clean, shop, raise families, hold a job, and even operate a vehicle. One thing that has helped me to carry on is my learning about Jehovah and his loving and tender ways. I am not one of Jehovah's Witnesses yet, but I hope to become one in the future.

A. G., United States

Value in God's Eyes I often feel depressed and worthless, sometimes thinking that I shouldn't be a full-time evangelizer because my efforts aren't good enough. The article "The Bible's Viewpoint: You Have Value in God's Eyes!" (June 8, 1999) made me feel a lot better. It helped me to see that Satan tries hard to make us feel that way in order to stop us from serving Jehovah.

L. W., Canada

The article was very comforting. Until now, I have felt as though Jehovah were not listening to my prayers. But since reading your article, I have more confidence in Jehovah and in myself. Please continue printing comforting articles like this.

R.V.T., Belgium

I bear the scars of painful experiences—mistakes that robbed me of my self-esteem. Today my relationship with Jehovah and the knowledge that his love is beyond human comprehension give me a feeling of happiness and security.

V.S.C., Brazil

I have just finished listening to the article on audiocassette. I have been blind for about 44 years, and even after getting baptized as a Christian, I never thought that I was worth very much. This article moved me deeply. I thank God so much that he does not see us the way we see ourselves.

A. K., Italy

I have been plagued with negative emotions. But as I read the article, it was as if Jehovah were gently talking to me. It is very hard to change thinking patterns, but I will try not to forget what the article said: "Jehovah, like a loving parent, 'is near'—ever watchful, attentive, and ready to help."—Psalm 147:1, 3."

K. F., Japan

The Changing Faces of War Victims

TO DAY'S wars are different from those of the past . . . It is ordinary citizens, rather than soldiers," who are increasingly the victims, reported "Perspective," a program broadcast by UN Radio. For instance, during the first world war, only 5 percent of all casualties were civilians. However, during the second world war, the number of civilian casualties jumped to 48 percent. And today, noted UN Radio, "almost all casualties in conflicts are civilians—90%—and most of these are women, children and the elderly."

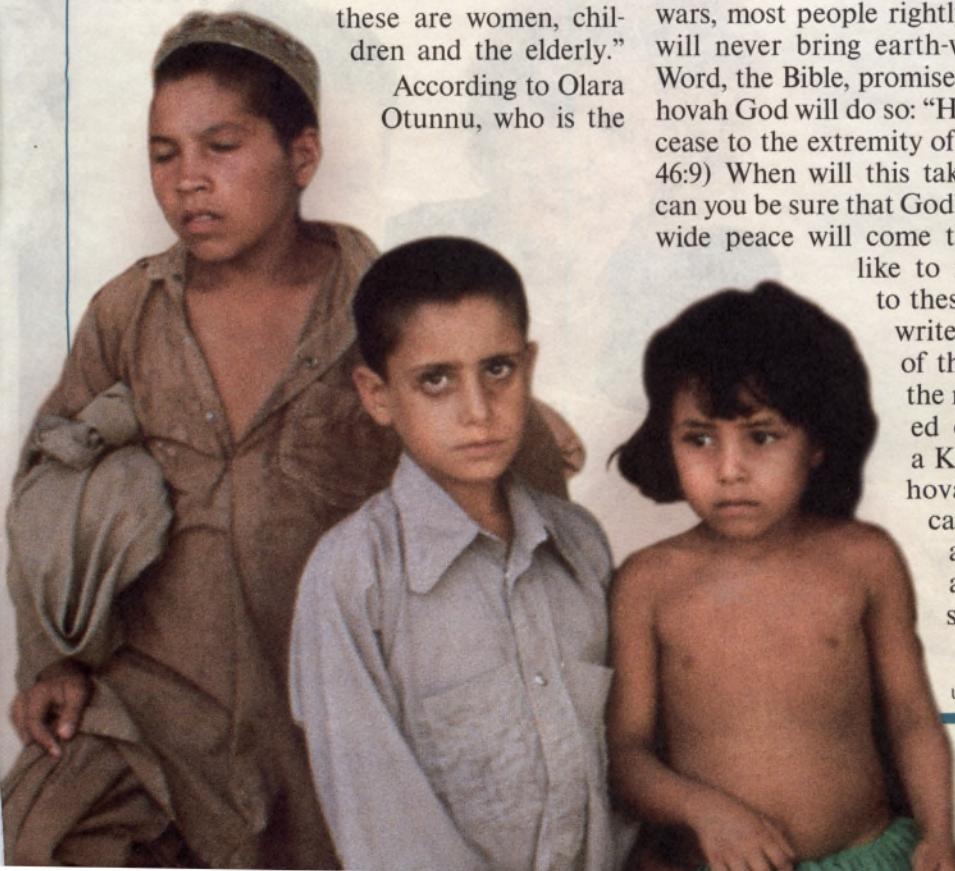
According to Olara Otunnu, who is the

UN secretary-general's Special Representative for Children and Armed Conflict, "an estimated two million children have been killed in situations of armed conflict since 1987." That amounts to more than 450 child war-victims per day over the past 12 years! In addition, during that same period, more than six million children have been seriously injured or permanently disabled.

One way the UN could combat the growing number of child war-casualties, suggested Mr. Otunnu, is by promoting zones of peace. "Locales where children predominate, such as schools, hospitals, and playgrounds, should be regarded as battle-free zones." However, added UN Radio, "preventing conflicts in the first place" is the most effective way for the UN to make sure that ordinary citizens do not become war casualties. Indeed, eliminating war casualties really requires that war itself be eliminated. Will that ever happen?

Because of humanity's long record of wars, most people rightly feel that humans will never bring earth-wide peace. God's Word, the Bible, promises, however, that Jehovah God will do so: "He is making wars to cease to the extremity of the earth." (Psalm 46:9) When will this take place? And why can you be sure that God's promise of worldwide peace will come true? If you would

like to receive an answer to these questions, please write to the publishers of this magazine, using the nearest address listed on page 5, or call a Kingdom Hall of Jehovah's Witnesses located near you. There are no obligations and no cost—just straight answers.



UN PHOTO 156450/J. Isaac

"We Are So Thankful!"

"I AM sure that the *Awake!* articles on strokes [February 8, 1998] played an important part in sustaining my mother's life," wrote Carol, in a letter to the branch office of Jehovah's Witnesses in Canada. Her mother had felt a numbness in her left arm, and by the next morning, she had begun having vision problems. "She wanted to wait until the next day to see her physician," Carol explained, "so I strongly urged her to read the *Awake!* articles dealing with strokes. Within 15 minutes she called me back, saying that she had better go to the hospital. The doctors kept her overnight for observation. The next day they confirmed that she had had a couple of warning strokes, and they stated that it was wise that she went to the hospital when she did. We are so thankful for this series of articles!"



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