

Awake!

JUNE 22, 2004

**Can Science
Help You to
Find God?**



Awake!

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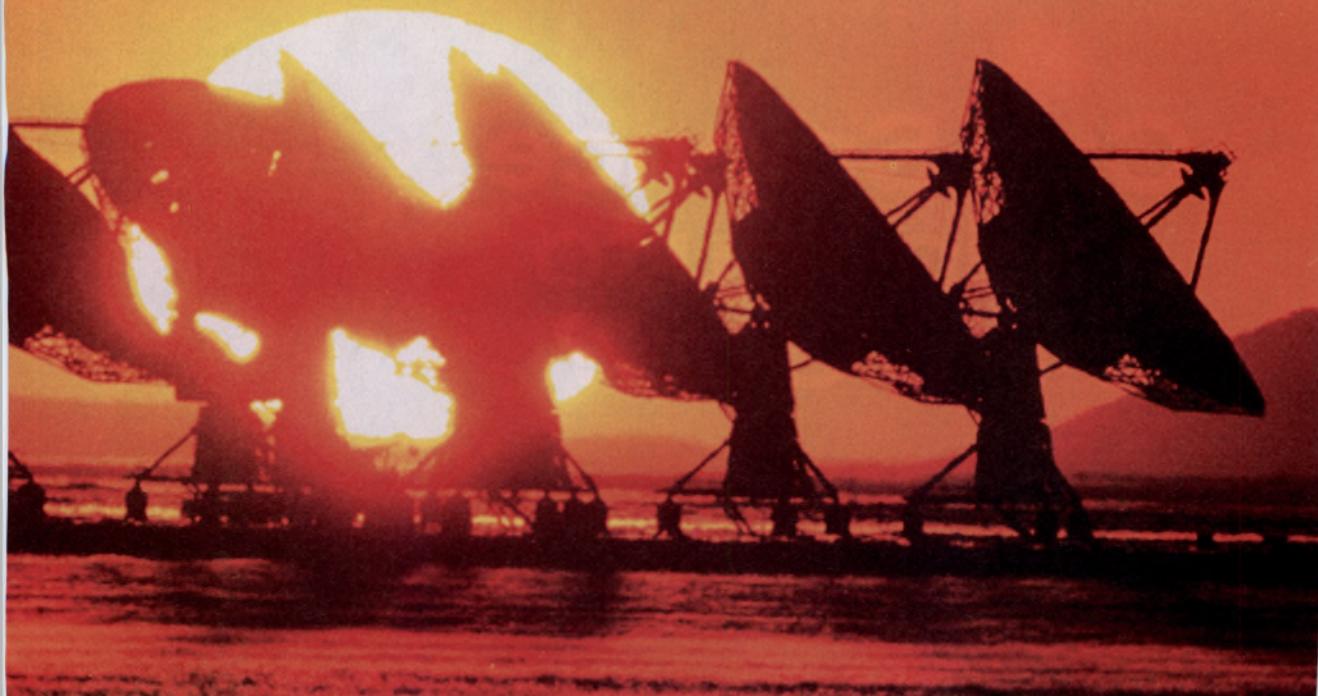
What can you do if you find yourself involved in a courtship with someone who is verbally or even physically abusive?

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COVER: Stars: Courtesy of ROE/Anglo-Australian Observatory, photograph by David Malin; telescopes below: © David Nunuk/Photo Researchers, Inc.

Can Science Help You to Find God? 3-12

Do you assume that scientists don't believe in God? You might be surprised by the conclusions some scientists are reaching these days.



Is It Unscientific to Believe in God?

WHEN reading about science, it is not unusual to come across religious expressions. For example, scientists have been referred to as "the high priests of a new technological culture," and their laboratories as "temples" or "shrines." Of course, such expressions are merely metaphors. However, they can lead to this important question: Is there really a gulf dividing science from religion?

Some may feel that the more scientists learn, the further they get from any belief in God. It is true there are many in the scientific community who scorn religious faith. But a significant number of others find themselves deeply impressed by the evidence pointing to design in the natural world around us. Other scientists wonder about more than design; they begin to think about the Designer.

Winds of Change

Charles Darwin's theory of evolution has been prevalent for a century and a half. Some educated people may have expected that by now, belief in God would be banished to the realm of the ignorant, the gullible, and the naive. Nothing of the kind has happened. Many scientists openly profess belief in a Creator. Granted, they may not believe in a personal God or in the Bible. Yet, they are convinced that the design evident in nature requires an intelligent Designer.

Can such scientists be dismissed as naive? Reporting on scientists who believe that intelligent design is responsible for our cosmos and life in it, a book review in *The New York Times* comments: "They have Ph.D.'s and occupy positions at some of the better universities. The case they make against Darwinism does not rest on the authority of Scripture; rather, it proceeds from premises that are scientific."

The same article also notes that proponents of intelligent design "do not stake any obviously foolish claims. . . . What they deny is that the standard Darwinian theory, or any other 'naturalistic' theory that confines itself to mindless,

Stars: Courtesy of ROE/Anglo-Australian Observatory; photograph by David Malin



mechanical causes operating gradually over time, suffices to explain the whole of life. The biological world, they contend, is rife with evidence of intelligent design—evidence that points with near certainty to the intervention of an Intelligent Designer.”*

Such conclusions are surprisingly common among scientists. For example, a study released in 1997 revealed that 4 in 10 U.S. scientists believed in a personal God. That ratio had remained virtually unchanged since 1914, when a similar survey was made.

Understandably, in countries where a more secular spirit prevails, such as those in Europe, the ratio is lower. Yet, the British newspaper *The Guardian* reported that “the level of belief is highest among practitioners of the hard sciences, such as physics and geology, lower for the soft sciences, such as anthropology.” It added: “The UK has organisations such as Christians in Science.” The paper also noted that in Great Britain “church attendance among science students is proportionally much higher than for the arts.”

Still, it does seem that the majority of scientists scoff at the idea of a Creator. Such disdain exerts powerful peer pressure. Astronomer Allan Sandage observes that “there is a reluctance to reveal yourself as a believer.” Why? “The opprobrium,” he says—the disapproval and censure from colleagues—is so severe.”

As a result, the scientists who dare to suggest that science is not necessarily at odds with belief in a Creator find that their voices are drowned out by more skeptical views. The following articles will focus on these often-ignored voices and on why these scientists feel as they do. How, though, are you personally affected? Can science help you to find God? Please read on.

* Prominent academics and scientists who have gone on record as subscribing to the idea of “an Intelligent Designer” include Phillip E. Johnson, who teaches law at the University of California, Berkeley; biochemist Michael J. Behe, author of the book *Darwin’s Black Box—The Biochemical Challenge to Evolution*; mathematician William A. Dembski; philosopher of logic Alvin Plantinga; physicists John Polkinghorne and Freeman Dyson; astronomer Allan Sandage; and others too numerous to list.

Awake!®

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

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Why Some Scientists Believe in God

SCIENCE is constantly unraveling new secrets about the universe and the life that thrives on our planet. Nonetheless, scientists and laymen alike still face such fundamental questions as these: How did the universe come to be? What existed before that? Why does the universe appear to be expressly designed to support life? How did life arise here on earth?

Science still cannot really answer such questions. Some people doubt that it ever will. Many, then, have felt compelled to rethink their views and beliefs. Let us consider three of the mysteries that are leading some scientists to wonder about the existence of a Creator.

A Fine-Tuned Universe—By Chance?

One major question has to do with the fine-tuning of our cosmos. Why is the universe equipped with fixed physical laws and with natural constants that are precisely and ideally suited to support a planet like ours and all the life on it?

What do we mean by fine-tuning? Consider, for instance, the precise settings of four fundamental physical forces: electromagnetism, gravity, strong nuclear force, and weak nu-

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clear force.* These forces affect every object in the universe. They are set and balanced so precisely that even slight changes could render the universe lifeless.

To many reasoning minds, the explanation simply has to be something more than mere coincidence. John Polkinghorne, formerly a physicist at Cambridge University, concluded: “When you realize that the laws of nature must be incredibly finely tuned to produce the universe we see, that conspires to plant the idea that the universe did not just happen, but that there must be a purpose behind it.”

Australian physicist Paul Davies made a similar point: “There is no doubt that many scientists are . . . scornful of the notion that there might exist a God, or even an impersonal creative principle.” He added: “Personally I do not share their scorn. . . . I cannot believe that our existence in this universe is a mere quirk of fate, . . . an incidental blip in the great cosmic drama.”

The Challenge of Complexity

A second problem challenging today's scientists involves the sheer complexity of

* For more details, see chapter 2 of the book *Is There a Creator Who Cares About You?* published by Jehovah's Witnesses.

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

the world around us. Common sense tells us that the more complex an event, the less likely it is to occur by chance. Consider an example.

There are myriad chemical reactions that need to be precisely staged to form DNA, the building block of life. Three decades ago Dr. Frank Salisbury of Utah State University, U.S.A., calculated the odds of the spontaneous formation of a basic DNA molecule essential for the appearance of life. The calculations revealed the probability to be so tiny that it is considered mathematically impossible.*

undergo a remarkable process called meiosis, whereby cells from each parent are left with half the usual number of chromosomes. This process prevents the offspring from having too many chromosomes.

Of course, the same process would have been needed for other species. How, then, did the "first mother" of each species become capable of reproducing with a fully developed "first father"? How could both of them have suddenly been able to halve the number of chromosomes in their reproductive cells in the manner needed to produce

a healthy offspring with some characteristics of both parents? And if these reproductive features developed gradually, how would the male and female of each species have survived while such vital features were still only partially formed?

In even a single species, the odds against this reproductive interdependence coming about by chance are beyond measuring. The chance that it arose in one species after another defies reasonable explanation. Can a theoretical process of evolution explain such complexity? How could accidental, random, purposeless events result in such intricately interrelated systems? Living things are full of characteristics that show evidence of foresight and planning—pointing to an intelligent Planner.

Many scholars have come to such a conclusion. For example, mathematician William A. Dembski wrote that the "intelligent design" evident in "observable features of the natural world . . . can be adequately explained only by recourse to intelligent causes." Molecular biochemist Michael Behe sums up the evidence this way: "You can be a good Catholic and believe in Darwinism. Biochemistry has

Questions that puzzle scientists

- *Why is there an amazing degree of fine-tuning in the four fundamental physical forces, making possible the existence of the universe and of life?*
- *How can the extreme and often irreducible complexity of living organisms be explained?*
- *Why is the fossil record sketchy, and where is evidence of intermediate organisms, or links, between the major types of living things?*

Complexity is especially evident when living organisms have complex parts that would be useless without other complex parts. Let us focus on the example of reproduction.

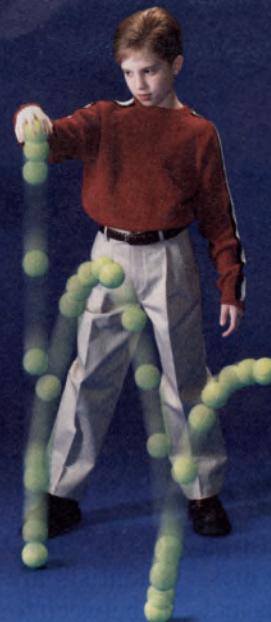
According to evolutionary theories, living things continued to reproduce as they became ever more complex. At some stage, though, the female of a number of species had to develop reproductive cells requiring fertilization by a male with complementary reproductive cells. In order to supply the proper number of chromosomes to the offspring, each parent's reproductive cells

* He assumed that this molecule had the opportunity to develop by natural chemical reactions on 100,000,000,000,000,000 (10²⁰) "hospitable" planets over a period of four billion years. What are the chances that a single DNA molecule formed? By his estimate, one in 10⁴³⁵!

▼The weak nuclear force keeps our sun burning at a steady rate



Gravity is responsible ► for keeping objects on the earth



▼The strong nuclear force binds the nucleus of atoms together



Electromagnetism ▲ is the force behind lightning

If these four forces were not precisely tuned and balanced, no life would be possible

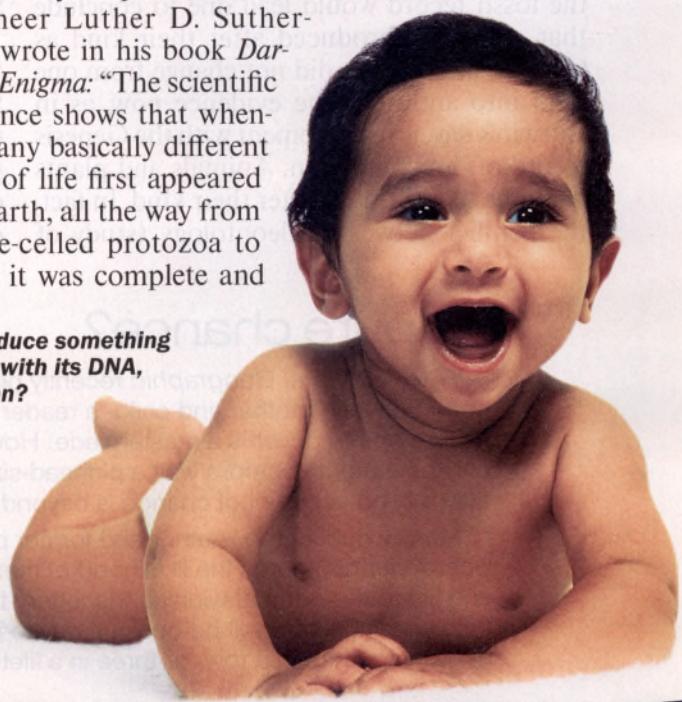
made it increasingly difficult, however, to be a thoughtful scientist and believe in it."

A Spotty Fossil Record

A third mystery that has puzzled some scientists is related to the fossil record. If evolution proceeded over aeons of time, we should expect to find a host of intermediate organisms, or links, between the major types of living things. However, the countless fossils unearthed since Darwin's time have proved disap-

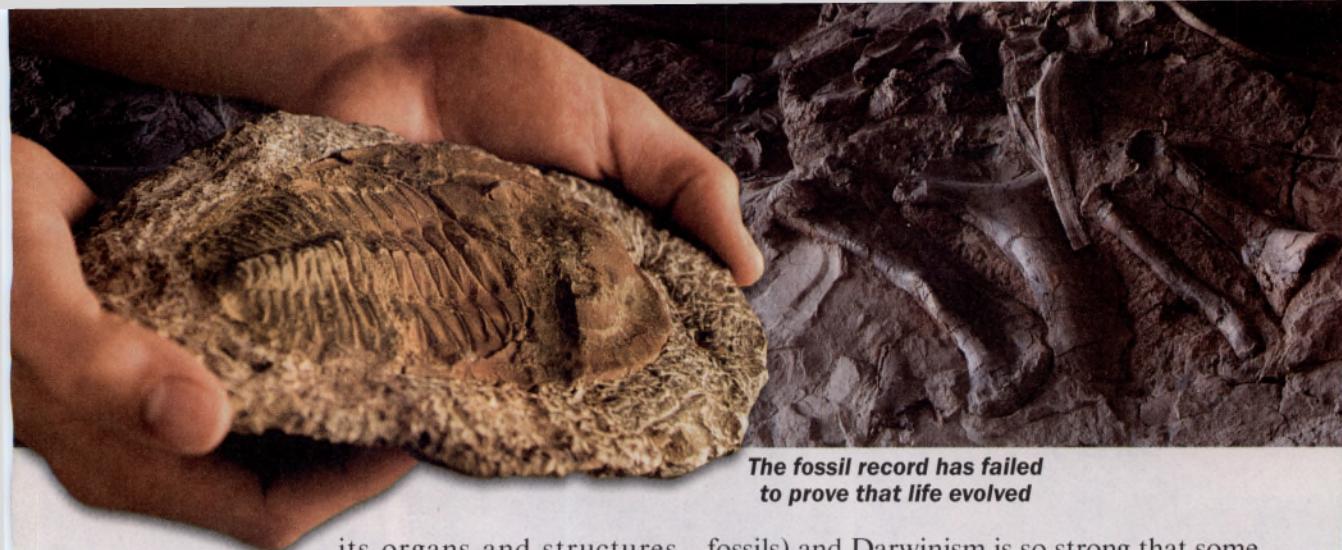
pointing in that respect. The missing links are just that—missing!

A number of scientists have therefore concluded that the evidence for evolution is too weak and contradictory to prove that life evolved. Aerospace engineer Luther D. Sutherland wrote in his book *Darwin's Enigma*: "The scientific evidence shows that whenever any basically different type of life first appeared on Earth, all the way from single-celled protozoa to man, it was complete and



How could random forces produce something as complex as a single cell with its DNA, let alone a human?





**The fossil record has failed
to prove that life evolved**

its organs and structures were complete and fully functional. The inescapable deduction to be drawn from this fact is that there was some sort of pre-existing intelligence before life first appeared on Earth."

On the other hand, the fossil record closely matches the general order of the appearance of living forms found in the Bible book of Genesis. Donald E. Chittick, a physical chemist who earned a doctorate degree at Oregon State University, comments: "A direct look at the fossil record would lead one to conclude that animals reproduced after their kind as Genesis states. They did not change from one kind into another. The evidence now, as in Darwin's day, is in agreement with the Genesis record of direct creation. Animals and plants continue to reproduce after their kind. In fact, the conflict between paleontology (study of

fossils) and Darwinism is so strong that some scientists are beginning to believe that the in-between forms will never be found."

Facing the Evidence

The foregoing represents just the tip of an iceberg of unanswered questions that puzzle those who dismiss the evidence of a Creator. Some scientists realize that the rejection of God is a path paved, not by hard evidence and careful logic, but by hopeful assumptions and conjectures.

Thus, after a lifetime of fruitful scientific research and work, astronomer Allan Sandage said: "It was my science that drove me to the conclusion that the world is much more complicated than can be explained by science. It is only through the supernatural that I can understand the mystery of existence."

By pure chance?

When *National Geographic* recently printed an appealing cover capturing the loving bond between mother and child, a reader wrote to the magazine: "The mother-and-child picture on the cover is a masterpiece. How anyone can look at that darling child that only nine months before was a pinhead-size egg and think this magical development was only a blind accident of chance is beyond me."

Many would agree. Author and former professor of nuclear physics Dr. Gerald Schroeder compares the likelihood of mere chance being the cause behind the universe and life to the odds of winning the lottery three times in a row: "Before you collect your third winnings, you will be on your way to jail for having rigged the results. The probability of winning three in a row, or three in a lifetime, is so small as to be negligible."

In their own words

Many scientists unhesitatingly declare their belief in a Creator. Although some have broad and vague ideas about who God is, they still agree that the evidence points to an intelligent Designer. Note the following comments:

"The order of the living world is plainly evident. It was set up by a superior Power that I personally call God. It is here that faith agrees with scientific truth. Far from contradicting it, it completes it, providing a simpler understanding of our universe."

—JEAN DORST, BIOLOGIST,
FRANCE



"As a scientist, I look at the world around me, and observe engineering mechanisms of such remarkable complexity that I am drawn to the conclusion of intelligent design being behind such complex order."

—ANDREW MCINTOSH, MATHEMATICIAN,
WALES, UNITED KINGDOM



"The complexity of nature clearly points to a Creator. Every biological and physical system, once understood, shows incredible complexity."

—JOHN K. G. KRAMER, BIOCHEMIST, CANADA



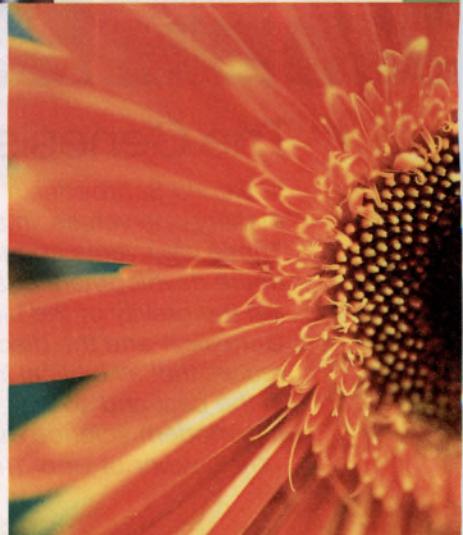
"I cannot imagine the universe and human life without an intelligent beginning, without a source of spiritual 'warmth' that lies beyond matter and its laws."

—ANDREY DMITRIYEVICH
SAKHAROV, NUCLEAR
PHYSICIST, RUSSIA



"Each animal is in some way uniquely designed to suit its particular environment, and I cannot help but attribute the complexity of the design to a Creator, rather than to random evolutionary forces."

—BOB HOSKEN,
BIOCHEMIST, AUSTRALIA





Where Can You Find Answers?

DO YOU ever feel a bit put off by the debate that rages on the subject of evolution versus creation? If so, you are not alone.

After all, on one side of the issue are some learned scientists and academics, often using very technical language, who insist that if you are educated and intelligent, you must accept the theory of evolution as fact. On the other side are some equally overbearing religionists who use emotionally charged rhetoric to say that if you have genuine faith, you must agree with their brand of creationism.

Such extremist viewpoints alienate many reasonable people. The question of God's ex-

istence deserves better than smug, dogmatic assertions. Remember, this question is more than a subject for debate, more than a mere intellectual exercise. The issues involved can affect your life and your future.

A Common Problem With Scientists

As we have seen, there are more than a few reputable, educated scientists who say that the evidence points to the existence of a Designer or Creator. A few go still further. They question the scientific integrity of their colleagues who dogmatically dismiss the existence of God.

For example, geophysicist John R. Baumgardner notes: "In the face of such stunningly unfavorable odds, how could any scientist with any sense of honesty appeal to chance interactions as the explanation for the com-



The Genesis account appraised

The Bible describes six creative periods

Gerald Schroeder, a former professor of nuclear physics, writes: "The Bible relates in thirty-one verses, in a few hundred words, events spanning sixteen billion years. These are events about which scientists have written literally millions of words. The entire development of animal life is summarized in eight biblical sentences. Considering the brevity of the biblical narrative, the match between the statements and timing in Genesis 1 and the discoveries of modern science is phenomenal, especially when we realize that all biblical interpretation used here was recorded centuries, even millennia, in the past and so was not in any way influenced by the discoveries of modern science. It is modern science that has come to match the biblical account of our genesis."

—THE SCIENCE OF GOD—THE CONVERGENCE OF SCIENTIFIC AND BIBLICAL WISDOM.

plexity we observe in living systems? To do so, with conscious awareness of these numbers, in my opinion represents a serious breach of scientific integrity."

Renowned physicist Richard Feynman brought up another facet of scientific integrity. In a university commencement address, he spoke of "a specific, extra type of integrity." He said that this included "bending over backwards to show how you're maybe wrong." To do so, he said, "is our responsibility as scientists, certainly to other scientists, and I think to laymen."

How often do we find evolutionists applying such phrases as "maybe wrong" to their theories? Sadly, such modesty seems to be in short supply among them. In truth, modesty and integrity should lead more scientists to admit that science, which is limited to a study of the physical realm, is ill-equipped to answer questions about the existence of a Creator. What, though, about religious leaders who advocate creationism?

A Common Problem With Religionists

Modesty and integrity are also in short supply on the part of religious leaders. After all, where is the integrity in asserting that the Bible teaches what it does not teach? Where is the modesty in putting personal views and favorite traditions above the Bible? This is precisely what many creationists have done.

For instance, creationists often say that the entire universe was created in six literal 24-hour days some 6,000 years ago. With teachings like this, they misrepresent the Bible, which says that God created the heavens and the earth "in the beginning"—at some unstated point before the more specific creative "days" began. (Genesis 1:1) Significantly, the Genesis account shows that the expression "day" is used in a flexible sense. At Genesis 2:4, the entire period of six days described in the preceding chapter is spoken of as only one day. Logically, these were, not literal days of 24 hours, but long periods of

time. Each of these epochs evidently lasted thousands of years.

All too often, religious teachers are equally off base when they talk about faith. Some seem to suggest that faith involves believing passionately in something for which there is no solid evidence. To many reasoning people, that sounds more like gullibility. The Bible defines faith quite differently: "Faith is the assured expectation of things hoped for, the evident demonstration of realities though not beheld." (Hebrews 11:1) So genuine faith is not mere gullibility. It is based on solid evidence, on reasonable assurance.

On what evidence, then, is faith in God based? There are two bodies of evidence, both of them compelling.

Weighing the Evidence

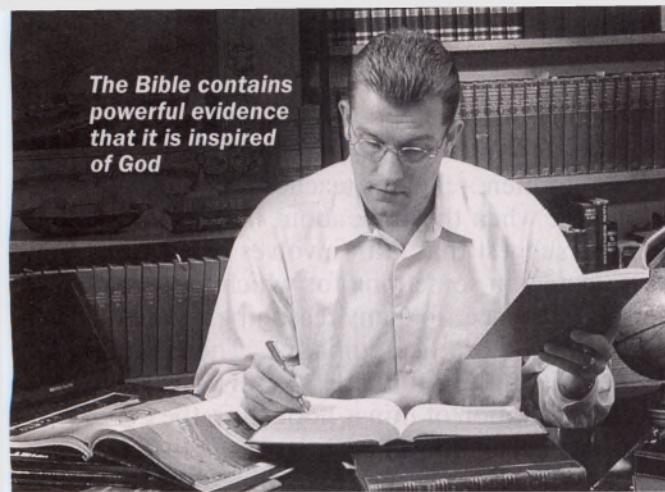
The apostle Paul was moved to write that God's "invisible qualities are clearly seen from the world's creation onward, because they are perceived by the things made, even his eternal power and Godship." (Romans 1:20) For thousands of years, wise men and women have perceived evidence of God's existence in the natural world.

As we have seen, science can be a useful tool in this regard. The more we learn about the complexity and order of the universe, the more reason we have to be in awe of the One who designed it all. Some scientists are open to such evidence and find it convincing. No doubt they would say that science has helped them to find God. Other scientists, it seems, will not be convinced by any amount of evidence. What about you?

If you are open to weighing the evidence on the matter, we urge you to do so. The book *Is There a Creator Who Cares About You?* is designed to help you in this vital quest for answers.* In addition, it will help you to weigh a second body of evidence for the existence of God: the Bible.

* Published by Jehovah's Witnesses.

The Bible contains powerful evidence that it is inspired of God



The Bible contains a great deal of evidence that it was inspired by a superhuman intelligence. For example, it contains many prophecies, or history written in advance. Some of these describe the very conditions of our modern world! (Matthew 24:3, 6, 7; Luke 21:10, 11; 2 Timothy 3:1-5) Humans cannot reliably foretell the future. Who but God could do such a thing?

However, the Bible does more than help to answer the question of whether God exists. It also teaches us his personal name, describes his personality, and tells how he has shown an interest in mankind over the years. It even reveals what he has in store for us. In all such areas, science is powerless to help us find answers. Really, human science cannot bring lasting hope into our lives. Nor can it establish proper morals and values.

A Basis for Morals and Values

Sadly, the trend of science as practiced by some today seems to undermine morality, values, and standards. Biologist Richard Dawkins, who rejects the idea of God, stated: "In a universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won't find any rhyme or reason in it, nor any justice." Do you find that a rather grim view of the world? Don't you think that human society needs a moral code that rewards good behavior and punishes wrongdoing?

Here we find a critical difference between the Bible's view of humanity and atheistic evolution's view. God's Word stresses that humans hold a special place in creation; evolution suggests that humans are the accidental product of blind natural processes. The Bible explains that humans are made in the image of a just and loving God and are able to live moral and good lives; evolution, with its emphasis on the struggle to survive, is at a loss to explain the human qualities of love and altruism.

Evolution cannot offer any real hope or purpose. The Bible offers the Creator's grand purpose for our future. He has clearly declared his intent: "I will bless you with a future filled with hope."—Jeremiah 29:11, *Contemporary English Version*.

Learn About the Creator

A wise psalmist was moved humbly to admit: "Know that Jehovah is God. It is he that has made us, and not we ourselves." (Psalm 100:3) To many reasoning minds, this modest acknowledgment makes infinitely more sense than modern theories about human life arising as a result of chance.

Modern science sometimes fosters the arrogant notion that human reasoning and knowledge should be the ultimate guide. Sadly, organized religion has frequently made the same mistake. However, human knowledge is and will remain limited. The apostle Paul had extensive knowledge of spiritual matters, yet he remained humble. He realistically stated: "Now we are seeing a dim reflection in a mirror . . . The knowledge that I have now is imperfect."—1 Corinthians 13:12, *The Jerusalem Bible*.

Of course, genuine faith in God does not depend on modern science. But to the discerning observer, science can reinforce faith. True faith and spirituality are essential for a full and happy life. (Matthew 5:3) If you use the Bible to gain an intimate knowledge of Jehovah and of his purpose for mankind and the earth, you will find the basis for real meaning in life and a solid foundation for hope.

Measuring the Earth With a Stick

HAVE you ever heard of the Greek mathematician and astronomer Eratosthenes? His name is probably best known among astronomers. Why do they think so highly of him?

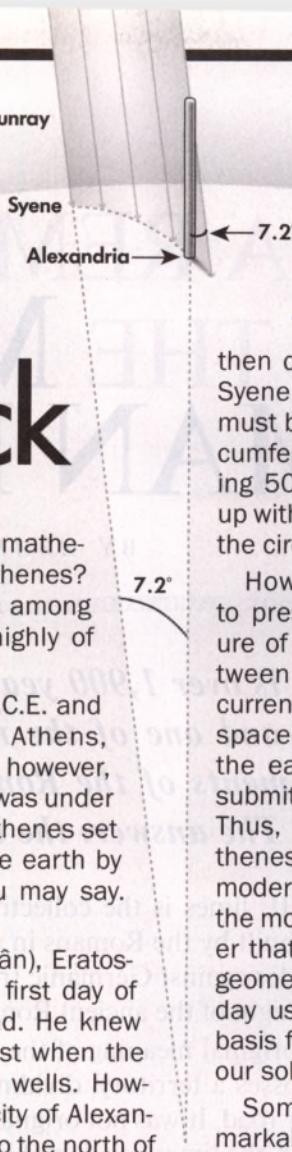
Eratosthenes was born about 276 B.C.E. and received some of his education in Athens, Greece. He spent a good part of his life, however, in Alexandria, Egypt, which at that time was under Greek rule. In about 200 B.C.E., Eratosthenes set out to determine the dimensions of the earth by using a simple stick. 'Impossible!' you may say. How did he do it?

In the city of Syene (now called Aswān), Eratosthenes observed that at noon on the first day of summer, the sun was directly overhead. He knew this because there was no shadow cast when the sunlight reached the bottom of deep wells. However, at noon on the same day in the city of Alexandria, which was located 5,000 stadia* to the north of Syene, a shadow could be observed. That gave Eratosthenes an idea.

Eratosthenes set up a gnomon, a simple upright stick. When the sun was overhead at noon, he measured the angle of the shadow that the stick cast in Alexandria. He determined the angle to be 7.2 degrees from vertical.

Now, Eratosthenes believed the earth to be spherical, and he knew that there are 360 degrees in a circle. So he divided 360 by the angle he had measured, 7.2. The result? His angle was one fiftieth of a full circle. He

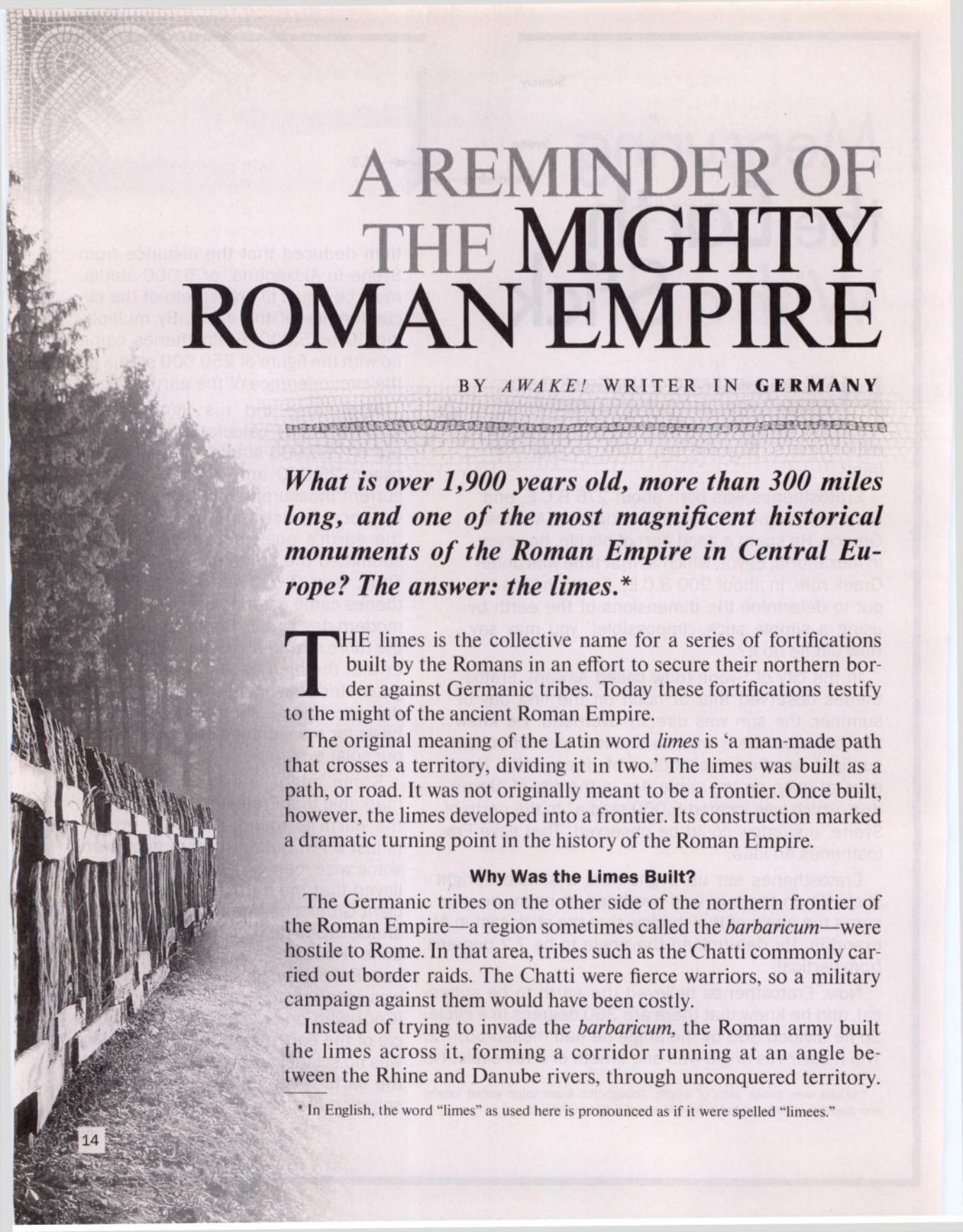
* Stadia were Greek units of length. Though the exact value varied locally, one stadium is believed to have been about 530 to 600 feet.



then deduced that the distance from Syene to Alexandria, or 5,000 stadia, must be equal to one fiftieth of the circumference of the earth. By multiplying 50 by 5,000, Eratosthenes came up with the figure of 250,000 stadia as the circumference of the earth.

How close did his figure come to present-day calculations? The figure of 250,000 stadia is equal to between 25,000 and 29,000 miles in current measurements. Using orbiting spacecraft, astronomers measured the earth's polar circumference and submitted the figure of 24,860 miles. Thus, over 2,000 years ago, Eratosthenes came astoundingly close to the modern-day figure. His accuracy is all the more remarkable when you consider that the man used only a stick and geometric reasoning! Astronomers today use this geometric method as a basis for measuring distances outside our solar system.

Some might find it especially remarkable that Eratosthenes knew that the earth is round. After all, up until just a few hundred years ago, even some wise men involved in science believed that the earth was flat. The ancient Greeks had deduced the earth's shape from their scientific observations. However, about 500 years before Eratosthenes, a Hebrew prophet was inspired to write: "There is One [God] who is dwelling above the *circle* of the earth." (Isaiah 40:22) Isaiah was no scientist. How did he know that the earth was round? It was divine inspiration that revealed this truth.



A REMINDER OF THE MIGHTY ROMAN EMPIRE

BY AWAKE! WRITER IN GERMANY

*What is over 1,900 years old, more than 300 miles long, and one of the most magnificent historical monuments of the Roman Empire in Central Europe? The answer: the limes.**

THE limes is the collective name for a series of fortifications built by the Romans in an effort to secure their northern border against Germanic tribes. Today these fortifications testify to the might of the ancient Roman Empire.

The original meaning of the Latin word *limes* is ‘a man-made path that crosses a territory, dividing it in two.’ The limes was built as a path, or road. It was not originally meant to be a frontier. Once built, however, the limes developed into a frontier. Its construction marked a dramatic turning point in the history of the Roman Empire.

Why Was the Limes Built?

The Germanic tribes on the other side of the northern frontier of the Roman Empire—a region sometimes called the *barbaricum*—were hostile to Rome. In that area, tribes such as the Chatti commonly carried out border raids. The Chatti were fierce warriors, so a military campaign against them would have been costly.

Instead of trying to invade the *barbaricum*, the Roman army built the limes across it, forming a corridor running at an angle between the Rhine and Danube rivers, through unconquered territory.

* In English, the word “limes” as used here is pronounced as if it were spelled “limees.”

In places, this corridor was cut through thick woodland. It was patrolled by soldiers, thus offering travelers relatively safe passage.

At first, the Romans simply made a broad pathway. In time, wooden towers that could accommodate soldiers were built along the road. Each tower was built within sight of the next. Alongside the road, a nine-foot-high palisade of pointed wooden stakes was built as well. Afterward, a rampart and trench were constructed. In places, a stone wall and stone watchtowers were added.

In remote regions, more forts were built to house the troops. Finally, by the third century C.E., the limes boundary in Germany was over 300 miles long. It included 60 large fortresses and numerous smaller forts. Moreover, guards went out on patrol from at least 900 watchtowers. Some say that these were three stories tall, up to 30 feet in height.

Artificial Frontier

Thus, what started as a pathway through enemy land became an artificial frontier. The limes border ran beyond Germany into what is now the Netherlands, as far as the coast of the North Sea. And in Roman England, Hadrian's Wall and the Antonine Wall were built to secure the border against the Caledonian tribes residing in what is now Scotland.

The limes was never intended to seal the border completely. Gates were built that allowed the population of the *barbaricum* to cross the limes into the Roman provinces of Rhaetia and Germania Superior. This afforded the people an opportunity to trade goods.

The limes provides evidence of a dramatic reversal of Roman policy. T. W. Potter writes: "To Roman eyes, the

THE LIFE OF A ROMAN SOLDIER

The Roman army was made up of legionnaires, who were Roman citizens, and support troops (*auxilia*), who were recruited from peoples conquered by the empire. The army's smallest unit was the *contubernium*, consisting of some ten soldiers who lived together. Ten *contubernia* were headed by an officer, the centurion. Sixty centuries made up a legion, which totaled from about 4,500 to 7,000 soldiers.

"An army marches on its stomach," said Napoléon Bonaparte. Rome recognized this fact long before Napoléon did and fed its troops well. "There was never a mutiny in the Roman army because of bad food," comments *Archäologie in Deutschland*. In fact, "in some parts of the Roman world, the food of the troops was of better quality than that of the civilian population."

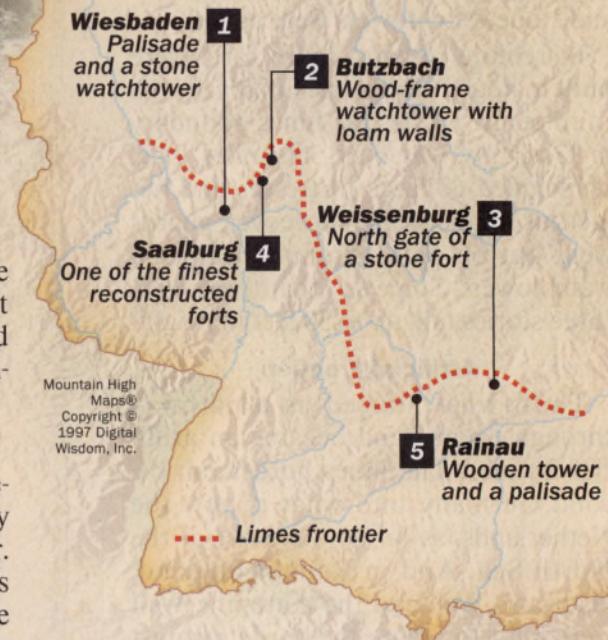
Daily rations consisted of fresh meat, fruit, vegetables, wheat bread, and oil. Yet, the soldiers were not spoiled. "The Roman army did not have a cafeteria," explains the above magazine. Each *contubernium* had to prepare the food for the soldiers within that group.

After 25 years of military service, a Roman soldier was given an honorable discharge and, in recognition of his service, a sum of money or a plot of land. An auxiliary soldier was granted Roman citizenship for himself and his children. "Service in the Roman army was for many men the quickest way to become a Roman citizen," reports the book *Der Limes zwischen Rhein und Main* (The Limes Between Rhine and Main).





RECONSTRUCTED LIMES IN GERMANY



notion that the empire should possess finite boundaries was for many centuries all but inconceivable.” The frontier thus marked “the beginning of a decisive change in policy, from expansion to retrenchment.”

How Much Still Remains?

By the third century, the long, slow decline of the empire had begun. Eventually the army withdrew from the limes frontier. The fortifications fell into disrepair; stones and timbers were taken for other uses. The frontier of one of the mightiest empires the world had ever seen was soon overgrown and neglected and was gradually forgotten.

However, the end of the 19th century saw growing interest in Roman history and tradition in Germany. Since then, short sections of the limes trench, rampart, and wall have been restored, as well as a few forts and watchtowers. Still, there are large sec-

tions that have not been restored, and they are hardly recognizable.

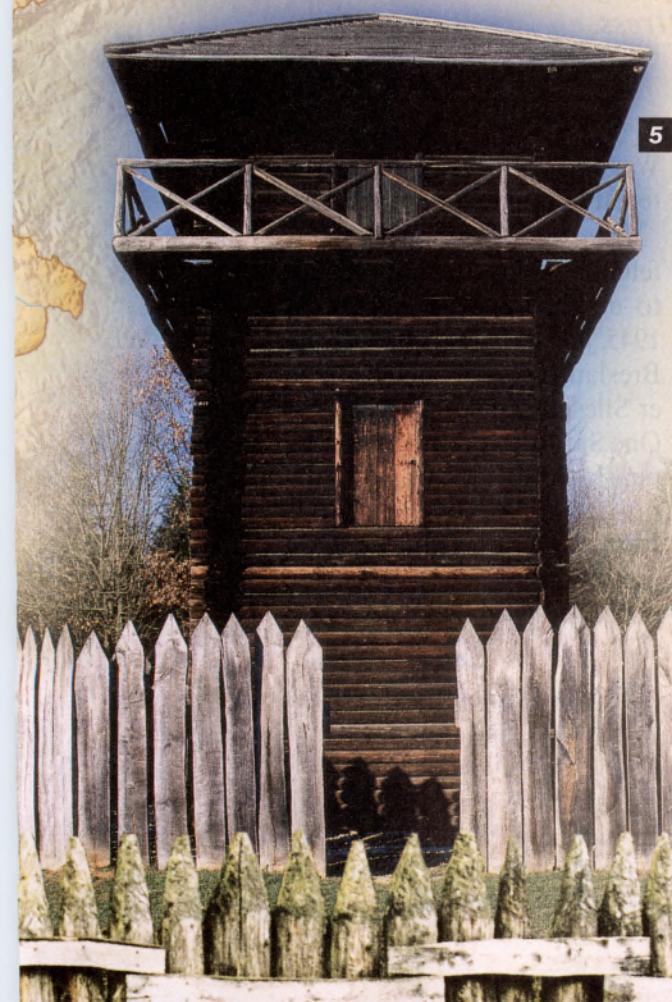
One of the finest reconstructed forts is the Saalburg in the Taunus region, some 25 miles from the branch office of Jehovah’s Witnesses in Germany. The fort measures 500 feet by 750 feet and is surrounded by a moat and a stone wall with watchtowers.



3



4



5

It originally housed about 500 troops. In the center of the fort is its most important building, the headquarters, or the *principia*.

At the rear of the *principia* is a shrine where the ensign, or standard, was kept. The booklet *Limeskastell Saalburg* (Limes Fort Saalburg) states: "The shrine for the standard was dedicated to the patron gods of the Roman Empire and to the worship of the emperor. A guard of honor paraded in front of it by day." Thus, the limes restorations confirm that religion played a role in military life.

Since this restoration, the limes boundary has become a popular tourist attraction. In many places the route established by the limes is now a footpath for hikers. If you come to Germany, why not take a look for yourself? You will see a striking reminder that sooner or later, even the mightiest of human empires go into decline and disappear.

WARTIME HARDSHIPS

Prepared Me for Life

AS TOLD BY ERNST KRÖMER

"This is your room." With those words, my partner and I were welcomed to Gabon, West Africa. There was just enough space for a mattress. We lived in that room for six months.



*With my mother,
Gertrud, and my
sister Ingrid in 1939*

MY LIFE on a farm during World War II prepared me for living under difficult conditions. When the war broke out in 1939, Nazi Germany quickly occupied Poland. I was four years old at the time. Our family consisted of my parents, my younger brother and sister, and my two older sisters. Father warned us to be prepared for hard times if Germany lost the war.

We lived in Löwenstein, a small German village in Lower Silesia, which is now part of Poland. On our farm of some 60 acres, we grew grain and raised livestock. Father also worked as the administrator for the farmers of the region. When the Nazis took over, they used Father to organize the farmers in support of the war effort.

Father had served in the cavalry during the first world war, and now his government job with the Nazis saved him from the draft. My parents had long since resigned from the church because they were disappointed with the way the clergy had acted during World

War I. As a result, I grew up without any interest in religion.

I started school in 1941, but I hated it and felt that there were more interesting things to do than look at a blackboard. Early in 1945, just a few months before the war ended, Breslau (now Wrocław), the capital of Lower Silesia, came under siege by the Russians. One Saturday evening we could see the town, nearly 30 miles away, all lit up by mortar fire and by the explosions of bombs dropped from airplanes. Soon we had to flee into the mountains. When the war ended, we returned home to Löwenstein.

After the War

Terrible times followed the war. Women were raped, and plundering was a daily affair. Most of our livestock was stolen.

Father was arrested in July 1945. After seven nights of brutal interrogation, he was released. Three months later he was again arrested and taken away. We never saw him

after that. Two Polish men took over our farm and claimed to be the owners. In April 1946 all the Germans in the village were told to leave and take only what they could carry.

Mother had prepared for this, and there was no panic. She had a big wheeled basket containing bedding, and each of us had a knapsack filled with what we needed. The Polish militia herded us into cattle cars—30 persons to a car. About two weeks later, we arrived at our destination in northwest Germany, not far from the Netherlands.

The government assigned our family, including our relatives—19 of us in all—to two rooms on a farm about five miles from Quakenbrück. In time, some of our extended family received places to stay with other farmers, and we were less crowded.

Mother made a lot of sacrifices for us children, often not eating so that we could eat. We lacked firewood during our first winter. Our walls and ceilings were covered with a thick layer of ice, and our rooms had the appearance of an ice cave. Fortunately, we had warm bedding, so we survived.

Contact With Witnesses

About 1949, Mother received a copy of *The Watchtower* from one of my aunts. An article in it reminded her that during the war she had heard Hitler on the radio condemning ‘a brood of people’ who predicted the downfall of Germany. Mother had wondered who these people were. When she read in *The Watchtower* that they were Jehovah’s Witnesses, her interest was sparked and she decided to study the Bible with them.

One day in April 1954, I met the Witness couple studying with Mother. After the study, I accepted the booklet *Can You Live Forever in Happiness on Earth?* as well as a subscription to *The Watchtower*. Upon reading the booklet, I was convinced that I had found the truth. So I gave it to my employer to read. When I asked her what she thought about it,

she said: “The thoughts are very nice, but it’s too good to be true. I just can’t believe it.”

“Well, I’m sure this is the truth,” I told her, “and I will follow it.” Shaking her head, she said: “This message is for a mild person. You are too wild to be a Witness.” But I began to make changes in my life.

Even though there were no Witnesses in the area, I studied by myself and cycled about six miles every week to attend their meetings. Later I went to a circuit assembly, where a number of congregations of the Witnesses met for worship. There I shared for the first time with others in preaching publicly. Soon I was doing this regularly. On July 14, 1954, Mother and I were baptized. Later, at 80 years of age, my maternal grandmother also became a Witness.

My job of working on a farm was demanding too much time, so I quit and obtained employment at a forestry reserve. Our family thereafter moved to Reutlingen, a small town near Stuttgart. It was while we were there that my younger sister, Ingrid, also became a Witness, the only one of my siblings who has.

Full-Time Preaching

In 1957, Mother was finally able to have Father legally declared dead. As a result, she began receiving a pension, which enabled her to live without my financial assistance. No longer having such family obligations, I took a part-time job and in April 1957 started preaching full-time as a pioneer. Afterward, I received an invitation to serve as a special pioneer. On hearing about this, a fellow Witness invited me to his office and said, “I’m sure you could do with some help.” He then handed me 500 deutsche marks. With it I bought all the clothes I needed and still had 200 marks left.

In 1960, I volunteered to serve in Austria, where I enjoyed preaching in the small village of Scheibbs and briefly in the city of Linz, but later that year, I had a serious motorcycle

accident, fracturing my right leg. After a series of operations, I was able to continue in my assignment. In 1962, however, I had to return home to Reutlingen to care for immigration problems. While there, I had another operation to remove a metal rod that had been put in my leg. I discontinued pioneering for six months to earn money to care for medical expenses.

When a traveling overseer visited the congregation where I was serving, he suggested that I apply to serve at the branch office of the Witnesses, then located in Wiesbaden, Germany. I did, and two weeks later I received a telegram to come as soon as possible. One week later, in May 1963, I was in the Germany branch, called Bethel, working on a rotary press printing magazines.

Applying Myself to Learning

Bethel was the best place I had ever lived, and I quickly adjusted to the hard work. In 1965, I visited Spain, secretly bringing in Bible literature, since the preaching work there was then under ban. That visit caused me to want to learn another language, and I chose English. I used every opportunity to study. About this time the first English-speaking group was formed in Germany, and I joined it. The first time that I studied a *Watchtower* study article in English, it took seven hours. When it took only five hours the second time, I knew that I was making progress.

In 1966, I received an invitation to attend the 43rd class of Gilead, a school in the United States designed to train ministers of Jehovah's Witnesses for missionary work. Then, after graduation, Günther Reschke and I were assigned to Gabon, West Africa, in April 1967. When we arrived in Libreville, Gabon's capital, we stayed in the tiny room described at the outset, hanging our clothes in the dining room. Six months later we moved to another missionary home.

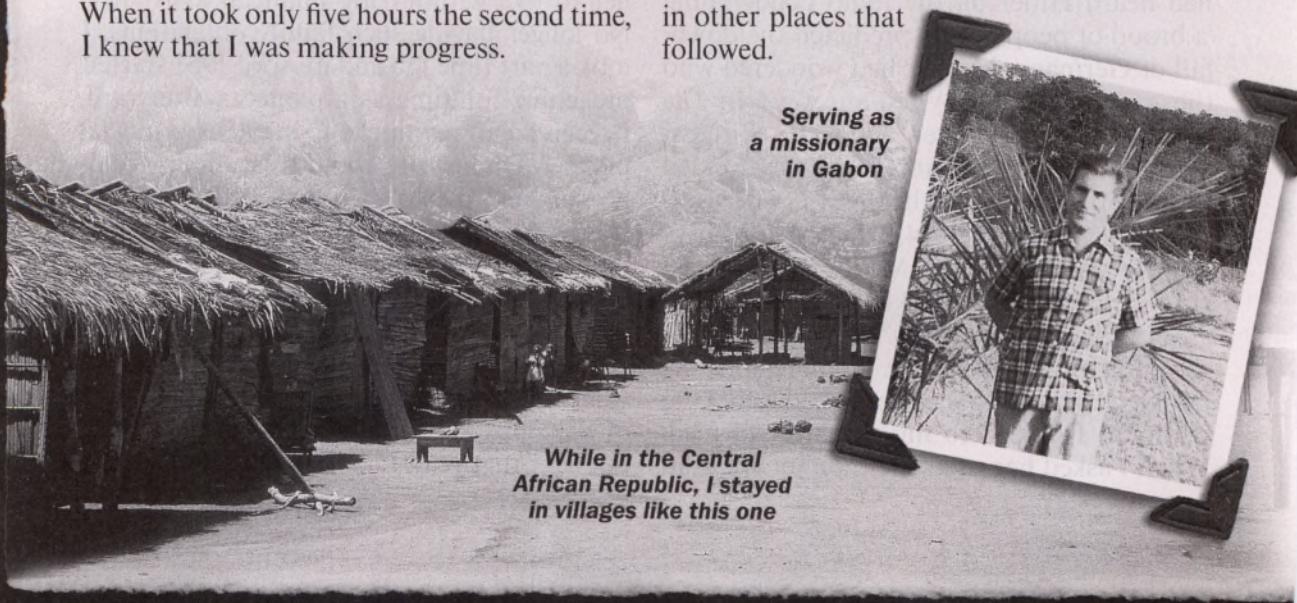
In Gabon my biggest struggle was learning French. Finally, after intense effort I achieved a measure of mastery over it. Then, in 1970, our preaching work in Gabon was banned suddenly, and we missionaries were given two weeks' notice to leave the country.

On to the Central African Republic

Along with other missionaries, I was assigned to the Central African Republic. French was the country's official language, but in order to be able to preach to most of the people, we had to learn Sango. We were sent to open a missionary home in the town of Bambari, nearly 200 miles from the capital, Bangui. Bambari had neither electricity nor running water, but the two congregations needed our help. My wartime experiences in Europe made it much easier for me to cope with living conditions in Bambari, as well as in other places that followed.

**Serving as
a missionary
in Gabon**

**While in the Central
African Republic, I stayed
in villages like this one**



After serving for two years in Bambari, I was assigned to visit congregations as a traveling overseer. There were about 40 congregations in the country, and I spent a week with each one to which I was assigned. I had a small car, but when dirt roads became too bad, I used public transportation.

Bangui was the only place in the whole country where vehicles could be repaired. Since my ministry required extensive traveling, I bought some vehicle-repair books, got some tools, and did most car repairs myself. One time the housing of the universal bearing on the drive shaft broke, and the car couldn't move. I was about 40 miles from the nearest human dwelling, so I cut a piece of hardwood from the forest and fashioned it into a housing for the bearing. Using plenty of grease, I secured it to the drive shaft with wire and managed to continue on my journey.

Serving in the bush, or country areas, was especially challenging because usually few people there could read or write. In one congregation, only one person could read, and he had a speech impediment. The lesson in *The Watchtower* was unusually difficult, but it was faith strengthening to see the congregation making a sincere effort to grasp the points under consideration.

Afterward, I asked the group how they benefited from lessons they could not fully understand. The answer given was beautiful: "We receive encouragement from one another."—Hebrews 10:23-25.

Even though many of my Christian brothers were illiterate, they taught me a lot about life and living. I came to appreciate the value of the Scriptural counsel to 'consider others as superior.' (Philippians 2:3) My African brothers taught me much about love, kindness, and hospitality and about how to survive in the bush. The parting words of Brother Nathan Knorr, then president of Gilead School, on my graduation day came to mean much more to me. He had said: "Keep hum-



ble, never thinking we know it all. We don't. There is so much for us to learn."

Life in the African Bush

I stayed with the local brothers as I went from congregation to congregation. Usually the week I visited was a festival of sorts, especially for the children. This is because the host congregation would go hunting or fishing and made a special effort to have plenty of food for everybody.

Living with the brothers in their huts, I ate everything from termites to elephant meat. Monkey was on the menu regularly. Wild pig and porcupine were particularly delicious. Of course, every day was not a banquet. Initially, it took a while for my body to adjust to the diet, but when it did, my stomach was able to digest almost anything I was served. I learned that eating papaya along with the seeds is good for the stomach.

All kinds of unexpected things can happen in the bush. On one occasion I was mistaken for a *mammy-water*, which is said to be a white spirit of a dead person that lives in the water. People believe that it can pull a person down

In Our Next Issue

- Meeting the Challenges of Adolescence
- A World of Music at Your Fingertips
- What Does It Mean to Be the Head of the House?

and drown him. So once when I climbed out of a stream after bathing, a girl who had come to fetch water saw me and started screaming as she ran away. When a fellow Witness tried to explain that I was a visiting preacher, not a spirit, people wouldn't believe it. They argued, "A white man would never come way out here."

Often I slept in the open because the air was fresh. I always carried a mosquito net, since it was also a protection against snakes, scorpions, rats, and other things. Several times I experienced an invasion of army ants, and it was the mosquito net that protected me. One night I pointed my light at the net and saw that it was covered with them. I quickly took to my heels because the ants, although small, can kill even lions.

While I was in the southern part of the Central African Republic, near the Congo River, I preached to Pygmies, who really live off the land. They are expert hunters and know what one can and cannot eat. Some speak Sango, and they were happy to listen. They would agree to a return visit, but on returning we found that they had migrated to some other place. None at the time became Witnesses, but I learned later that some Pygmies did in the Republic of Congo.

For five years, I served as a circuit overseer in the Central African Republic. I traveled all over the country, for the most part visiting congregations out in the bush.

Service at the Nigeria Branch

In May 1977, I was invited to serve at the branch office of Jehovah's Witnesses in Lagos, Nigeria. This most populous country in Africa then had nearly 100,000 Witnesses, and some 80

people served at the branch. I was assigned to work in the garage, which included servicing vehicles.

In 1979, I returned to farming, the work I had done as a youth growing up in Europe. The farm, which grew food for the branch staff, was at Ilaro, about 50 miles from Lagos. There I learned that farming in a tropical rain forest is quite different from farming in Europe. After three and a half years working there, I returned to Lagos and again worked in the garage.

In 1986, I was transferred to Igieduma, about 225 miles from Lagos, where a large new branch complex was under construction. This facility was dedicated in January 1990. It includes a printery, a small farm, and residence buildings that accommodate more than 500 people. These are located on 140 acres of land enclosed by a nearly seven-foot-high wall. Presently, I have oversight of the farm and maintenance of the grounds, which are cared for by a staff of some 35 people.

For about 27 years now, I have lived in Nigeria and have truly enjoyed my various assignments at the branch. I am happy that my mother has remained faithful to Jehovah and

that my younger sister, Ingrid, who served as a special pioneer for 14 years, is still serving Jehovah along with her husband.

Despite the challenges I have faced, I have truly enjoyed serving Jehovah and my spiritual brothers in West Africa. I am grateful for the good health I have enjoyed until now and pray that I can maintain it so as to continue actively to serve our great God, Jehovah.



Young People Ask . . .

How Can I Stop My Boyfriend From Mistreating Me?

"Today my boyfriend beat me for the first time. He apologized, but I don't know what to do now."

—Stella.*

APPROXIMATELY 1 in 5 female students," says an article in *The Journal of the American Medical Association*, "reported being physically and/or sexually abused by a dating partner." In a survey conducted in Germany among youths aged 17 to 20, more than a quarter of the girls reported that they had been subjected to unwanted sexual contact involving physical violence, verbal pressure, drugs, or alcohol. According to one U.S. survey, 40 percent of the teenagers polled have seen classmates "verbally insult someone they were dating in a hurtful way."[#]

Are you a young adult pursuing marriage with someone who insults you or yells at you or who belittles, pushes, shoves, or slaps you? A previous article in this series showed that such mistreatment is alarmingly common.[▲] It further showed that Jehovah God does not



approve of abusive speech or conduct and that victims should not accept such misbehavior as normal or as something that is their fault. (Ephesians 4:31) Even so, knowing what to do in such a situation is not easy. You may still have strong feelings for your boyfriend—despite his behavior. Or worse yet, you may fear his reaction if you criticize him. What should you do?

Assess the Situation

First, you need to calm down and get an objective view of what has happened. (Ecclesiastes 2:14) Are you truly a victim of verbal abuse? Was your boyfriend being deliberately malicious, or was he simply "speaking thoughtlessly"? (Proverbs 12:18) How often has this occurred? Is it a one-time mistake that you can simply overlook? Or has he developed a habit of saying belittling or insulting things?

If you are not sure of your own feelings in this regard, talk matters out with someone—not another peer but someone who is older and wiser. Perhaps you can confide in your parents or in a mature fellow Christian. Such

* Some names have been changed.

[#] While both males and females can be victims of verbal and physical abuse, the U.S. Centers for Disease Control and Prevention notes that "females suffer significantly more injuries than males." At any rate, for the sake of simplicity, in this article we will refer to the abuser in the male gender.

[▲] See the article "Young People Ask . . . Why Does He Treat Me So Badly?" in the May 22, 2004, issue of *Awake!*

a discussion can help you determine if you are overreacting or if a serious problem does exist.

If it seems safe to do so, arrange to talk to your boyfriend about it. (Proverbs 25:9) Calmly tell him how his behavior makes you feel. Be specific about why you were offended. Set clear limits regarding what you will not tolerate. How does he react? Does he brush your thoughts aside or respond with even more angry speech? This is a clear signal that he is unwilling to change.

What, though, if he displays godly humility and genuine remorse? Then it may be possible to salvage the relationship. Be careful, though! Perpetrators of verbal abuse often make elaborate expressions of seeming remorse after they hurt someone—only to repeat their hurtful speech the next time they feel provoked. Time will tell how sincere he is about making changes. One good indication of how serious he is would be his willingness to seek help from Christian elders.—James 5:14-16.

Realize that “all have sinned and fall short of the glory of God.” (Romans 3:23) You will search in vain for someone who is perfect. All married couples will experience *some* measure of “tribulation in their flesh” because of imperfection. (1 Corinthians 7:28) In the final analysis, you have to decide if his flaws are

Mistreatment during courtship is likely to continue in marriage



ones that you can live with happily. Again, allowing some time to pass is the safest way of making this determination.

When There Is Violence

It is a different matter, though, if the abusive speech is laced with angry profanity or threats of violence or if you find yourself being abused physically—perhaps by being pushed, shoved, or slapped. This indicates a dangerous lack of self-control; things can easily escalate into even more serious expressions of violence.

It is best for unmarried couples to avoid being isolated together in the first place. But if you do somehow find yourself alone with a raging man, do not “return evil for evil.” (Romans 12:17) Remember: “An answer, when mild, turns away rage, but a word causing pain makes anger to come up.” (Proverbs 15:1) Stay calm. Ask him to take you home. If necessary, walk—or run—away!

What if a man tries to force a woman into sexual activity? Of course, it is wise for a couple, right from the start of a courtship, to set clear limits on their expressions of affection. (1 Thessalonians 4:3-5) If a young man pressures a young woman to violate Bible principles, she should make it clear to him in no uncertain terms that she will not compromise. (Genesis 39:7-13) “Don’t back down,” pleads Anne, who gave in to such sexual pressure. “Have respect for yourself. Please, don’t make this mistake, no matter how much you love him!” Should he ignore your refusal, tell him that you would consider any further attempts as rape. If he still does not stop, call for help and try to fend him off as you would any rapist.*

In either case, the Bible’s counsel at Proverbs 22:24 is appropriate: “Do not have companionship with anyone given to anger; and with a man having fits of rage you must not enter in.” You have no

* *Awake!* of March 8, 1993, has information on resisting rape.

obligation whatsoever to remain in an abusive relationship. Obviously, it would be foolhardy to meet alone with an abusive male to inform him of a breakup. Likely, your best course of action is to let your parents know what has taken place. Naturally, they will be angry and upset over your mistreatment. But they can help you determine what further steps need to be taken.*

Trying to Change Him

In any event, it is not your responsibility to make your boyfriend change. Irena admits: "You think that you love him, that you will manage, and that you can help him. But you simply cannot." Nadine likewise confesses: "I keep thinking that I can change him." The truth is, only he can 'make his mind over' and change. (Romans 12:2) And doing so will be a long, arduous process.

So be firm in your decision, turning a deaf ear to any efforts he might make to play on your emotions. Try to put as much distance between you and him as possible—emotionally and physically. Do not allow him to talk, beg, or threaten you back into a relationship. When Irena broke up with her violent boyfriend, he threatened to kill himself. Clearly, such a person needs help, but not *your* help. You help him best by taking a stand against unchristian behavior. If he wants to change, he is free to seek help.

However, some think that marriage will solve the problem. Says one researcher: "Women who marry their abusive boyfriends and men who marry their abusive girlfriends are usually surprised to discover that the violence doesn't stop. Many people believe the myth that once the marriage license is signed, all such problems evaporate. Don't believe it." The fact is, physical abuse that starts in courtship is very likely to carry over into marriage.

* In some cases, such as attempted rape, your parents may decide to report matters to the police. This could prevent other girls from going through such a devastating experience.



Do not be forced into inappropriate displays of affection

"Shrewd is the one that has seen the calamity and proceeds to conceal himself," says the Bible. (Proverbs 22:3) Breaking up with someone you care about is hard. But being trapped in an abusive marriage is far harder. Besides, you need not fear that you will never find a suitable partner. With the insight you have gained, you will be more inclined than ever to look for someone who is gentle, kind, and self-controlled.

Healing the Emotional Scars

Being a victim of verbal or physical abuse can be devastating. A victim named Mary advises: "Get help—tell somebody immediately. I thought I could make it through on my own, but talking to people has helped me." Confide in your parents, a trusted mature friend, or a Christian elder.*

Some have also found it helpful to keep busy by engaging in such things as wholesome reading, sports, or hobbies. "Most important," remembers Irena, "was studying the Bible and attending Christian meetings."

Clearly, Jehovah does not approve of abusive words or actions. With his help, you can protect yourself from being mistreated.

* In cases of trauma, some may choose to be treated by a physician or a licensed mental-health worker.

BY AWAKE! WRITER IN FRANCE



THE CONCORDE

FLIES INTO AVIATION HISTORY

After 27 years of service,

the Concorde—"the world's only supersonic passenger aircraft"—has gone into retirement. Citing rising costs and decreasing customer demand, British Airways withdrew the last of its fleet of seven Concordes from commercial service in October 2003. Five months earlier Air France, the only other operator of this plane, with its distinctive delta-shaped wings, had ceased flying its five aircraft.

Thus closed a chapter of aviation history that opened in 1962 when British and French engineers joined forces to develop a long-distance supersonic aircraft. The prototypes made their maiden flights in 1969, and commercial supersonic transport became a reality in January 1976, with flights to Bahrain and Rio de Janeiro.

The Concorde may have been a technological success, but it was a commercial flop. The oil

Top: Champagne served

Center: Chief pilot in the cockpit

Bottom: Concorde prototype,
France, 1968



All photos except prototype: NewsCast;
prototype: AFP/Getty Images



crises of the 1970's were hard to swallow, since the plane guzzles over 5,600 gallons of fuel per hour—triple the amount per passenger that is consumed by a standard aircraft. The Concorde was also saddled with a limited range of only 4,300 miles and a low passenger capacity—just 100. Hence, it was not economical for the airlines. Another obstacle to Concorde's expansion was the opposition that arose to its operation early on in the United States, purportedly because of noise concerns.

Price was another issue. Tickets cost thousands of dollars. Relatively few passengers could thus afford to fly on the Concorde. With its cordon-bleu menu of champagne, foie gras, and caviar, the Concorde "was the best travel experience anyone could ever have," stated one businessman. "It gave you the ultimate luxury, which is time. It's not the most comfortable flight. But it was the most incredible feeling."

Faster Than the Sun?

During its career, the Concorde transported nearly four million passengers—not really such a

large number of people when one considers that the world's fleet of

Boeing 747's transports that many in just a few weeks. What, then, made the Concorde such a remarkable aircraft?

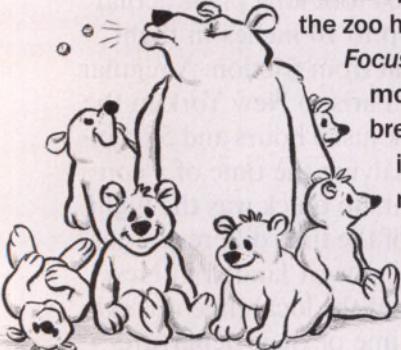
Consider this: The Concorde cruised at 1,350 miles an hour—twice the speed of sound—at an altitude of 60,000 feet (more than 11 miles). It traveled so fast that the 204-foot-long plane actually stretched up to 10 inches in flight because of heat from friction. A regular crossing from Paris to New York in the Concorde took just 3 hours and 55 minutes, almost halving the time of a conventional flight. So quick was the flight that because of the time difference, passengers traveling west landed in New York to find that the local time was *earlier* than the time of their departure back in Paris!

The Concorde's career was blighted by only one fatal accident. On July 25, 2000, an Air France plane crashed on takeoff from Charles de Gaulle Airport in Paris, killing 113 people, including 4 on the ground. After various safety modifications, service was resumed a year later. But economics finally gained the upper hand.

The Concorde, which had neither rival nor successor, will spend its well-earned retirement in the world's aviation museums. Jean-Cyril Spinetta, chairman of Air France, comments: "Concorde will never really stop flying because it will live on in people's imagination."

Watching the World

Population Control—A Dilemma for Zoos



"No zoo today can get by without contraception," says Henning Wiesner, head zoologist at Munich's Hellabrunn Zoo. Animals in zoos reproduce rapidly, their offspring thrive, and they tend to live longer than their counterparts in the wild. But zoos have limited space. Hence the need for contraceptives. However, "family planning in the zoo has a hitch. Animals don't care much for it," says the German magazine *Focus*. Bears, for example, sniff out contraceptives hidden in food and remove them. Oral contraceptives can also cause health problems, such as breast cancer, in certain animals. Other options are castration and sterilization, but these bring new problems. For one thing, they are permanent, and offspring may be needed in the future. Second, doctored animals cease producing sex hormones, a change that may harm their social status among others of their kind. Still another option is to cull, or kill off, unwanted offspring—but that infuriates many animal lovers and animal-protection groups. So zoos face a real dilemma.

Ants and Antibiotics

"Scientists have found that some ants grow mushroom crops to feed their young, even using antibiotics as a form of 'pesticide' to protect them," says the international edition of *The Miami Herald*. Called leaf cutters, these ants transplant, prune, and weed their crops just as a farmer does. The antibiotic, which protects the ants' crops from an infectious mold, is produced by a bacteria that belongs to the Streptomycete family and lives on the leaf cutter's outer skin. Ted Schultz, insect specialist at the National Museum of Natural History in Washington, D.C., notes that while humans must constantly invent new antibiotics to overcome drug-resistant germs, leaf cutters have been using

the same antibiotic successfully for aeons. Understanding the ants' secret "could be directly relevant to human survival," states Schultz.

A Global Health Catastrophe

The world is headed for "one of the biggest health catastrophes" it has ever seen, thanks to an alarming increase in diabetes, warns Britain's Professor Sir George Alberti, president of the International Diabetes Federation (IDF). According to IDF figures, over 300 million people worldwide have impaired glucose tolerance, which often leads to diabetes, reports Britain's *Guardian* newspaper. Type 2 diabetes, once affecting mainly older people, is now making inroads into the health of Britain's young who

have grown obese because of a diet of junk food and a lack of exercise. "The enormous frustration is that most of this [diabetes and its effects] is preventable through lifestyle," says Alberti. Developing countries may also see diabetes soar as they adopt "the unhealthy diet and urban lifestyles of the affluent world," comments *The Guardian*.

The Changing Italian Family

From 1995 to 2001, the number of unmarried couples living together in Italy almost doubled, the number getting married decreased, and the number of people living alone increased. These findings, published in the newspaper *La Repubblica*, are based on data collected by the Italian National Statistics Institute (ISTAT). Over the same

period, average family size dwindled to just 2.6 members. According to ISTAT, many couples are choosing to live together out of wedlock for "trial periods" with a view to possible marriage.

Owls' Super Senses

Thanks in part to their enormous eyes and binocular vision, owls have "the sharpest night vision in the animal kingdom," reports *Australian Geographic* magazine. And many of them "can detect sounds 10 times fainter than a human can." What contributes to this acute hearing? "To varying degrees," says the article, "the different owl species share an extraordinary ear feature: one ear opening is higher than the other." This arrangement makes it easier for owls to locate moving prey. Owls of the *Tyto* genus have an additional refinement in the form of a disk of facial feathers. This adjustable disk collects sound and funnels it to the ear. Fur-

thermore, the medulla, a part of the brain associated with hearing, is more complex in owls than in other birds.

Avoidable Hepatitis Infections

Most "hepatitis infections result from the lack of hygiene on the part of medical staff," says the Polish weekly *Polityka*. In 1997 the National Institute of Hygiene in Poland reported 992 hepatitis C infections, but five years later the number was 1,892. The article laments the current lack of any licensed vaccine against hepatitis C. Professor Andrzej Gładysz, a national consultant on infectious diseases, says: "It is no exaggeration to say that in Poland we have 500 thousand to 600 thousand people infected with hepatitis C virus." And most of these infections "occur in doctors' or dentists' offices," states Jacek Juszczyszyn of the Infectious Diseases Clinic at the Medical University in Poznan. Concludes

Polityka: "When we are in the hands of a doctor, we would like to be sure that those hands are good and clean."

Proliferation of Shantytowns

"Almost a billion people, 32 percent of the inhabitants of the world's cities, live in impoverished urban areas," says Mexico City's *El Universal* newspaper. A United Nations study cites Bogotá, Havana, Mexico City, Quito, and Rio de Janeiro as examples of cities seeing a proliferation of shantytowns. What are the causes? In the case of Bogotá, the UN report attributes the mushrooming shantytowns to "the rapid growth of the population, the strong emigration from rural areas, and violence, which has displaced entire communities," says the paper. Additionally, 23 percent of the population in that city lived below the poverty line in the year 2000 compared with 19.4 percent in 1994.

Electronic Trash

Some 155,000 tons of electronic waste, dubbed e-waste, was discarded by Canadians in 2002, comments Canada's *National Post* newspaper. According to an Environment Canada report, Canadians threw out "an estimated two million television sets, 1.1-million VCRs and 348,000 CD players—most considered obsolete after only a few years of use." Electronic equipment "is often discarded because it no longer meets the need of the user, not because it is broken," the report states. Much of this waste may be dangerous. Just one television, for instance, "can contain up to two kilograms [4.5 pounds] of lead," says the *Post*. And mercury, which is found in certain display panels, is now contaminating landfills. At the current rate, e-waste will double by 2010, warns Environment Canada.



From Our Readers

Fashion I'd like to express my appreciation for the series "Are You a Slave to Fashion?" (September 8, 2003) As a teenager, I have felt the world's pressure to buy the latest fads and to maintain the "perfect" figure. But these articles have helped me to change my spending habits and to dress in a more modest manner.



M. B., United States

I am ten years old, and my teacher asked us to bring in some research on the subject of fashion. I brought in a copy of the article "The Dark Side of

Glamour." The teacher made copies for the whole class!

G., Belgium

As a 19-year-old girl, I find it hard not to be influenced by what's defined as the "ideal" woman. I don't have a model's figure, and that often makes me feel ugly. I frequently want to go on diets—even drastic ones. Shortly after I prayed for advice on how to cope with these feelings, I received this magazine and with it the answer to my prayer. Thank you very much.

S., Germany

The articles helped me to understand the vanity behind wanting to be in fashion. I am 14 years old, and in Italy it is not easy to go to school if you aren't wearing designer clothes—you are automatically a nobody! Your articles taught me that the important thing is to be spiritually rich in God's eyes.

F. G., Italy

Orchids I enthusiastically read the article "Orchids in All Their Glory." (September 8, 2003) It gave me some tips on growing orchids at home and taught me some of their names and origins. *Awake!* provided the very information I was searching for.

L.E.C., Bangladesh

Clean Teeth I just had to write you about the article "A Stick That Cleans Teeth." (September 8, 2003) I had been wondering how people cleaned their teeth before toothpaste. So I was totally enthralled with the article!

D. G., United States

I had always looked down on the chewing of sticks. But I was wrong. It would seem that such chewing is beneficial, and I will now use one myself to protect my own teeth.

A. A., Chad

Holocaust Report The article "Her Report Made a Real Impression" spoke of Jews wearing the Star of David in concentration camps. (September 8, 2003) However, according to my own experience in Ravensbrück concentration camp, the Jews did not wear the Star of David but a yellow triangle.

J. R., South Africa

"Awake!" responds: Evidently, the Star of David was not worn by Jews in most camps. However, there is evidence that it was worn in some camps.

Bullying I am not one of Jehovah's Witnesses. However, the series "Bullying—What Can You Do About It?" (August 22, 2003) was most timely. Attacks by peers at my daughter's school have become very serious. As you suggested, I talked with her and was able to give her some support and help. Thank you for caring about people.

T. M., Ukraine

The “Jewel of the Sea”

Diatoms, microscopic algae that encase themselves in ornate, exquisitely patterned glass shells, are found in prolific numbers in every ocean on earth. They have fascinated scientists for centuries—in fact, ever since the microscope was first invented and men could sketch their beauty. Justifiably, the diatom is called the jewel of the sea.

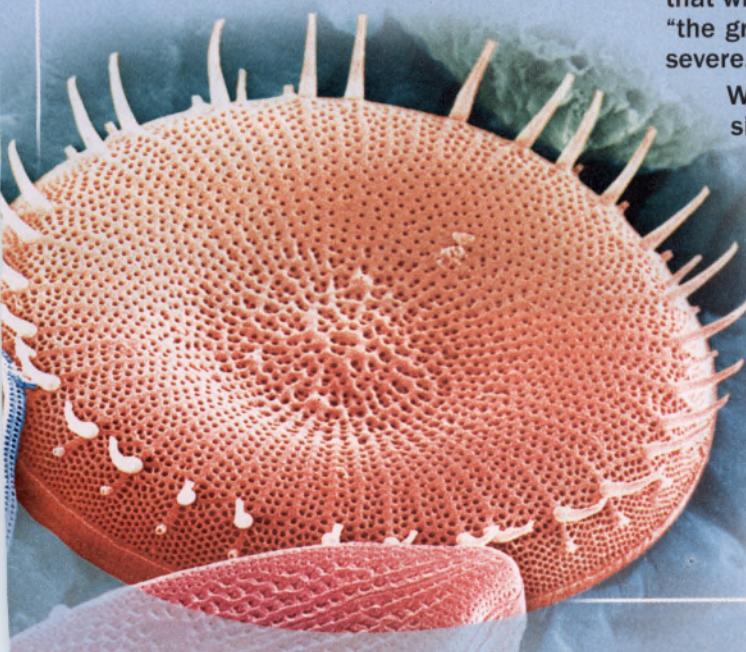
Alfred Nobel, inventor of dynamite in the 1860's, used silica from diatoms to stabilize nitroglycerin, which enabled him to form portable sticks of the explosive. Fossilized diatom shells are used commercially in many ways today—for example, to illuminate road paint, purify wine, and filter swimming pool water.

Far more important, though, is the fact that these tiny one-celled plants account for one fourth of the photosynthesis on our planet. Researchers Allen Milligan and Francois Morel,

of Princeton University, U.S.A., have found that silica in the diatom's glass shell causes chemical changes in the water inside it, creating an ideal environment for photosynthesis. The reason the glass is so ornate, scientists believe, is that a greater surface area is thus exposed to the water inside the cell, making photosynthesis more efficient. Just how these minute but beautiful cases are formed from silicon dissolved in seawater is still a mystery, but what researchers do know is that by absorbing carbon dioxide and releasing oxygen, diatoms play a vital role in sustaining life on earth, perhaps an even more important role than most land plants.

Morel rates diatoms “among the most successful organisms on earth.” Milligan adds that without their appetite for carbon dioxide, “the greenhouse effect might be much more severe.”

When diatoms die, their carbon remains sink to the ocean floor and eventually fossilize. Some scientists believe that in this form, under intense pressure, diatoms have contributed to the world's oil reserves. Concern is growing, however, that as seawater temperatures rise because of global warming, this allows bacteria to eat the diatoms' remains before they can sink, and carbon is released back into the surface water. Thus, even this tiny “jewel of the sea” is part of a marvelously designed life-sustaining system that could now be under threat.



"There Really Is Someone Out There"

A 13-year-old girl in New Mexico, U.S.A., wrote: "During a discussion in science class dealing with evolution, I spoke out concerning all the evidence that there is a Creator. I took a copy of the book *Is There a Creator Who Cares About You?* to my science teacher and asked him to read it, explaining that it had helped me. He thanked me kindly and accepted the book.

"A couple of weeks later, he came to me and commented that he had read the book and felt that it was one of the best-written books he had ever read.

"Not long after this, one of the students committed suicide, a pretty 15-year-old girl. Many students were crying and very upset as they came into science class. To my surprise, the teacher opened the matter for discussion by the class. He began by saying: 'Do you know what helped me deal with this death?' He then said that it was what I had done for him. He said: 'She gave me this little book entitled *Is There a Creator Who Cares About You?* It helped me to know that there really is someone out there who cares about us and that even if no one else will listen to us, he's there!' The class seemed calmed and comforted by his words."



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