

Awake!

NOVEMBER 8, 2003



OIL

Will It Ever
Run Out?

Awake!

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OIL

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Why is oil so vital to modern life? How do we get it? How much is left? Are there viable alternatives?

OIL

How It Affects You

HAVE you ever stopped to think what life for many would be like without petroleum and its products?* Oil made from petroleum is used to lubricate motor vehicles, bicycles, strollers, and other things with moving parts. Oil lessens friction, thus slowing the breakdown of machine components. But that is not all.

Oil is used to make fuel for planes, automobiles, and heating systems. A multitude of cosmetics, paints, inks, drugs, fertilizers, and plastics as well as a myriad of other items contain petroleum products. Daily life for many would be drastically different without oil. Little wonder that according to one source, petroleum and its derivatives have "a greater variety of uses than perhaps any other substance in the world." How do we get oil? Where does it come from? How long has mankind used it?

The Bible tells us that more than two millennia before Christ, Noah, following divine instructions, constructed a gigantic vessel and used tar—possibly a petroleum substance—to make it watertight. (Genesis 6:14) Petroleum substances were used by the Babylonians for their kiln-dried bricks, by the Egyptians in the mummification process, and by other ancient peoples for medicinal purposes.

Who would have imagined that this product would come to be of such importance in today's world? No one can deny that

* The word "petroleum" comes from Latin and means "rock oil." It is customarily used to identify two closely related compounds—natural gas, also known as methane, and oil. Both substances sometimes seep to the surface through cracks in the earth. As for oil, it can be liquid or in the form of asphalt, pitch, bitumen, or tar.

modern industrial civilization depends on petroleum.

The use of oil from petroleum for artificial lighting was oil's springboard to fame. As early as the 15th century, oil from surface wells was used in lamps in Baku, today's capital of Azerbaijan. In 1650, shallow oil reservoirs were dug in Romania, where oil, in the form of kerosene, was used for lighting. By the mid-19th century, that country and others in Eastern Europe already had a prosperous oil industry.

In the United States, it was mainly the search for a high-quality illuminant in the 1800's that made a group of men direct their efforts toward oil. These men rightly concluded that in order to produce enough kerosene to supply the market, they would have to drill for oil. So in 1859 an oil well was successfully drilled in Pennsylvania. The oil fever had begun. What happened next?

PETROLEUM AND OIL —WHAT IS THE DIFFERENCE?

Although usually coming from what are called oil wells, oil is in fact petroleum, or crude oil, that issues from below the ground. Petroleum is defined as "a thick, flammable, yellow-to-black mixture of gaseous, liquid, and solid hydrocarbons that occurs naturally beneath the earth's surface." It "can be separated into fractions including natural gas, gasoline, naphtha, kerosene, fuel and lubricating oils, paraffin wax, and asphalt and is used as raw material for a wide variety of derivative products." —*The American Heritage Dictionary of the English Language*.

OIL

How Do We Get It?

"**L**ET there be light." In the United States in the 19th century, a new source of artificial light was needed to replace the inconveniences of flickering light produced by fats, whale oil, and other substances. What was the solution? Oil! Where could it be found?

In 1859, Edwin L. Drake, a retired railroad conductor, using an old steam engine, drilled a well 70 feet

deep to the first crude oil discovered near Titusville, Pennsylvania, U.S.A. That marked the beginning of the oil era. As oil was discovered in many parts of the world, it caused great economic and political repercussions. It proved to be the high-quality source of artificial light that the world eagerly awaited.

Soon, frantic buying of land and drilling of wells was a major activity in the so-called oil regions of the United States. In those years it was common to hear of people who suddenly became wealthy and of others who later lost their fortunes. Ironically, Edwin Drake, the man who drilled the first well in Pennsylvania, was one of the latter.

Despite its extraordinary boom, or perhaps because of it, the oil industry in Pennsylvania soon experienced its first drop. Oil fell from \$20 a barrel to 10 cents! Overproduction and speculation made prices collapse, and some wells rapidly became exhausted. A special reminder of those times is

Oil gushing out of a well in Texas



◀ Brown Brothers ▶

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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Early oil field, Beaumont, Texas



Horse cart transporting barrels of oil

Pithole City, Pennsylvania, which today is a ghost town. It was established, it flourished, and it was deserted—all within the span of little more than one and a half years. Those ups and downs would become an integral part of oil history.

In 1870, John D. Rockefeller and a few associates incorporated the Standard Oil Company. This company dominated the kerosene market until competitors appeared, especially in the Russian oil industry. One rival was Marcus Samuel, a founder of what is today known as the Royal Dutch/Shell Group. In addition, as a result of the ingenuity of the Nobel brothers,* a powerful oil enterprise was established in Russia with the oil extracted from fields in Baku.

Those were the beginnings of the history of a series of oil enterprises. Since then, alliances and organizations have been created to avoid the price and production instability of the early times. One of them is the Organization of Petroleum Exporting Countries (OPEC), whose 11 members collectively possess most of the world's proven crude-oil reserves.—See the box on page 7.

How Much Oil, and Where Is It?

By the end of the 19th century, the widespread use of electricity could have meant bankruptcy for

* One of them, Alfred Bernhard Nobel, would later become the founder of the Nobel Prizes.

All photos: Brown Brothers

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[#]Audiocassettes also available.

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the oil enterprises. However, another outstanding invention had drastically reversed the situation—the internal-combustion engine, used mainly in automobiles. Gasoline, a petroleum derivative, was now essential for self-propelled vehicles, which were already available in most industrialized

BARRELS OR TONS?

The first Pennsylvania oil companies shipped oil in 48-gallon wine barrels. Eventually only 42 gallons of oil was put in to allow for spillage during shipment. A barrel (42 gallons) is still used today for oil commerce.

From the beginning, oil for Europe was transported by sea and was usually measured by weight, in tons, as is the practice today.

Source: American Petroleum Institute

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nations by the late 1920's. Now much more oil was needed to keep the world moving, but where would it be found?

With passing years, oil's supremacy in the global market has been reinforced by the ongoing discovery of new oil fields in various parts of the world—some 50,000 of them! But in terms of production, the important factor is, not the number of fields discovered, but their size. How big are they?

Oil fields that contain at least five billion barrels of recoverable oil—called supergiants—are the largest in the classification, while the second largest (from five hundred million to five billion barrels) are called world-class giants. Although some 70 countries are listed in the "U.S. Geological Survey World Petroleum Assessment 2000" as having some oil reserves, only a few of them

have giant oil fields. (See the box on page 7.) The largest number of supergiant oil fields are grouped in the Arabian-Iranian sedimentary basin, which comprises the area in and around the Persian Gulf.

The search for new oil sources has not stopped. Instead, it has been reinforced by state-of-the-art technology. Currently the Caspian Sea region, made up of the nations of Azerbaijan, Iran, Kazakhstan, Russia, Turkmenistan, and Uzbekistan, has caught the attention of oil producers. According to the U.S. Energy Information Administration, this region has huge potential for the exploitation of oil and natural gas. Alternative exportation routes, such as through Afghanistan, are being studied. Additional potential has also been found in the Middle East, Greenland, and parts of Africa. The conversion

HOW DID PETROLEUM FORM?

The opinion that has prevailed among most scientists since the 1870's is called the biogenic theory. This "holds that biological debris buried in sediments decays into oil and natural gas in the long course of time and that this petroleum then becomes concentrated in the pore space of sedimentary rocks in the uppermost layers of the [Earth's] crust." This process then produces petroleum, whose main components are hydrocarbons—that is, hydrogen and carbon. However, since the 1970's this theory has at times been challenged by some scientists.

In the August 20, 2002, issue of *Proceedings of the Na-*

tional Academy of Sciences, the article "The Genesis of Hydrocarbons and the Origin of Petroleum" was published. The authors argue that the origin of natural petroleum must occur at depths that are "well into the mantle of the Earth" and not at the much shallower depths generally accepted.

Physicist Thomas Gold has suggested some controversial theories and explains his reasons in detail in his book *The Deep Hot Biosphere—The Myth of Fossil Fuels*. He writes: "The theory of the biological origin of hydrocarbons was so favored in the United States and in much of Europe that it effectively shut out work on the opposing view-

point. This was not the case in the countries of the former Soviet Union." That was "probably because the revered Russian chemist Mendeleyev had supported the abiogenic [not biological] view. The arguments he presented are even stronger today, given the greatly expanded information we now have." What is the abiogenic view?

Gold states: "The abiogenic theory holds that hydrocarbons were a component of the material that formed the earth, through accretion of solids, some 4.5 billion years ago." According to this theory, the elements of petroleum have been deep in the earth since the earth's formation.*

* Awake! does not take a position on differing theories. It merely reports them.

of discovered hydrocarbons into energy and items for use in everyday life is a story in itself.

How Is Oil Extracted?

Geologists and surveyors search for places where crude oil could be trapped underground. After performing some specific measurements and taking samples, they drill to confirm that there is actually oil. In the early days, successfully hitting an oil field might have meant being showered by a gusher of mud and oil, with the consequent loss of the initial outpouring and the risk of explosion. However, by means of measuring instruments and special valves, today's drilling rigs prevent this from happening. Smaller and deeper drillings are also possible today.

Eventually, the pressure that makes the oil and gas emerge decreases, and it must be maintained by the injection of water, chemicals, carbon dioxide, or other gases, such as nitrogen. Depending on the zone, oil can have different degrees of density. Naturally, light oil is by far preferred, for it is easier to obtain and refine.

As explained by the American Petroleum Institute, modern technology includes horizontal drilling, done virtually parallel to the earth's crust, which reduces the number of wells that must be bored. Offshore extraction, which began in 1947 in the Gulf of Mexico, greatly increased oil production. Of course, the extraction method used has a direct effect on the price of the final product.*

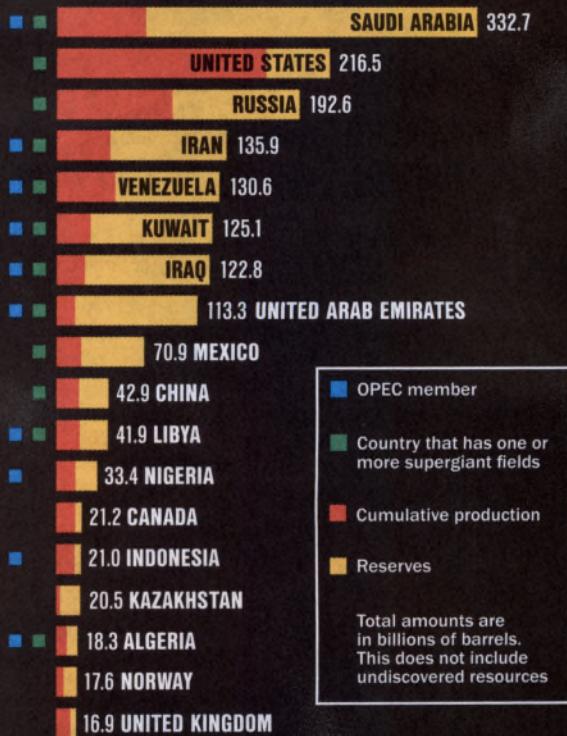
How Is Oil Transported?

In 1863 in Pennsylvania, small-diameter wooden pipelines were built for transporting oil, as they were cheaper and less cumbersome to use than 42-gallon barrels moved on horse carts.* Today's pipeline systems have

* "A guyed tower constructed in more than 300 metres [1,000 feet] of water in the Gulf of Mexico has been estimated to produce oil at about 65 times the production cost in the Middle East."—*The Encyclopædia Britannica*.

* In the early days, oil was stored and transported in wooden barrels, the same as those used for wine.—See the box on page 5.

MAIN SOURCES OF OIL



evolved and multiplied. According to the Association of Oil Pipe Lines, the United States alone has a network of 200,000 miles of petroleum pipeline!

Such pipeline systems, mainly made of metal, transport not only crude oil to refineries but also final oil products to distributors. Modern pipeline technology allows for automated systems that monitor flow and pressure. So-called intelligent pigs (devices used to inspect hundreds of miles of pipeline), Magnetic Flux Leakage inspection, and ultrasonic in-line inspection have also been developed. Yet, all that the ordinary user of the final products will probably see is a sign indicating that a petroleum pipeline lies underground and warning that no digging should be done at the site.

(Continued on page 10)

OIL PRODUCTION

SIMPLIFIED



SATELLITE

The Global Positioning System provides accurate signals used for surveying

1 EXPLORING

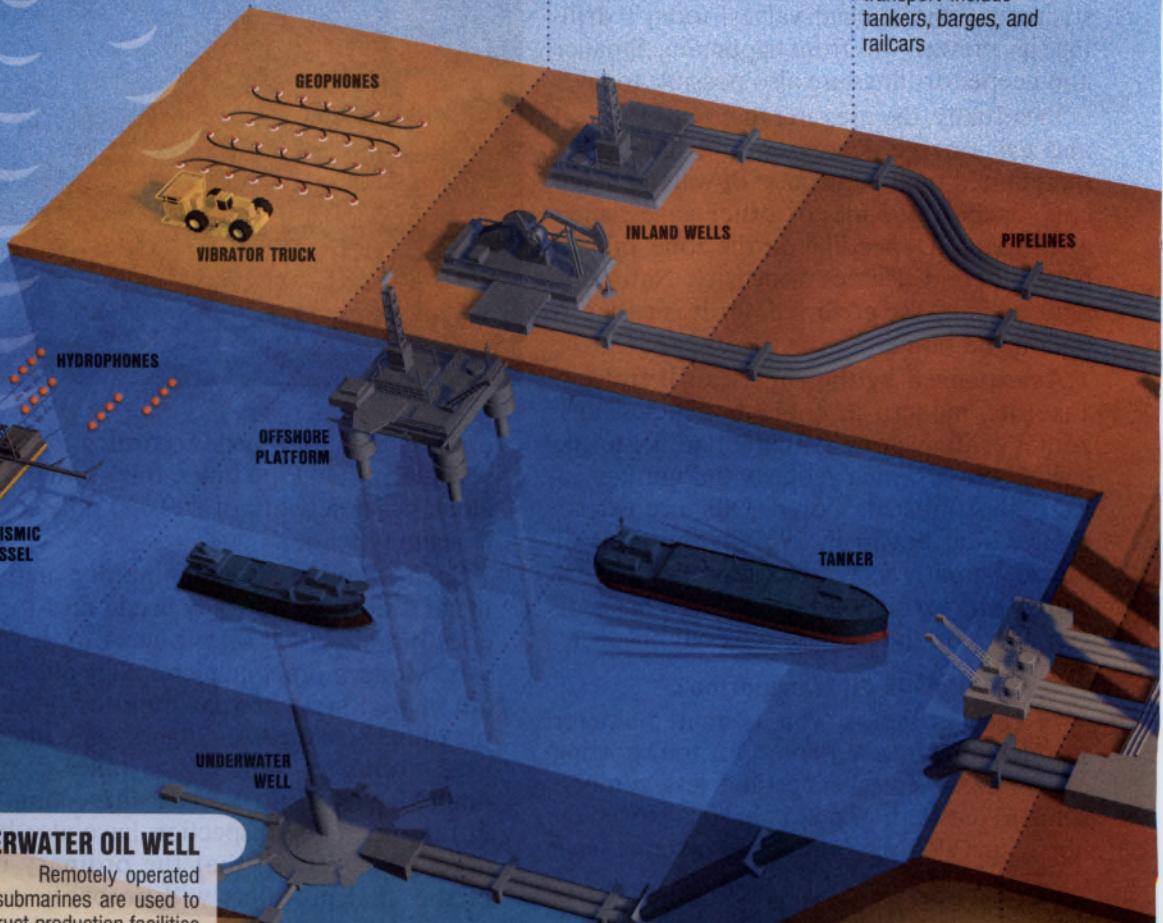
Seismic surveying, one method used, records the below-ground reflections of artificially generated sound waves

2 EXTRACTING

Extraction methods include the use of inland, offshore, and underwater oil wells. To maintain the pressure, gases or water may be injected

3 TRANSPORTING

Pipelines above the ground, below the ground, and under the sea transport the oil. Other methods of transport include tankers, barges, and railcars



UNDERWATER OIL WELL

Remotely operated submarines are used to construct production facilities on the sea bottom



HORIZONTAL DRILLING

Motors controlled remotely by an engineer turn the drill bit, and sensors detect the rock properties



DISTILLATION TOWER ▶

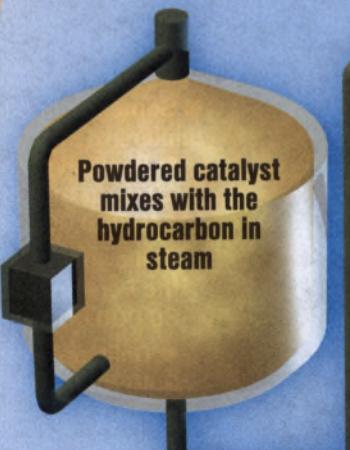
When sticky, dark crude oil is heated in the furnace, the hydrocarbons turn into gases. The gases condense back into liquids at different temperatures. Oil is thus separated into its parts, or fractions

4 REFINING

Crude oil is heated, distilled, and broken up into fractions that can be used to make everyday products

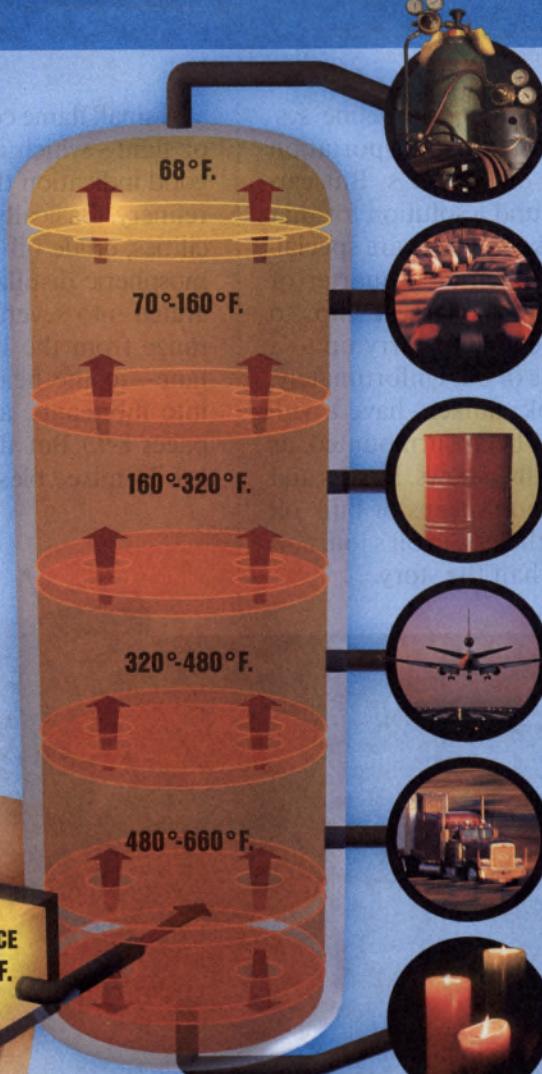
REFINERY

FURNACE
750°F.



CATALYTIC CRACKER ▶

The hydrocarbons are heated by steam and mixed with the hot catalyst of powdered alumina-silica gel. This process cracks, or breaks up, the hydrocarbons into smaller and more useful molecules



REFINERY GASES

These include methane, ethane, propane, and butane

GASOLINE

Used as automobile fuel and as a raw material for plastics

NAPHTHA

Can be made into plastics, automobile fuel, and other chemicals

KEROSENE

Made into jet fuel and stove oil

GAS OIL

Made into diesel and furnace fuels

RESIDUE

Further processed into refinery fuels, heavy fuel oil, candle wax, greases, and asphalt

ETHANOL

This solvent is used in the manufacturing of paints, cosmetics, perfumes, soaps, and dyes

PLASTICS

Polystyrene, for example, is made by polymerizing styrene

Photo Courtesy of Phillips Petroleum Company

GASOLINE ADDITIVES

Octane booster prevents gas from igniting too quickly in the engine, thus improving its performance

(Continued from page 7)

As useful as it is, though, a pipeline system is not practical for the transportation of large quantities of oil overseas. But early oil entrepreneurs found a solution for that too—immense oil tankers. These are specially designed ships as much as a quarter of a mile long. Tankers are the largest ships to sail the oceans and are able to carry up to a million or more barrels of oil. Unfortunately, as mighty as they look, tankers have a vulnerability that has not been surmounted, as the box "About Oil Spills" shows. Barges and railcars are also common means of bulk oil transportation. Nevertheless, in oil's journey, transportation is only half the story.

A small flame coming from a tall pipe stack, or flare—which acts as a safety valve—is a good indication that you are looking at an oil refinery. Basically, in these huge refining facilities, crude oil is heated and sent to an atmospheric distillation tower, where it is separated into several fractions. These fractions range from the lightest—gases, such as butane—to the heaviest, which are processed into lubricants, among other products. (See pages 8-9.) But this still leaves the question, Is oil a mixed blessing?

ABOUT OIL SPILLS

- The total quantity of oil spilled by tankers between 1970 and 2000 is 5,322,000 tons
- The largest oil spill occurred in 1979 when the *Atlantic Empress* collided with the *Aegean Captain* in the Caribbean, resulting in a spill of 287,000 tons of oil
- The *Exxon Valdez* was only about the 34th-largest oil tanker spill
- Although most tanker spills result from operations such as loading, discharging, and bunkering, the largest spills are related to collisions and groundings



Oil tanker "Erika" sinks near Penmarch Point, France, December 13, 1999

© La Marine Nationale, France

- Some major oil spills from causes other than tankers:

- Blowout of the exploratory well Ixtoc I in 1979, in the Gulf of Mexico. Total spilled: 140,000,000 gallons
- Blowout of a platform in a well in the Persian Gulf in 1983. Total spilled: 80,000,000 gallons
- Deliberate release in 1991, in the Persian Gulf. Total spilled: 240,000,000 gallons

Sources: International Tanker Owners Pollution Federation Limited, "Oil Spill Intelligence Report," "The Encarta Encyclopedia"

OIL A Blessing and a Curse?

TO WHAT extent do industrialized nations depend on oil and its products? Oil—and natural gas—are essential to them, and this has created, as Daniel Yergin states in his book *The Prize*, a “Hydrocarbon Society.” Just think of heating oil, greases, waxes, asphalts, and the items made from petrochemicals—aircraft, automobiles, boats, adhesives, paint, polyester clothes, sneakers, toys, dyes, aspirin, deodorant, makeup, recording discs, computers, TVs, telephones. Every day many people use a number of the over 4,000 oil-derived products or items that shape modern life. But what about the harm to the fabric of life that has characterized the history of oil since its beginning?

A King That “Does Not Rule Benevolently”

By the end of 1940, when war between Romania and Hungary seemed imminent, Nazi dictator Adolf Hitler was quick to act as arbitrator. A gesture of goodwill? What Hitler really wanted to prevent was having Romanian oil wells fall under the control of the Soviet Union. Oil was also a major factor in the Iraqi invasion of Kuwait in 1990 and the inclusion of other nations in the counter-offensive. By no means are these isolated events. So many times the determination to control oil has been the cause of conflict and suffering.

Not only is oil essential to modern life but it is also deeply rooted in the very heart of politics and the special interests of a few powerful people. As the Organization of Petroleum Exporting Countries (OPEC) recently stated, oil is not an ordinary product

but “a strategic asset.” Oil has been used between nations for political leverage, through embargoes and sanctions. In addition, oil wells, refineries, and tankers have been the target of terrorist attacks—often causing terrible damage to the environment.

The oil industry has been accused of adding to the damage done to the environment by carbon dioxide emissions, which may contribute to global climate change. According to a report from PEMEX (Mexican Petroleum), one of the world’s biggest oil enterprises, contaminants are emitted during various phases of petroleum processing. Although gasolines are cleaner now—nearly six years after the Kyoto Protocol, when 161 nations met to take steps to reduce the threat of global climate warming—many feel that little has changed. On the other hand, OPEC says that “oil is the creator of the wealth and prosperity enjoyed today” by many countries. But is this always the case?

Some would point to damage that has resulted from the drilling of oil wells and the construction of pipelines. Others might point to the increasing number of unemployed in Saudi Arabia, the country richest in oil deposits. Ali Rodríguez Araque, president of OPEC, says: “The governments of the industrialized nations are taking enormous advantage of the sacrifices which they demand of producers, refiners and consumers.”

CorpWatch, an organization that works to hold corporations accountable on issues such as environmental justice, states: “Oil is still King. But it does not rule benevolently.”

What will be the future for oil?

OIL Will It Ever Run Out?

"Without [energy] the wheels of industry do not turn . . . No cars, trucks, trains, ships or airplanes could be built . . . Without energy, houses would remain cold and unlighted, food would be uncooked. . . . Without energy resources we would literally be back in the Stone Age."

—From the "U.S. Geological Survey World Petroleum Assessment 2000."

ENERGY experts theorize that oil supplies may eventually become exhausted. Some estimate that world oil reserves will last from 63 to 95 years more. In the meantime, other energy sources are being tapped, some of which have been used for decades. Among those that are renewable—or can be replenished quickly—are the following types: solar, wind, wave, hydroelectric, and ocean thermal. But at present, major problems remain involving their production and distribution.

The prospect of exhausting nonrenewable energy sources and only then turning to renewable ones is certainly gloomy. Oil companies are ready to take advantage of the limited time that they say oil is calculated to last. Unfortunately, there is every reason to expect that the social and environmental problems associated with oil will last just as long. Needless to say, the root of these problems is not oil itself. It is man's greed and thirst for power that has given oil its bad reputation.

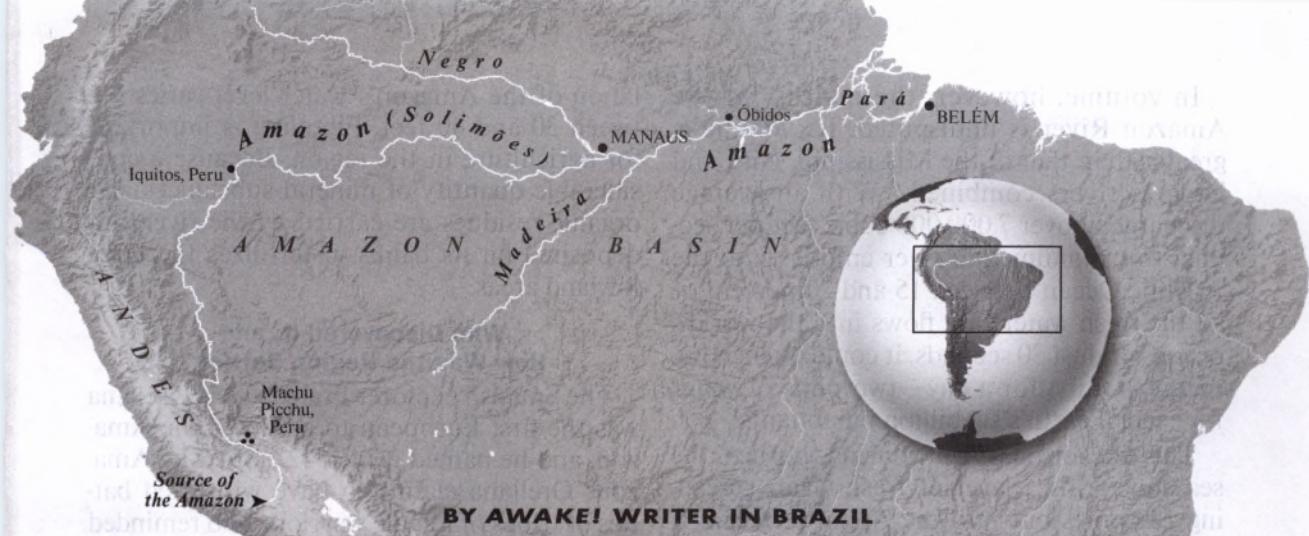
Happily, the future of oil—and, indeed, of all sources

of energy—is not in the hands of the nations. Ultimately, it is in the hands of earth's Creator and Caretaker, Jehovah God, who has promised that soon every environmental and social problem related to the use and abuse of the earth's resources will disappear. (Revelation 4:11) As the Bible states, the time is near when God will "bring to ruin those ruining the earth." Righteous rulership by God will result in "a new heaven and a new earth," a world without selfish exploitation and injustice, where the resources of the earth will be used altruistically for the benefit of all obedient humankind.—Revelation 11:18; 21:1-4.



Alternative energy sources include solar panels and wind turbines





BY AWAKE! WRITER IN BRAZIL

THE MIGHTY AMAZON A LIFELINE FOR MILLIONS

AMONG rivers it is a giant. It traverses the earth's largest tropical rain forest. Researchers say that it is essential to our planet. It is a paradise for explorers and naturalists. But for millions of Brazilians, it is also a vital communication line. We are describing the Amazon River, the backbone of the Amazon region.

A Closer Look at 'the River Sea'

From its humble beginnings high in the Peruvian Andes, within 100 miles of the Pacific Ocean, the Amazon—swollen by the waters of other rivers along its way—descends some 16,000 feet to the Atlantic Ocean. It changes name several times before reaching Brazilian territory, where it is first called the Solimões. After its confluence with its most voluminous tributary, the Negro River, near Manaus, it becomes the mighty Amazon.

At this point an unusually beautiful spectacle called the meeting of the waters occurs.

The dark coffee-colored waters of the Negro River and the muddy waters of the Solimões meet and flow side by side without mixing for approximately six miles. This phenomenon occurs as a result of various factors, including the difference in composition, density, and temperature between the two rivers.

The controversy that surrounds the Amazon's main tributaries and their headwaters, as well as the complicated geography of its delta, makes it difficult to know exactly where the Amazon begins and where it ends. Based on its most distant outlet in the Pará estuary, which serves as an entry point for shipping, its length is approximately 4,200 miles.* Determining its total length, though, is "more a question of definition than a question of measurement," says the Brazilian edition of *The Guinness Book of Records*.

* This makes the Amazon River 50 miles longer than the Nile River was before the construction of the Aswan Dam and ranks the Amazon as the longest river in the world. Other studies indicate that its total length is 4,437 miles.

In volume, however, the majesty of the Amazon River is undisputed. Its volume is greater than that of the Mississippi, Nile, and Yangtze rivers combined.* With an average discharge of over 7,000,000 cubic feet per second, this monumental river empties into the Atlantic Ocean between 15 and 20 percent of all the fresh water that flows into the world's oceans. In just 30 seconds, it could quench humanity's thirst for a day—two pints of water for each of earth's six billion inhabitants!

This extraordinary outpouring "pushes" the sea and forms a layer of fresh water spreading 125 miles out into the Atlantic Ocean. It is not surprising that on sighting the river's mouth, Vicente Yáñez Pinzón, a Spanish navigator who entered the Amazon in June 1500, called it *Mar Dulce* (the Freshwater Sea).

For those who travel on this great river, it seems to be just that—a sea flooding a carpet of forests. At some points it is so broad that a person on one of its banks cannot see the other side. During floods certain stretches of the river are up to 30 miles wide! Its depth, averaging from 150 to 250 feet at some stretches, varies according to its width. At its narrowest point, at Óbidos in Pará State, the river is 420 feet deep.

Most of the Amazon has a very slight slope—averaging a mere one and a quarter inches per mile. The gentle slope of its estuary allows the tide to penetrate far upstream. Its effects are felt even at Óbidos, 500 miles from the river's mouth.

Because it flows almost parallel to the equator, the Amazon benefits from the summers of both hemispheres. Flooding alternates between the tributaries on the left bank and those on the right bank. As the levels of the rivers rise and fall, first on the north side and then on the south side, the entire Amazon pulses like a huge heart. Annually, the oscil-

lation of the Amazon's water level varies between 30 and 40 feet. Flooding is important for agriculture in the region. Because a considerable quantity of mineral substances and organic residues are carried by the river and deposited on its banks, it fertilizes the large lowland areas.

Who Discovered It, and How Was the Region Settled?

The Spanish explorer Francisco de Orellana was the first European to go down the Amazon, and he named it in 1542.* But why Amazon? Orellana claims to have witnessed battles of tribes of female warriors who reminded him of the Amazons of Greek mythology! Other expeditions followed, with further Spanish, English, Dutch, and Portuguese exploration. According to the *Enciclopédia Mirador Internacional*, the Portuguese made "countless daring raids to conquer [land] along the Negro, Solimões, and Branco [rivers] and formally claimed the region in the name of the crown."

To consolidate its presence, Portugal established missionary activity in the area. The same encyclopedia says that in an attempt to disseminate the Catholic faith and increase the trade in "drugs of the backwoods"—wood, resins, herbs, and spices—"members of religious orders frequently transferred their missions from one point to another, always along the riverbanks. Dozens of small villages grew out of these numerous settlements."

This early activity in the 17th and 18th centuries and the later growth of rubber plantations at the close of the 19th century brought about definite patterns of settlement in the region. Since the rivers were a natural means of penetration, people settled on their banks, forming small towns and villages. Population centers of the mid-Amazon today are old towns that date from these previous centuries.

How Do People Get Around?

The Amazon basin is the largest river basin in the world, covering some two million square

* The second-largest river in terms of volume is the Congo, in west-central Africa. However, two of the Amazon's principal tributaries, the Negro and the Madeira, pour out as much water each as the Congo.

* See *Awake!* of March 22, 1997, page 3.



1



2



3

- 1. A village girl**
- 2. Homes on stilts along the river's edge**
- 3. The dark waters of the Negro meet the muddy Solimões near Manaus**
- 4. The Negro River feeds the Amazon**

miles. It is larger than the whole of Europe excluding Russia. Along with its 1,100 tributaries and other smaller watercourses, the Amazon forms a complex communications network that could be likened to the circulatory system of the human body, of which the Amazon compares to the aorta, the body's largest artery. This network of waterways contains two thirds of all the earth's fresh water. This extensive hydrographic network, with over 15,000 miles of navigable waters, plays a fundamental role in transportation and in the lives of the local people.

Millions who dwell in the Amazon region use this natural superwaterway. Boats of all sizes sail along it, including large transatlantic vessels that travel 1,000 miles upstream to Manaus. Lesser freight and passenger vessels reach as far as Iquitos, in Peru, 2,300 miles from the mouth of the river. A large part of the Amazon region's wealth leaves the area via the Amazon, and products from other

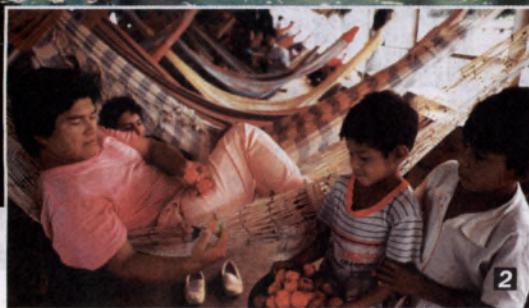
parts of the world arrive the same way. The Madeira River, its largest tributary and over 2,000 miles long, also bustles with commercial activity. This intense commerce annually generates about two million tons of cargo in the Amazon basin. The busiest stretch of the river is between Manaus and Belém, situated at the river's mouth.

How Is Life Along the River?

The distribution of the people living along the river is an indicator of their dependence on river transport and their preference for the fertile soil of the lowlands. According to Altomir, a local resident, "in these areas the population along the river cultivate small farms that principally grow cassava—used to make manioc meal—which together with fish makes up the staple diet. They also raise watermelons, bananas, and corn as well as cattle." But when the floods come, the cattle must quickly be taken to other areas, sometimes by raft.



1



2



3

**1. The port of Manaus
2. Boat passengers in hammocks
3. Fishing by canoe**

To withstand the vagaries of the river, riverside houses are built on stilts, and floating houses are built on rafts that are moored close to the towns. The people "are very hospitable and greet strangers with a smile," says Belarmino, a frequent traveler on the river.

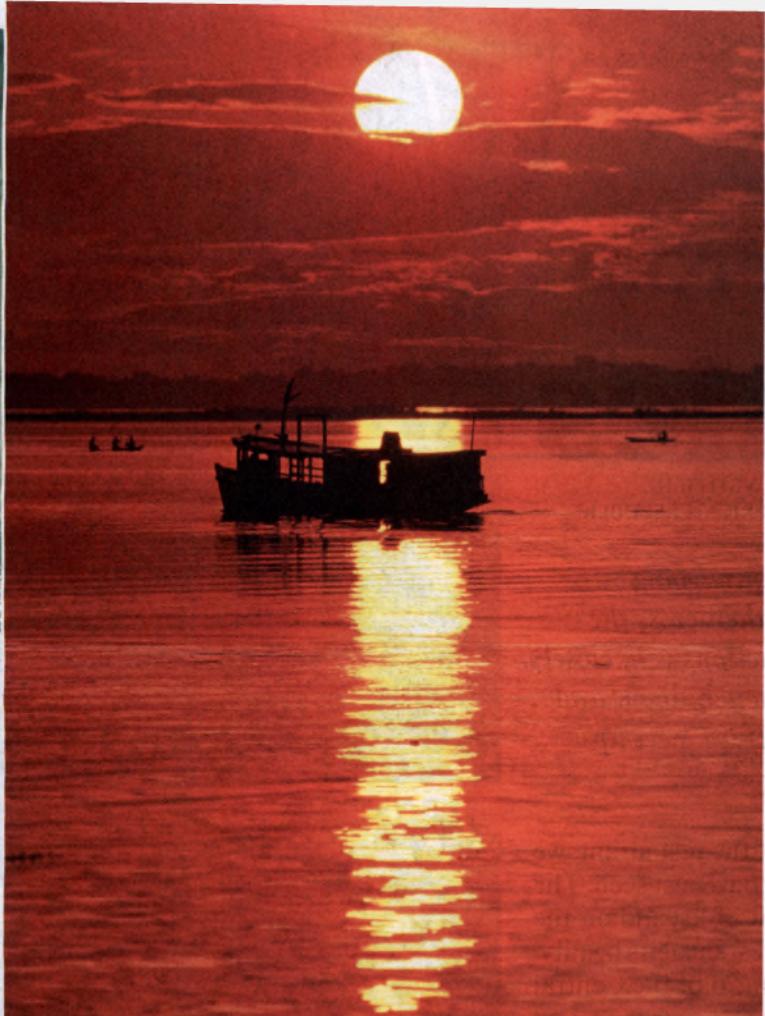
It is common to see small canoes pull up to larger vessels to sell and trade merchandise—or to get a tow up the river. A rope is thrown to the canoeist, who ties it to his boat. Local produce, such as cabbage palm, Brazilian wine palm, manioc meal, nuts, and fish (including freshwater crayfish), is sold or traded for cereals and industrialized goods.

The river is a source of income for thousands of Brazilians who earn a living ferrying cargo and passengers. It is also a natural means of transportation for timber cut at lumber mills in the interior of the forest.

A large part of the protein consumed in the region comes from the river. "It has been

calculated that the Amazon contains about 2,000 species of fish, many more than any other river system on earth," claims the Portuguese edition of the book *Vida Selvagem nos Rios* (Wildlife Habitat). After his expedition to the Amazon region, the famous oceanographer Jacques-Yves Cousteau went so far as to say that 'there are more species of fish in the Amazon than in the Atlantic Ocean.'

Among the animals that make up the aquatic fauna is the herbivorous manatee, threatened with extinction. It is a coveted catch, as a fair-sized manatee may yield more than 26 gallons of oil. This mammal averages eight feet in length and weighs about 770 pounds. In addition, there is the pirarucu, a freshwater giant that is known as the Brazilian cod. On average, it is over six feet in length and weighs about 150 pounds. The boutu, or Amazon river dolphin, and the *tucuxi* dolphin charm people with their fleeting appearances.



Unusual Travel by Boat

Boats have long been an essential part of life in the Amazon region. They are the basis for the livelihood of thousands of vendors who sell their produce there and thus bring a touch of civilization to isolated river communities. They also provide inexpensive transport to towns and villages in the interior that are unreachable by road. Most passengers travel in hammocks crammed into a small area. This explains the rush when a boat docks—everyone wants a good spot to hang his hammock. Those who travel on the lower deck will have to share space with a variety of cargo. Since travelers are talkative, it is easy to strike up a friendship—and there is no lack of time for this, since journeys usually last several days.



THE PHENOMENON OF THE POROROCA

In the Amazon estuary, the meeting of the waters of the Amazon with those of the incoming sea causes a loud and extremely destructive phenomenon. Tidal seawater is held back by the rapid outward flow of the river. The level of the sea builds up outside the mouth of the river until the river can no longer hold it back. Then, in a huge, gushing, wall-like wave, the seawater rushes up the river, reversing the river's flow, dislodging chunks of the riverbank, uprooting trees, and leaving a trail of destruction. The enormous waves generated by the force of these two opposing currents can reach a height of 13 feet, and the deafening noise resulting from the clash can be heard over great distances. It is the sound of the pororoca, or tidal bore.

continues on next page

Near Manaus, the river traffic is very heavy because its port is the most important in the Amazon region. It is the collection point for the produce of a vast area, which includes parts of Peru, Bolivia, and Colombia. Eco-tourism is also thriving, bringing in visitors from South America and the rest of the world.

An Unforgettable Visit

Perhaps you will have the opportunity to visit this amazing area that has delighted explorers but still holds many secrets. In addition to highlighting the natural beauty of the rain forest, a trip to the Amazon region stirs feelings of reverence for the Creator of all things—including this mighty river system.

—Psalm 24:1, 2

What We Learned From the **Pygmies**

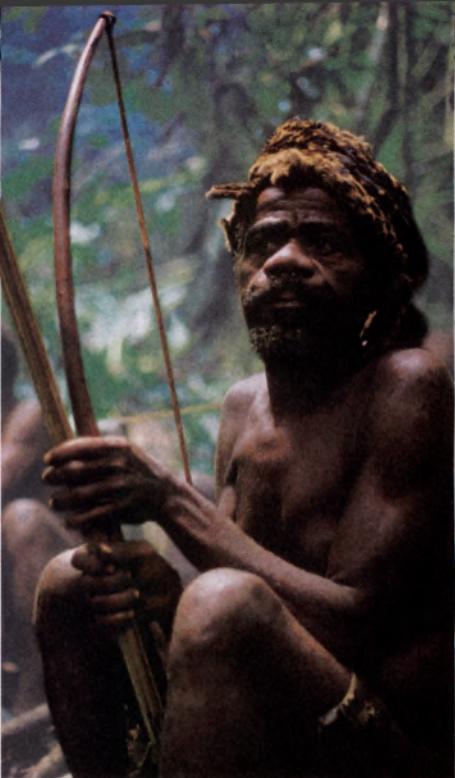
BY AWAKE! WRITER IN
CENTRAL AFRICAN REPUBLIC

"Take off your shoes. We are going to walk through water and then cross the elephants' trail. Follow my instructions very closely. If we meet up with a gorilla, crouch down and do not look him in the eye. If we meet up with an elephant, freeze."

REAXING on the veranda of the restaurant, we think over all the things we have just seen. The Sangha River flows in front of us; and on the other side, we can see the dense forest in all its beauty. We are at Bayanga, in the southern tip of the Central African Republic, situated between Cameroon and the Republic of Congo.—See the map on page 19.

As soon as we arrived at the Dzanga-Ndoki National Park welcome center, we forgot about how exhausting the trip had been to get here. This park is located 300 miles from Bangui, the capital of the Central African Republic, and to get here we drove for almost 11 hours on a narrow trail. In some places clusters of bamboo grass grow right beside the road. At Ngoto, we had to take a ferry to cross the river. This ferry is very unusual in that it does not have a motor; it took us across the river using only the force of the current. The boat is held in place by a pulley that slides along a huge cable, and a few young men only had to guide the ferry into position.

Farther on, at the Bambio River, there is a floating bridge, which is very practical, as it can adapt to the



© Jerry Callow/Panos Pictures



fluctuating height of the river during the dry and rainy seasons. The area is magnificent, and we get to see the animals in their natural habitat and get to meet Aka Pygmies,* who still lead a traditional life.

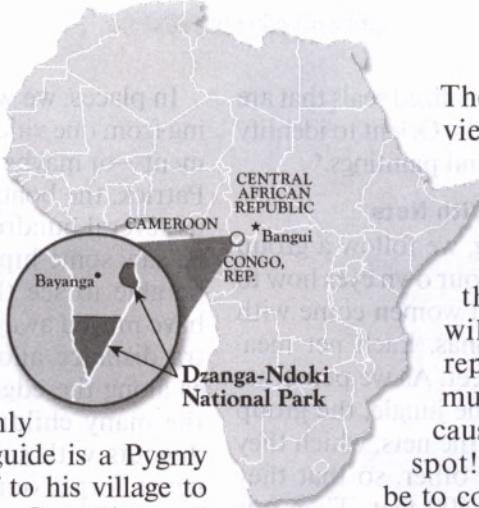
Would you like to come along with us on this wonderful visit, be it, alas, only in your imagination? Our guide is a Pygmy named Benoît. We head off to his village to meet two Pygmy herbalists, Germaine and Valérie, who will accompany us. They take us from one wonder to another as they show us the different plants in the forest that are used for medicinal purposes.

Plants That Cure and Heal

After we drive several minutes along a forest trail, our new companions ask us to leave the car and follow them into the forest. They cut a trail with their machetes, while we do our best to keep up with them. Now we have our first surprise, the *mo nzambu nzambu*, a plant called a water creeper. Our guides quickly cut off lengths of about 20 inches, and we drink the water that flows out. It is pure, fresh, and thirst quenching.

A little farther on, we are shown a leaf from the guava tree. The Pygmies boil these leaves to make a tea for treating coughs. Another tree, the *ofuruma*, produces white latex, which is a perfect eye lotion for treating conjunctivitis. "Is there a remedy for snakebite?" we ask. "Of course there is. We pound *bolo* leaves [Aka name for a type of liana, a tropical vine] and put them on the bite," answer our guides. At every step, we discover other plants that, our guides assure us, have healing properties. There are remedies for healing wounds as well as for intestinal parasites, ear infections, dental cavities, and even sterility.

* The Pygmies of equatorial Africa are known for their small stature, having an average height of less than five feet.



These peoples, sometimes viewed as primitive, have many things to teach us. As we continue on in the forest, our two herbalists "shop" for their food—mushrooms, wild lettuce, roots that replace garlic. Some leaves must be extremely tasty because they are eaten on the spot! How wonderful it will be to continue learning in God's promised new world!—Isaiah 65:17; 2 Peter 3:13; Revelation 21:1-4.

They All Gather at the Salt Lick

In the afternoon we go to see the forest elephants at the salt lick. It is on the way there that our guide gives us the instructions mentioned at the beginning of this article. But what is the salt lick? It is a huge clearing where the ground is full of mineral salts that are the delight of certain animals. For this reason it is a daily meeting place for forest elephants, buffalo, antelope, giant forest hogs, and other wild animals.

As the forest is very dense, making it extremely difficult to see the animals here, the park has constructed a mirador, or observation platform, at the edge of the salt lick. However, to get to the platform, we have to cross a swamp with water that reaches up to the middle of our thighs. Our guide listens carefully to the noises around us and also regularly makes sure that we are staying close to him. Why? Because the elephants sometimes take the same path!

Once we arrive at the mirador, we take time to look at the animals—more than 80 elephants, some buffalo, and a few antelope. A scientist who has studied the elephants for 11 years is also here. She tells us: "Each one has its own personality. I have indexed 3,000, and I know 700 of them by name." Unfortunately, the ivory of the forest elephant is extremely

desirable for making personalized seals that are used in some countries in the Orient to identify the author of documents and paintings.*

How to Hunt With Nets

Early the next morning, we follow a group of ten hunters to see with our own eyes how to hunt with a net. Men and women come with their nets made from lianas. Each net measures about 65 feet by 4 feet. As we penetrate deeper and deeper into the jungle, the group spread out and pull tight the nets, which they have fastened one to the other, so that they cover a distance of over 600 feet. Then our hunters make a big circle around this barrier, and while retracing their steps, they shake branches and cry out loud to drive the animals, if there are any, into the nets. This time, there were no animals. The hunters undo the nets, go deeper into the forest, and start all over again. Once, twice, ten times.

By the end of the morning, we are exhausted. The Pygmies have seen three blue duikers, small antelope, but these managed to avoid the nets and escape. We are not interested in seeing an animal caught in the nets. Rather, we want to learn about the ingenious ways these people survive even when they seem to have so little to work with and none of the tools of the industrialized world. Thus, we are not at all disappointed, since what we just witnessed was extraordinary.

A Dugout Ride on the Sangha River

Who would not like to glide silently through the water? In a dugout it is even more interesting, as you are practically at the same level as the water. Our ride in the afternoon takes us to see gray herons and numerous other multicolored birds, each one more beautiful than the last. Some of the birds fly from branch to branch along the riverbank, giving the impression that they are following us as we glide through the water.

* These seals, called chops, are also made of other materials. For more information, see *Awake!*, May 22, 1994, pages 22-4.

In places, we watch the chimpanzees jumping from one vine to another solely for amusement—or maybe they want to amuse us! Alain Patrick, the boatman, is working hard to take us several hundred yards farther, as yesterday he saw some hippopotamuses there. Will we be able to see them today? Sadly, no. They have moved away. On the other hand, this extra distance allows us to see several villages along the edge of the river and to admire the many children maneuvering their little dugouts with surprising skill. Truly, we will never forget our ride in the dugout on the Sangha River.

Our Impressions on the Return Home

During our drive back to Bangui, hundreds of sights and memories replay in our minds. Many things have profoundly moved us, while others have astounded us. In particular, we will never forget the harmony between the Pygmies and the forest or the wisdom that allows the Pygmies to benefit from all that is found in their natural habitat.

Moreover, even if we did not have enough time to see everything, we had the privilege of visiting a unique part of the world, where forest elephants, gorillas, chimpanzees, hippopotamuses, antelope, panthers, and multi-colored birds and butterflies can be found. We were told that the dense forests of the Dzanga-Sangha Reserve and the Dzanga-Ndoki National Park shelter some 7,000 species of plants and 55 species of mammals.

All this matchless biodiversity reminds us of a Bible verse: "How many your works are, O Jehovah! All of them in wisdom you have made. The earth is full of your productions." (Psalm 104:24) This unforgettable learning experience has fortified our determination to apply the following words found in the same psalm: "I will sing to Jehovah throughout my life; I will make melody to my God as long as I am. Let my musing about him be pleasurable. I, for my part, shall rejoice in Jehovah." —Psalm 104:33, 34.

Prague

Come Visit Our Historic Jewel

BY AWAKE! WRITER IN THE CZECH REPUBLIC

HOW would you like to visit a city with over a thousand years of history—a city whose architecture stretches from 10th-century Romanesque to Gothic, Renaissance, baroque, rococo, classical, neoclassic, and 20th-century Art Nouveau? Then come with us to Prague, a jewel of Central Europe. The Czech language is by no means easy; however, if you bring along a phonetic phrase book, it will be a great help. But first of all, where is Prague?

Take a look at a map of Europe. Find Berlin, the capital of Germany, over toward the east. Follow a straight line some 200 miles south, and the first major city you hit in the Czech Republic will be Prague, the capital. Farther south and east, you will see Vienna, Austria, and then Budapest, Hungary. All these cities are within a few hours of each other by car.

Prague straddles the Vltava River (Moldau in German). For purposes of our visit, we can divide cen-

tral Prague into five areas. (See the map on page 23.) The first area is on the west bank, high on a hill. Here you will see Prague Castle and Hradčany, the town that was founded on the outskirts of the castle about 1320. Inside the castle area is the huge Gothic St. Vitus' Cathedral, which was started in 1344 but not finished until 1929. It houses the crown jewels and the tomb of Prince Wenceslas. To get to the castle area, you can take public transportation or walk. It is a stiff climb, so be sure to wear comfortable walking shoes! While in the castle area, do not miss the unusual miniature houses and gift shops in Golden Lane (Czech, Zlatá Ulička). These were built in the late 1500's for members of the palace guard. Later, in the 17th century, they were occupied by goldsmiths. Thus, the name.

To the south of the castle area is the Little Quarter, Malá Strana. One guidebook states: "The quarter is rich in splendid Baroque palaces



and old houses with attractive signs." Prague is known as the City of a Hundred Spires, although there are many more, reminding us of a time when many of the Czech people were religiously inclined. Here in the Little Quarter, we find some of those churches, although poorly attended these days in the post-Communist era. One of the most famous is the Church of St. Nicholas. Its construction was started in 1703 and completed in 1761. It took so long that although the church was the work of father and son architects, neither lived long enough to see it finished.

Crossing the Vltava

There are at least seven bridges that cross the Vltava to the east side of Prague. The most famous is the Charles Bridge (Karlův Most), reserved for pedestrians. If you have not walked the length of this bridge, some 1,700 feet, you have not experienced Prague. Try it early in the morning and in the evening. The different light effects make it worth the effort.

The bridge connects the Little Quarter on the left bank with the Old Town on the eastern, right bank. The Charles Bridge is usually swarming with tourists, sidewalk entertainers, and vendors, all in an atmosphere of relaxed enjoyment. You will probably hear a very creditable Czech jazz group playing New Orleans favorites. They even sell compact discs and cassettes of their enthusiastic renditions. At other spots, you might find students trying to make a little money by selling exquisite porcelain miniatures of the most famous buildings in the Old Town Square. You can almost recreate the square, including the famous astronomical clock, in your curio cabinet at home!

But now pay attention to the dozens of statues of Catholic "saints" that line both



The Hebrew script includes the Tetragrammaton

sides of the bridge. So much of Czech religious history is summed up in these. Their dates of installment go from John Nepomuk (1683) all the way to Cyril and Methodius (1938). However, the most striking figure for many Bible students is that of the Christ, which dates from 1629. What is special about it?

It is encircled by gilded Hebrew script that includes the Tetragrammaton, four Hebrew letters. These represent the divine name, Jehovah, which appears nearly 7,000 times in the Hebrew Scriptures.

The Old Town Will Really Surprise You

Once you cross the Charles Bridge and pass under the Old Town Bridge Tower (look for the sculptured kingfisher on the eastern facade, Wenceslas' favorite personal symbol), you will be in the Old Town, where you will not be able to put your camera down! The area is an endless architectural feast for the eyes. If you go straight as you come off the bridge, you will find yourself on Charles Street (Karlova), which connects to a labyrinth of narrow, winding streets crowded with small shops and many customers. But look around at the different Renaissance and baroque styles.

As you wander and wonder at what you are seeing, you will suddenly come across the Old Town Square, and the first thing you might see is a crowd of people staring at a clock, especially if it is about to strike the hour. This is the Town Hall Clock, a fascinating astronomical clock. But don't expect astronomical accuracy. This clock was designed when people still believed that the earth was the center of the universe and that the sun and the stars revolved around it. Nevertheless, it is a mas-

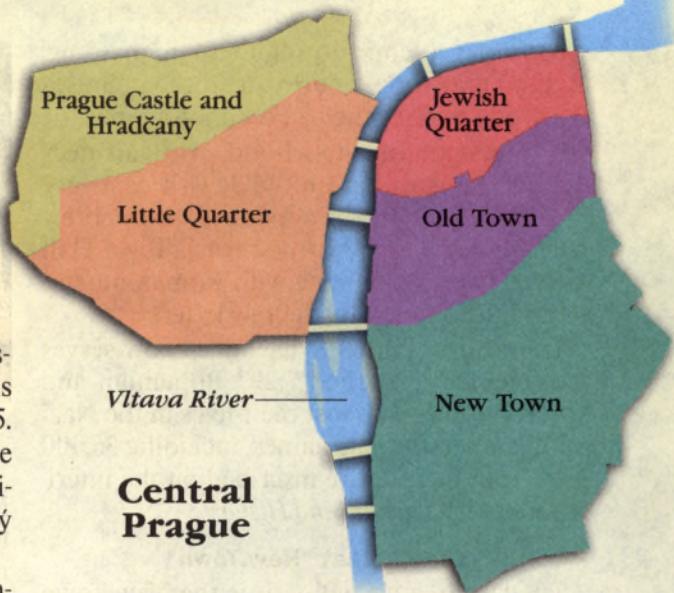
terpiece of clock making and engineering.*

—See the box on this page.

Now we advance into the Old Town Square, which is breathtaking because of its beautiful buildings and varied architecture. The square is so extensive that even crowds fail to diminish its size. There is a lot to see. Take your time, and consult your guidebook to know what you are looking at. That huge church in the distance with twin towers and many spires is called the Týn Church and dates from 1365. Space does not permit us to dwell on more of the magnificent buildings in this incredible square, such as the rococo Golz-Kinský Palace.

In the center of the square is a massive monument to the Czech religious reformer John Hus (1372-1415). Although a Catholic priest, he brought the ire of the hierarchy down on himself for daring to expose the corrupt morals of the clergy and for attacking the sale of indulgences. Even though promised safe-conduct if he attended the Council of Constance to explain his views, Hus was condemned as a heretic and burned at the stake.

* See *Awake!* of May 22, 2000, pages 16-18.



Central Prague

Prague's Jewish Past

The fourth area, not to be missed, is the Jewish Quarter, called Josefov in Czech. It was named after Joseph II in 1784, when discrimination against the Jews was softened. One of the highlights of this quarter is the Old-New Synagogue. It was built about 1270 and is the oldest synagogue in Europe that is still in use. It is also one of the earliest Gothic buildings to be found in Prague. You can enter the synagogue, and if you look carefully, you will find an example of the divine name in Hebrew

The Astronomical Clock

The clock has three sections. On the hour the two windows in the upper portion open, allowing you to see a procession of the 12 apostles. Interestingly, Judas Iscariot and James the son of Alphaeus have been replaced by Paul and Barnabas, who are not counted among the 12 apostles in the Bible. Just below the apostles is a skeleton, the symbol of Death. It starts the process as an introduction to the apostles. In its left hand, it raises an hourglass, which is then inverted. Other moving figures are a cock crowing, a Turk shaking his head, Vanity looking in a mirror, and Greed in the form of an avaricious moneylender.

Among other things, the astronomical clock indicates three kinds of time—old Bohemian time in Arabic numerals, our modern time in Roman numerals, and the 12-part division of daylight time according to the Babylonian system. Now you see why you need to spend time studying this ornate clock!



—but don't attempt to photograph anything. A guard may soon escort you off the premises if you do not obey the ban on photographs.

In the same neighborhood, you can peer through the gates at an old Jewish cemetery and see thousands of gravestones with Hebrew inscriptions. Nearby is the Jewish Town Hall with its two clocks—one with Roman numerals and the other with Hebrew letters.

The nearby Pinkas Synagogue "now serves as a memorial to the 77,297 Bohemian and Moravian Jews who lost their lives in the Nazi gas chambers." Their names, including 36,000 Jews from Prague, are inscribed on the interior or walls.—*Prague Art and History*.

The Ancient "New Town"

The last area we will visit is the New Town (Nové Město). Although called new, it was actually founded by Charles IV as a horse market in 1348. Its most famous landmark is Wenceslas Square, described as "the consumer centre of contemporary Prague." There are a few Art Nouveau facades, such as that of the beautiful Hotel Evropa, but the main point of interest is the equestrian statue of Wenceslas erected in 1912.

We cannot complete a visit to Prague without remembering its cultural heritage, especially in the field of music. So don't miss a visit to the National Theatre and the State Opera.

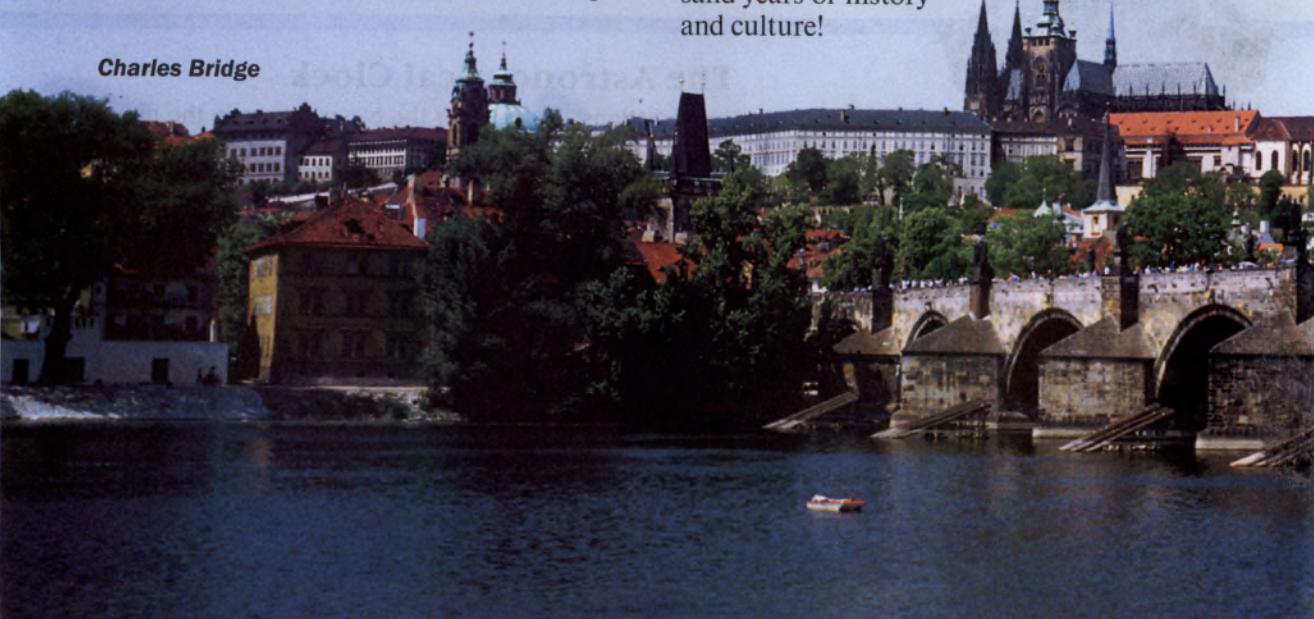


Art Nouveau palace with baroque features

Millions of classical music lovers have listened to the "New World Symphony," by Antonin Dvorak. You will find the Dvorak Museum housed in a red-and-ocher baroque villa. The acknowledged "father of Czech music" is Bedřich Smetana, "a composer with a genuine Czech heart," as Franz Liszt wrote. He is specially known for his cycle of symphonic poems called "Má Vlast" (My Homeland) and the section called Vltava, which is a musical description of the river that runs through Prague. The Smetana Museum is located on the waterfront in the Old Town.

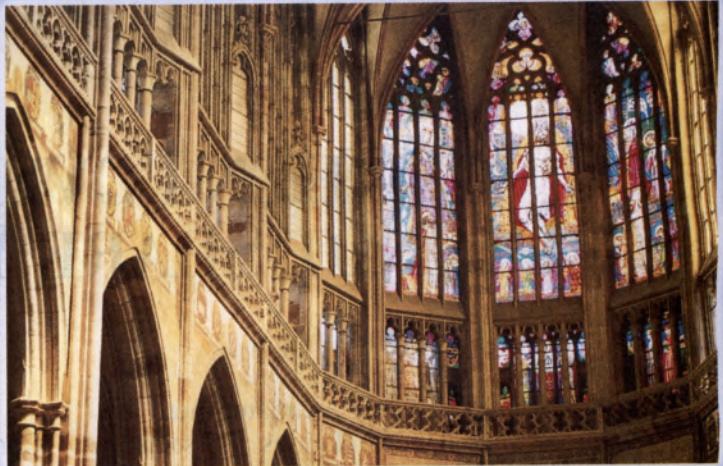
There is so much more to see and appreciate in Prague! You must see it for yourself. Come and experience a thousand years of history and culture!

Charles Bridge





**Old Town Hall clock tower
and St. Nicholas Church**



View inside St. Vitus' Cathedral



Wenceslas Square



WHEN LOVED ONES DO NOT SHARE YOUR FAITH

ACCORDING to one estimate, there are more than 10,000 religions and sects in the world. In one country about 16 percent of the adult population have at some point switched from one religion to another. It is no wonder, then, that there are disagreements about religious beliefs among relatives and friends. Sometimes this results in strained relationships. Thus the question, How should Christians treat loved ones who do not share their faith?

A Special Relationship

Consider, for instance, what the Bible says about the special relationship between parents and their children. No time limit is implied in the command at Exodus 20:12 to "honor your father and your mother." In fact, in Jesus' discussion of this command, recorded at Matthew 15:4-6, it is obvious that he was speaking of the honor that *adult* children would render to their parents.

The Bible book of Proverbs cautions

Keeping in touch with your loved ones will assure them of your affection



against showing disrespect toward one's parents. Proverbs 23:22 advises that you should "not despise your mother just because she has grown old." Pointedly, Proverbs 19:26 warns that one who "is maltreating a father [and] that chases a mother away is a son acting shamefully and disgracefully."

It is clear from the Scriptures that we should not neglect our parents. The fact that our parents do not accept our religion does not cancel our relationship with them. These Bible principles apply similarly to other blood relations and to one's marriage mate. Clearly, Christians remain morally and Scripturally obligated to love their relatives.

Reasonableness Is Vital

Of course, the Bible warns against bad association, and this influence could come from one's immediate relatives. (1 Corinthians 15:33) Many faithful servants of God in the past stood up for what is right even though their parents disagreed. This evidently was true of Korah's sons. (Numbers 16:32, 33; 26:10, 11) True Christians should not compromise their faith to please others, not even their relatives.—Acts 5:29.

In some situations parents or other loved ones vehemently fight against the beliefs of a Christian. Some may even become enemies of true Christianity. In such cases Christians take reasonable steps to protect their spirituality. Jesus aptly said: "A man's enemies will be persons of his own household. He that has greater affection for father or mother than for me is not worthy of me; and he that has greater affection for son or daughter than for me is not worthy of me."—Matthew 10:36, 37.

In most cases, however, Christians do not face severe opposition from their loved ones. Their relatives simply do not share the same understanding of Bible teachings. The Holy Scriptures encourage Christ's followers to treat unbelievers "with mildness" and "deep respect." (2 Timothy 2:25; 1 Peter 3:15) The Bible aptly counsels: "A slave of the Lord

does not need to fight, but needs to be gentle toward all." (2 Timothy 2:24) The apostle Paul also counseled Christians "to speak injuriously of no one, not to be belligerent, to be reasonable, exhibiting all mildness toward all men."—Titus 3:2.

Keep in Touch and Express Love

At 1 Peter 2:12, Christians are given this encouragement: "Maintain your conduct fine among the nations [unbelievers] that . . . they may as a result of your fine works of which they are eyewitnesses glorify God." Often, loved ones who do not share our beliefs see the changes that the Bible has made in our life. Remember that many who were indifferent or even opposed to Bible truth have changed their mind. It may have taken many years of closely observing the good conduct of a marriage mate or a child for some individuals to investigate the reason behind that conduct. When people do not accept Bible truths, let it not be because they were neglected by a Christian loved one.

Admittedly, circumstances vary, and some Christian Witnesses live far away from their parents. It may not be possible to visit as often as desired. But writing letters, calling on the telephone, or keeping in contact regularly in other ways will assure our loved ones of our affection. Many who are not true Christians love their parents and other relatives and communicate regularly with them regardless of their religious affiliation. Should Christian Witnesses do any less?

In Our Next Issue

- **Saving the Environment
—How Successful Have We Been?**
- **Living With Multiple Sclerosis**
- **When the River Ran Backward**

Watching the World

Heavy Drinking Takes Its Toll

Binge drinking among women and the young has led to a huge increase in alcohol-related deaths in Britain," reports London's newspaper *The Independent*. "Deaths due to excessive drinking have doubled in 20 years, mostly due to chronic liver disease and cirrhosis." And victims are getting younger. "A decade ago the peak age for deaths was in the early 70s for both men and women. Latest figures for 1998-2000 show the peak age has now dropped to the late fifties," states the report. But the effects of alcohol abuse are not limited to disease. In France "alcohol is apparently directly responsible for 10 to 20 percent of accidents at work," reports the newspaper *Le Monde*. Moreover, in France each year, 2,700 people are killed and 24,000 injured in drinking-related road accidents, and alcohol is involved in about 30 percent of acts of violence. Alcohol abuse also exacts an enormous financial toll. *Le Monde* notes that in France in 1996, misuse of alcohol resulted in an estimated financial loss equivalent to 17.6 billion euros (19.2 billion dollars).

Stress and Illness

"Stress at work and fatigue increase the chance of acute infections such as common colds, flu-like illnesses and gastroenteritis," according to a Dutch study of more than 8,000 employees, reported on by the Netherlands Organisation for Scientific Research. "The study revealed that employees in highly demanding jobs suffered from colds 20 percent more often

A Car That Runs on Waste

A farm owner in Finland now has a car that runs on the gas given off by decomposing waste. "The car is fueled by biogas, which is produced from wastes that are cleaned and pressurized in a biogas reactor located on the car owner's farm," reports the Finnish magazine *Suomen Luonto*. Biogas is the cleanest-burning vehicle fuel in use today, and since it can be produced during the recycling of garbage, it is very ecologically friendly. In fact, one of the by-products of biogas production is valuable agricultural fertilizer. Cars already designed to use natural gas—about two million worldwide—can also run on biogas. In Sweden many city buses are powered by biogas, and some gas stations there already offer biogas in addition to other fuels. The article notes a final advantage: "Biogas is much cheaper than gasoline or diesel fuel."



than employees in less demanding positions." Other factors found to contribute to a greater risk of infection included night work and insecurity resulting from company reorganization. "Employees working shifts have a higher chance of developing infections than daytime employees," states the report.

Children and Singing

Singing is "an important means of emotional expression that promotes children's personality development," writes Leipzig University ear, nose, and throat specialist Dr. Michael Fuchs in the German health magazine *Gesundheit*. However, Fuchs laments that "the vocal range of children

has clearly diminished over the past 20 years. The sound of their voices has also changed." Fuchs suggests two reasons. First, "children today sing less at home. While families in former times used to spend their leisure time singing and playing music, they now sit in front of the television together, and music is enjoyed only passively." Second, when they do sing, children tend to imitate the hoarse voices of rock and pop singers. "Children demand too much of their vocal organs when they try to imitate such stars," writes Fuchs. Doing so can make their larynx and neck muscles tense. The added strain can also cause nodules to appear on their vocal cords, further reducing voice quality.

Fireplace Safety

"A fire in a fireplace or a woodstove can be a source of indoor and outdoor pollution, as well as a potential fire hazard," points out the *UC Berkeley Wellness Letter*. To help people avoid fire dangers as well as health problems often associated with fireplace pollutants, the *Wellness Letter* offers these recommendations:

- "Keep the chimney in working order . . . , cleaned and repaired."
- "Consider installing a carbon monoxide detector . . . , especially if your home is tightly sealed."
- "Build small, hot fires rather than large smoky ones."
- "Use seasoned woods—woods stored and dried for at least six months. Hardwoods make better, longer-lasting fires."

● "Open a window a couple of inches to provide ventilation."

● "Make sure your woodstove is installed correctly, at least a yard away from combustible walls and furnishings." Use a "heat shield to protect the floor."

● "Don't burn treated lumber, plywood, particle board, painted or finished wood, colored paper, or plastic. These can create toxic fumes."

● "Always use a firescreen in front of an open fire."

Winter and Vitamin D

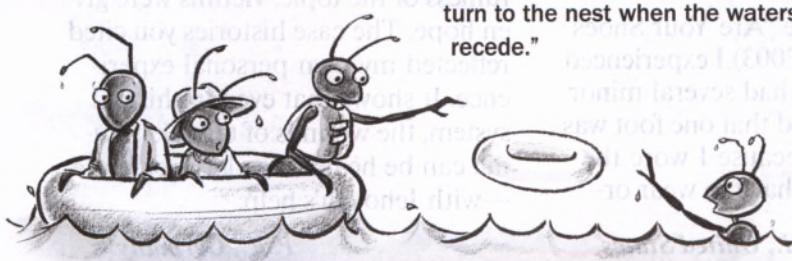
"Vitamin D is needed for absorption of calcium so that the mineral can take its place in bone and shore up the skeleton against fractures," explains the *Tufts University Health & Nutri-*

tion Letter. "Generally speaking, 90 percent of our vitamin D is made in our skin upon exposure to sunlight. But during the winter months, the sun's rays are not strong enough to initiate vitamin D synthesis in northern climes. Worse still, hardly anyone middle-aged or older takes in the 10 percent of our vitamin D that the diet is supposed to provide." The U.S. National Institutes of Health therefore recommends that during the winter in the northern latitudes, people over 50 in particular should increase their intake of vitamin D by eating foods such as fatty fish and taking cod-liver oil or by taking vitamin D supplements, though not to exceed 2,000 international units, 50 micrograms, per day.

How Ants Survive Floods

What do ants do when it rains? Though not all ant species live underground, some that do employ remarkable flood-survival techniques, says *The New York Times*. Certain tropical forest ants "react to as little as a single drop [of water] placed in the nest entrance by making alarm runs through the nest, which often end at alternate entrances," explain ant specialists Dr. Edward O. Wilson and Bert Holldobler. "They use odor trails to lead nest mates into the unobstructed entrance galleries and sometimes out of the nest altogether." In no more than 30 seconds, they are able to mobilize most of the colony. And in the southwestern United States and northern South America, reports *The Times*, certain fire ants "move up through the nests to ground level, form large masses that include adults, the queen and her brood, and float on the rising waters. Many survive . . . The raft eventually anchors itself on grass or bushes, and the survivors may re-

turn to the nest when the waters recede."



South Africa's Juvenile Booze

"South Africa could be producing a nation of drunks, as children are beginning to abuse alcohol from a very early age," warns *The Star* newspaper of Johannesburg. Children as young as nine are said to arrive at some schools with severe hangovers, and the abuse keeps escalating. Why such a drinking problem? Police cite "advertising campaigns [that] present a lifestyle that is attractive to teenagers." Other reasons given by the paper are the accessibility of alcohol, its social acceptance, parental permissiveness, and the freedom and money that children now have. "There's also a lack of parental control and of respect for authority—basically a total collapse of the social structure," says one clinical psychologist.

From Our Readers

Amazing Senses I am 15 years old and have been reading your magazines since I learned to read. Thank you for the series "Life's Amazing Senses—Do You Appreciate Them?" (March 8, 2003) The articles were fascinating. Thank you for the hard work and research you put into every issue of *Awake!* I can't wait to read the next one!

H. S., United States

This series really opened my eyes to how complicated we are. I was amazed to find that the human fingertip can detect a dot just three microns high! Jehovah must really care about his creation to have put so much thought into such a small thing.

E. R., Australia

Spanish Martyr Heartfelt thanks for the article "A Man Who Chose to Obey God." (March 8, 2003) I was moved upon reading how Antonio Gargallo, just 19 years old and recently baptized as a Christian, maintained his integrity when he suddenly had to make such a serious decision. It conveyed to me how much strength and inner peace Jehovah can give us if we are determined to do his will.

M. T., Italy

Thank you very much for this short but powerful experience. Tears ran down my cheeks as I read it. I was especially touched by the letter Antonio Gargallo wrote to his mother and sister before his execution. Please continue to write about Christians who have maintained their integrity to Jehovah in the face of death so that we can have our own faith strengthened.

R. O., Nigeria

Shoes Thank you for the article "Are Your Shoes Really Comfortable?" (March 8, 2003) I experienced years of foot problems and have had several minor toe operations. I finally discovered that one foot was slightly bigger than the other. Because I wore the wrong shoe size for years, I now have to wear orthopedic shoes.

R. G., United States

It was a very good article. However, you did not mention that the best time of the day to buy shoes is usually in the late afternoon, when the feet are more likely to be swollen.

A. W., Canada

"Awake!" responds: Thanks for your observation. Please see the "Watching the World" item "Health Problems Linked to Shoes," which appeared in our issue of August 8, 1999.

Cheating I wish to express my appreciation for the article "Young People Ask . . . What's Wrong With Cheating?" (January 22, 2003) I am a university student and have had the habit of cheating since I was in the fifth grade. I always questioned whether cheating was right, but I couldn't find an answer. This article is thus a real treasure. I'm changing my ways starting with my next test, for which I am now studying.

S. Y., Ukraine

Child Prostitution Thank you for the series "Child Prostitution—A Tragic Reality." (February 8, 2003) What particularly touched my heart was the fact that in spite of the painfulness of the topic, victims were given hope. The case histories you cited reflected my own personal experience. It shows that even in this old system, the wounds of terrible trauma can be healed to a large extent—with Jehovah's help.

P. R., Germany

A Golden Gift

FROM THE
Far North

BY AWAKE! WRITER IN SWEDEN

'What shall we take along as a gift that is typical of our country?' my wife and I wondered before leaving Sweden to visit some friends in England. Wanting to make our gift of homemade Nordic cloudberry jam educational, we composed an informative label based mainly on our own observations and some local references. The following is the result of our research.

What Are CloudbERRIES?

The cloudberry, *Rubus Chamaemorus* in Latin, grows on plants less than 12 inches in height. Each plant produces only one white flower and one berry. When unripe, the berry is red and hard, but as it matures, it turns golden-yellow or amber and becomes soft and juicy. Its name, cloudberry, is possibly derived from the fact that in northern England cloudbERRIES grow on mountains at low cloud levels. You will also find them in moist areas, mainly in the tundra and the swamps throughout the southern Arctic. In Sweden they usually ripen in August, when the Nordic autumn closes in.

The Gold of the Swamps

For centuries the native Lapp people have gathered cloudbERRIES for winter food. They are rich in vitamin C and other vitamins, and since they contain a natural preservative, cloudberry jam will stay fresh for years if kept cool. Since early settlers in these northern regions lived mainly on meat and fish, cloudbERRIES became an important vitamin complement. No wonder they have been called the gold of the swamps!

Nowadays, great quantities of cloudbERRIES are gathered for delivery to supermarkets and industry. In Sweden, for example, during a normal year, the market may handle over a thousand tons of cloudbERRIES—all handpicked! Diligent cloudberry



pickers, often schoolchildren on vacation, may make some very welcome pocket money in this way. The Finns have even honored the cloudberry by embossing it on their new two-euro coin!

A Palatable Experience

The cloudberry has a fresh, sweet-sourish taste. You may find cloudberry jam or preserves and even cloudberry-flavored liqueurs in delicatessens or other stores in major cities in Europe and the United States. Cloudberry ice cream parfait has often been on the dessert menu at the annual gala dinner for Nobel Prize winners, held in Stockholm, Sweden. Exclusive restaurants may serve the jam hot with vanilla ice cream. Additionally, the jam goes perfectly well with Swedish cheese-cake or fried Camembert cheese and is also a delicious tart filling. Golden cloudberry liqueur is produced in Finland, and cloudberry wine has recently been introduced to the wine market in Sweden.

If you ever happen to be where cloudbERRIES are growing, pick them and enjoy tasting them fresh, preferably dotted with castor sugar, with a big dollop of whipped cream on top. You will find them worth their weight in gold—and you may feel moved to thank your Creator for this delicious gift.

'A MAGAZINE TO BE DIGESTED'

DAVID is a law student at the Obafemi Awolowo University in Nigeria. Recently, he wrote to the local branch office of Jehovah's Witnesses: "I regularly deliver Awake! to a distinguished 70-year-old professor of jurisprudence on the faculty. One morning, after receiving the current issues, he said to a visitor in his office: 'Some books are to be tasted, others to be swallowed, and some few to be chewed and digested. Awake! is a magazine to be chewed and digested.'"

On another occasion, after leaving the professor's office, David said that he overheard him recommending Awake! to another visitor. "He spoke highly of the depth of research that goes into the preparation of Awake! and of its balanced yet bold approach to issues. I heard him say: 'I read the magazines very carefully. God must be the one who gives the writers the wisdom to write such marvelous articles.'"

